

8.2. Tables of Engine Test Results

Fuel	Load (nominal)	Speed rpm	Timing deg. BDC	Test ID
DIST 100	FULL	ALL	20	UNIDO_0
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
E20	FULL	ALL	"	UNIDO_1
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
E20/2.6TEGDN	FULL	ALL	"	UNIDO_2
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
E20/5.2TEGDN	FULL	ALL	"	UNIDO_4
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
E20/0.2ION	FULL	ALL	"	UNIDO_5
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
E20/0.4ION	FULL	ALL	"	UNIDO_6
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
DIST 100	FULL	ALL	"	UNIDO10
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
"	FULL	ALL	26	UNIDO11
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
"	FULL	ALL	14	UNIDO12
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"

Fuel	Load (nominal)	Speed rpm	Timing deg. BDTC	Test ID
E20/3.9TEGDN	FULL	ALL	14	UNIDO13
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
"	FULL	ALL	20	UNIDO14
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
"	FULL	ALL	26	UNIDO15
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
DIST 100	FULL	ALL	18	UNIDO16
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"
E25/3.9TEGDN	FULL	ALL	"	UNIDO17
"	2/3	"	"	"
"	1/3	"	"	"
"	IDLE	800	"	"

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ENGINE TEST RESULTS

DATE : 22/5/85  
TEST ID : UNID0.0

FUEL  
DISTILLATE : WTSY 100  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE  
MAKE : FORD  
MODEL : 3000  
No. CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

	ENGINE SPEED (NOMINAL)		100 % LOAD (Nominal)		20 deg BTDC	
	2000	1700	1400	1100	800	
Observed load	N	17.48	18.28	18.47	18.46	
Observed torque	NM	133.3	146.3	147.9	146.4	147.8
Observed speed	RPM	2010	1744	1453	1149	843
Observed power	KW	29.4	26.7	22.5	17.6	13.1
Air temperature	deg C	31.0	31.0	31.0	31.0	31.0
Barometric pressure	mBar	1020.5	1020.5	1020.3	1020.3	1020.3
Correction factor		0.993	0.993	0.994	0.994	0.994
Corrected torque	NM	139.0	145.4	146.9	145.4	146.8
Corrected power	KW	29.3	26.5	22.3	17.5	13.0
Fuel consumed	gms	79.7	84.3	87.1	89.2	88.3
Measurement time	seconds	30.390	34.790	41.590	52.590	71.580
Fuel mass flow	gms/sec	2.62	2.42	2.09	1.70	1.23
B.S.F.C.	gms/KWhr	322.7	328.6	337.3	348.9	342.5
Thermal efficiency	%	26.1	25.6	25.0	24.1	24.6
Fuel temperature	deg C	42.0	42.0	42.0	42.0	42.0
Pump delivery/stroke	mm <sup>3</sup>	63.3	67.4	69.9	71.6	70.9
	mm <sup>3</sup>	52.2	55.6	57.7	59.1	58.5
Start of injection	deg	max : 20.3	21.9	22.8	22.7	16.4
	min :	20.1	21.1	22.6	21.8	15.7
	mean :	20.2	21.4	22.7	22.1	16.2
Start of combustion	deg	max : 9.3	11.8	12.7	13.7	10.3
	min :	9.1	10.8	12.6	13.6	10.0
	mean :	9.1	11.1	12.6	13.6	10.1
Ignition delay	deg	max : 11.2	11.0	10.2	9.0	6.2
	min :	11.0	10.0	10.0	8.2	5.7
	mean :	11.1	10.3	10.1	8.4	6.1
Ignition delay	ms	max : 0.931	1.055	1.165	1.312	1.234
	min :	0.913	0.960	1.147	1.189	1.122
	mean :	0.922	0.989	1.154	1.225	1.202
Max. cylinder pressure	bar	90.5	95.1	96.2	95.2	89.0
Max. pressure rise	bar/deg	14.8	15.9	15.1	13.2	9.6
	bar/ms	178.6	166.3	131.3	91.3	49.4
Oil temperature	deg C	93.0	94.0	95.0	96.0	91.0
Water IN temperature	deg C	49.0	67.0	68.0	69.0	64.0
Water OUT temperature	deg C	82.0	82.0	81.0	83.0	82.0
Exhaust temperature	deg C	377.0	415.0	397.0	359.0	321.0

ENGINE TEST RESULTS

DATE : 22/5/85  
TEST ID : UNID01\_0

FUEL  
DISTILLATE : DIST 100  
DENSITY Kg/l : 0.843  
CAL VALUE MJ/Kg : 42.75

ENGINE  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR 35.61

	ENGINE SPEED (NOMINAL)			
	2000	1700	1400	1100
Observed load	N : 11.06	10.85	11.08	11.20
Observed torque	NM : 88.6	86.9	89.7	89.4
Observed speed	RPM : 2029	1754	1459	1138
Observed power	KW : 18.8	16.0	13.6	10.7
Air temperature	deg C : 31.0	31.0	31.0	31.0
Barometric pressure	mBar : 1020.3	1020.3	1020.3	1020.1
Correction factor	0.994	0.994	0.994	0.994
Corrected torque	NM : 88.0	86.3	89.2	88.8
Corrected power	KW : 18.7	15.8	13.5	10.6
Fuel consumed	gms : 46.8	44.8	45.0	45.4
Measurement time	seconds : 29.990	34.590	41.530	53.190
Fuel mass flow	gms/sec : 1.55	1.30	1.08	0.87
B.S.F.C.	gms/KW/hr : 299.2	294.2	289.2	296.0
Thermal efficiency	% : 28.1	28.6	29.1	28.9
Fuel temperature	deg C : 41.0	42.0	42.0	42.0
Pump delivery/stroke	mm <sup>3</sup> : 37.1	35.8	36.0	36.5
	mgms : 30.6	29.5	29.7	30.7
Start of injection	deg. max : 15.8	16.6	17.5	19.1
	min : 15.5	16.5	17.3	18.3
mean : 15.7	16.5	17.4	19.0	16.3
Start of combustion	deg. max : 5.5	6.6	9.0	10.1
	min : 4.6	6.4	8.3	10.9
mean : 5.1	6.5	8.5	11.0	10.1
Ignition delay	deg max : 11.2	10.2	9.1	8.3
	min : 10.2	10.0	8.3	7.6
mean : 10.6	10.0	8.9	8.0	6.2
Ignition delay	ms max : 0.920	0.865	1.044	1.300
	min : 0.836	0.846	0.953	1.107
mean : 0.867	0.851	1.022	1.165	1.287
Max. cylinder pressure	bar : 70.4	73.5	75.4	73.4
Max. pressure rise	bar/deg : 10.3	10.3	10.5	9.1
	bar/ms : 125.6	109.7	92.0	44.3
Oil temperature	deg C : 95.0	95.0	92.0	89.0
Water IN temperature	deg C : 55.0	50.0	48.0	56.0
Water OUT temperature	deg C : 73.0	77.0	77.0	81.0
Exhaust temperature	deg C : 285.0	249.0	233.0	198.0

ENGINE TEST RESULTS

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DATE : 22/5/85  
TEST ID : UNIDO\_0

FUEL  
DISTILLATE : DIST 100  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE :  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DVNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL) 2000 1700 1400 1100 800

33 % LOAD (Nominal) 20 deg BTDC

	2000	1700	1400	1100	800
Observed load	N : 4.57	4.41	4.64	4.67	4.68
Observed torque	NM : 38.6	35.3	37.1	37.4	37.4
Observed speed	RPM : 2034	1732	1452	1148	818
Observed power	KW : 7.8	6.4	5.6	4.5	3.2
Air temperature	deg C : 32.0	31.0	31.0	29.0	31.0
Barometric pressure	mBar : 1020.1	1020.1	1020.0	1019.9	1019.9
Correction factor	: 0.995	0.994	0.994	0.991	0.994
Corrected torque	NM : 36.5	35.1	36.3	37.1	37.2
Corrected power	KW : 7.3	6.4	5.6	4.5	3.2
Fuel consumed	gms : 29.1	27.4	26.6	26.7	29.7
Measurement time	seconds : 29.790	34.990	41.790	52.620	73.820
Fuel mass flow	gms/sec : 0.98	0.78	0.64	0.51	0.40
B.S.F.C.	gms/KM/hr : 452.8	442.6	408.7	410.0	454.5
Thermal efficiency	% : 18.6	19.0	20.6	20.5	18.5
Fuel temperature	deg C : 42.0	42.0	41.0	41.0	41.0
Pump delivery/stroke	mm+3 : 23.3	21.9	21.2	21.4	23.8
	mgms : 19.2	18.1	17.5	17.7	19.7
Start of injection	deg. max : 13.9	12.2	14.7	17.4	15.4
	min : 13.1	12.0	14.7	16.6	14.7
	mean : 13.3	12.1	14.7	17.0	15.0
Start of combustion	deg. max : 2.1	2.8	5.6	9.2	6.5
	min : 1.7	2.2	5.3	8.3	8.3
	mean : 1.9	2.5	5.6	8.9	8.4
Ignition delay	deg max : 11.8	10.1	9.2	8.3	7.1
	min : 11.2	9.3	9.1	7.6	6.4
	mean : 11.4	9.6	9.2	8.1	6.7
Ignition delay	ms max : 0.968	0.970	1.056	1.209	1.440
	min : 0.917	0.890	1.045	1.105	1.298
	mean : 0.935	0.928	1.051	1.174	1.358
Max. cylinder pressure	bar : 59.0	58.2	61.4	65.1	64.5
Max. pressure rise	bar/deg : 6.2	6.1	7.5	9.1	8.2
	bar/ms : 75.5	63.5	64.9	62.6	40.5
Oil temperature	deg C : 89.0	89.0	86.0	87.0	82.0
Water IN temperature	deg C : 51.0	50.0	52.0	51.0	52.0
Water OUT temperature	deg C : 78.0	78.0	78.0	86.0	75.0
Exhaust temperature	deg C : 197.0	173.0	154.0	144.0	140.0

ENGINE TEST RESULTS

DATE : 22/5/85  
TEST ID : UNID0.0

FUEL  
DISTILLATE :  
DENSITY kg/l : 0.843  
CAL VALUE MJ/kg : 42.75

ENGINE MAKE : FORD  
MODEL : 3000  
NO CYL : 3  
CAPACITY cc : 2960

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL) 800 IDLE CONDITION 20 deg BTDC

Observed load N : 0.32  
Observed torque NM : 2.5  
Observed speed RPM : 820  
Observed power KW : .2  
Air temperature deg C : 28.0  
Barometric pressure mBar : 1019.9  
Correction factor : 0.989  
Corrected torque NM : 2.5  
Corrected power KW : .2

Fuel consumed gms : 14.7  
Measurement time seconds : 73.570  
Fuel mass flow gms/sec : 0.20  
B.S.F.C. gms/KW/hr : 3348.5  
Thermal efficiency % : 2.3  
Fuel temperature deg C : 40.0  
Pump delivery/stroke mm<sup>3</sup> : 11.8  
mgms : 3.7

Start of injection deg. max : 15.4  
min : 13.8  
mean : 14.6  
Start of combustion deg. max : 9.2  
min : 7.3  
mean : 7.8

Ignition delay deg max : 7.2  
min : 6.5  
mean : 6.8  
Ignition delay ms max : 1.469  
min : 1.317  
mean : 1.379

Max. cylinder pressure bar : 55.9  
Max. pressure rise bar/deg : 7.0  
bar/ms : 34.7

Oil temperature deg C : 78.0  
Water IN temperature deg C : 54.0  
Water OUT temperature deg C : 73.0  
Exhaust temperature deg C : 94.0

ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2860

FUEL  
 EMULSION : E20  
 DENSITY Kg/l : 0.845  
 CAL VALUE MJ/Kg : 38.83

DATE : 22/5/95  
 TEST ID : UNID0\_1

BYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
100 % LOAD (Nominal)	100	100	100	100	100
20 deg BTDC					
Observed load	N : 17.05	18.09	18.52	18.25	18.28
Observed torque	NM : 136.5	144.9	149.3	146.1	146.4
Observed speed	RPM : 2011	1742	1450	1153	849
Observed power	KW : 28.7	26.4	22.9	17.6	13.0
Air temperature	deg C : 31.0	34.0	32.0	32.0	31.0
Barometric pressure	mBar : 1019.8	1019.8	1019.8	1019.8	1019.8
Correction factor	0.994	0.999	0.996	0.996	0.994
Corrected torque	NM : 135.7	144.6	147.6	145.4	145.5
Corrected power	KW : 28.6	26.4	22.4	17.6	12.9
Fuel consumed	gms : 79.0	83.4	87.4	89.3	86.3
Measurement time	seconds : 30.400	34.790	41.790	52.530	71.180
Fuel mass flow	gms/sec : 2.60	2.40	2.09	1.70	1.21
B.S.F.C.	gms/KWhr : 327.5	327.2	335.9	349.0	337.5
Thermal efficiency	% : 28.3	28.3	27.6	26.6	27.5
Fuel temperature	deg C : 37.0	37.0	37.0	38.0	40.0
Pump delivery/stroke	mm+3 : 62.6	66.7	69.9	71.4	69.5
mgms :	51.7	55.0	57.7	58.9	57.1
Start of injection	deg. max : 20.1	22.0	22.7	23.6	19.1
min :	20.0	21.1	21.9	22.8	17.4
mean :	20.0	21.6	22.4	23.3	17.8
Start of combustion	deg. max : 7.3	9.2	10.9	12.0	10.1
min :	7.2	9.0	10.1	11.8	10.0
mean :	7.3	9.1	10.7	11.9	10.1
Ignition delay	deg max : 12.8	12.9	11.9	11.8	8.1
min :	12.7	12.0	11.1	10.9	7.2
mean :	12.8	12.5	11.6	11.4	7.7
Ignition delay	ms max : 1.060	1.233	1.361	1.701	1.584
min :	1.052	1.149	1.275	1.575	1.418
mean :	1.057	1.157	1.337	1.645	1.520
Max. cylinder pressure	bar : 92.7	95.5	97.1	96.4	89.8
Max. pressure rise	bar/deg : 19.5	19.3	22.2	19.6	13.4
bar/ms :	235.0	202.1	192.9	135.5	68.4
Oil temperature	deg C : 81.0	87.0	91.0	89.0	86.0
Water IN temperature	deg C : 49.0	65.0	69.0	65.0	60.0
Water OUT temperature	deg C : 81.0	91.0	82.0	91.0	81.0
Exhaust temperature	deg C : 356.0	373.0	371.0	347.0	312.0

ENGINE TEST RESULTS

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DATE : 22/5/85  
TEST ID : UNIDO\_1

FUEL  
EMULSION : E20  
DENSITY kg/l : 0.845  
CAL VALUE MJ/kg : 38.83

ENGINE MAKE : FORD  
MODEL : 3000  
No. CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	500
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	500
	67 % LOAD (Nominal) 20 deg BTDC				
Observed load	N : 11.09	11.07	11.07	11.16	11.54
Observed torque	NM : 89.8	88.7	89.6	89.1	92.4
Observed speed	RPM : 2042	1754	1444	1182	825
Observed power	KW : 19.0	16.3	13.4	10.6	9.0
Air temperature	deg C : 31.0	32.0	32.0	31.0	29.0
Barometric pressure	mBar : 1019.8	1019.8	1019.8	1019.8	1019.8
Correction factor	0.994	0.996	0.996	0.994	0.991
Corrected torque	NM : 89.2	88.3	88.3	88.5	91.5
Corrected power	KW : 18.9	16.2	13.3	10.5	7.9
Fuel consumed	gms : 51.4	49.6	49.3	51.3	50.9
Measurement time	seconds : 29.790	34.590	42.000	53.390	73.180
Fuel mass flow	gms/sec : 1.73	1.43	1.17	0.96	0.69
B.S.F.C.	gms/KWhr : 329.2	318.5	316.6	329.7	316.0
Thermal efficiency	% : 28.2	29.1	29.3	28.1	29.3
Fuel temperature	deg C : 38.0	42.0	42.0	41.0	40.0
Pump delivery/stroke	mm <sup>3</sup> : 41.0	39.8	39.6	41.3	40.3
	mgms : 33.8	32.7	32.5	34.0	33.7
Start of injection	deg. max : 15.8	17.2	19.3	20.0	19.1
	min : 15.5	16.6	17.3	19.0	17.4
	mean : 15.6	17.0	17.7	19.3	17.7
Start of combustion	deg. max : 2.8	5.5	7.3	10.1	10.1
	min : 2.7	4.6	7.3	9.1	10.0
	mean : 2.8	5.0	7.3	9.5	10.0
Ignition delay	deg max : 13.0	12.3	11.0	10.1	9.0
	min : 12.7	11.7	10.1	9.1	7.4
	mean : 12.8	12.0	10.4	9.3	7.6
Ignition delay	ms max : 1.057	1.169	1.266	1.485	1.621
	min : 1.032	1.110	1.161	1.338	1.489
	mean : 1.042	1.138	1.206	1.445	1.542
Max. cylinder pressure	bar : 73.1	78.3	78.8	81.2	77.9
Max. pressure rise	bar/deg : 10.6	14.4	13.7	16.2	12.0
	bar/ms : 129.9	151.6	119.0	109.9	59.3
Oil temperature	deg C : 91.0	93.0	91.0	91.0	86.0
Water IN temperature	deg C : 55.0	51.0	52.0	53.0	56.0
Water OUT temperature	deg C : 78.0	78.0	78.0	79.0	80.0
Exhaust temperature	deg C : 279.0	242.0	230.0	216.0	199.0



ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2860

FUEL EMULSION : E20  
 DENSITY Kg/l : 0.845  
 CAL VALUE Kj/Kg : 38.83

DATE : 22/5/85  
 TEST ID : UNID001

DYNO TORQUE FACTOR : 35.61

	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	1700	1400	1100	800
30 R LOAD (Nominal)	20 deg BTDC			
Observed load	N : 4.41	4.27	4.50	4.78
Observed torque	NM : 35.0	38.5	36.7	38.1
Observed speed	RPM : 2029	1436	1145	825
Observed power	KW : 7.5	5.8	4.4	3.3
Air temperature	deg C : 29.0	29.0	29.0	28.0
Barometric pressure	mBar : 1020.0	1020.0	1020.0	1020.0
Correction factor	0.950	0.950	0.950	0.989
Corrected torque	NM : 35.0	38.2	36.3	37.7
Corrected power	KW : 7.4	5.7	4.4	3.3
Fuel consumed	gms : 31.3	29.4	29.3	33.1
Measurement time	seconds : 29.990	35.990	52.990	73.190
Fuel mass flow	gms/sec : 1.04	0.84	0.55	0.45
D.S.F.C.	gms/KW/hr : 508.0	473.4	457.0	439.9
Thermal efficiency	% : 18.3	19.3	20.3	19.5
Fuel temperature	deg C : 36.0	35.0	37.0	35.0
Pump delivery/stroke	mm <sup>3</sup> : 24.9	23.4	23.4	26.5
	mgms : 20.6	19.3	19.3	21.9
Start of injection	deg. max : 13.8	13.1	16.4	19.1
	min : 13.2	12.0	17.3	18.1
mean	13.6	12.2	17.7	19.3
Start of combustion	deg. max : -1.5	1.2	8.3	10.1
	min : -1.7	1.0	8.2	10.0
mean	-1.6	1.1	8.3	10.1
Ignition delay	deg max : 14.4	11.9	10.1	9.1
	min : 13.7	10.7	9.0	8.0
mean	14.1	11.2	9.4	8.4
Ignition delay	ms max : 1.183	1.151	1.472	1.842
	min : 1.130	1.033	1.317	1.610
mean	1.161	1.076	1.374	1.705
Max. cylinder pressure	bar : 61.5	61.4	67.2	67.0
Max. pressure rise	bar/deg : 7.6	8.3	11.4	10.8
	bar/ms : 91.9	96.1	78.3	53.2
Oil temperature	deg C : 80.0	80.0	80.0	79.0
Water IN temperature	deg C : 45.0	53.0	50.0	61.0
Water OUT temperature	deg C : 78.0	78.0	83.0	66.0
Exhaust temperature	deg C : 176.0	163.0	142.0	135.0

DATE : 22/5/85  
TEST ID : UNIDO...1

ENGINE TEST RESULTS

EMULSION : E20  
DENSITY Kg/l : 0.845  
CAL VALUE MJ/Kg : 38.83

ENGINE : FORD  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY CC : 2960

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL) 3000

IMLE CONDITION 20 deg BTDC

Observed load N : 0.32  
Observed torque NM : 2.6  
Observed speed RPM : 832  
Observed power KW : .2

Air temperature deg C : 23.0  
Barometric pressure mBar : 1020.0  
Correction factor 0.990  
Corrected torque NM : 2.6  
Corrected power KW : .2

Fuel consumed gms : 15.9  
Measurement time seconds : 72.610  
Fuel mass flow gms/sec : 0.22  
B.S.F.C. gms/KW/hr : 353.2  
Thermal efficiency % : 2.6  
Fuel temperature deg C : 35.0  
Pump delivery/stroke mm<sup>3</sup> : 12.7  
mgms : 10.5

Start of injection deg. max : 18.6  
min : 15.6  
mean : 16.3

Start of combustion deg. max : 8.4  
min : 7.3  
mean : 8.0

Ignition delay deg max : 9.7  
min : 8.0  
mean : 8.3

Ignition delay ms max : 1.748  
min : 1.600  
mean : 1.656

Max. cylinder pressure bar : 52.6  
Max. pressure rise bar/deg : 5.4  
bar/ms : 27.2

Oil temperature deg C : 79.0  
Water IN temperature deg C : 51.0  
Water OUT temperature deg C : 74.0  
Exhaust temperature deg C : 94.0

ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2360

FUEL EMULSION : E20/2.6TESIM  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 38.69

DATE : 22/5/95  
 TEST ID : UNINDO\_2

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	100 % LOAD (Nominal) 20 deg BTDC				
Observed load	N : 16.60	19.01	19.03	18.15	18.16
Observed torque	NM : 132.9	144.2	144.4	145.3	145.4
Observed speed	RPM : 2056	1752	1495	1144	836
Observed power	KW : 28.6	26.4	21.6	17.4	12.7
Air temperature	deg C : 28.0	34.0	29.0	32.0	31.0
Barometric pressure	mBar : 1020.4	1020.5	1020.5	1020.5	1020.5
Correction factor		0.989	0.988	0.985	0.983
Corrected torque	NM : 131.4	143.9	143.0	144.6	144.4
Corrected power	KW : 28.3	26.4	21.6	17.3	12.6
Fuel consumed	gms : 79.2	83.5	89.3	99.9	99.1
Measurement time	seconds : 29.590	34.590	41.990	52.590	72.180
Fuel mass flow	gms/sec : 2.63	2.41	2.10	1.70	1.22
B.S.F.C.	gms/KWhr : 840.6	829.1	850.0	852.8	847.4
Thermal efficiency	% : 27.3	28.3	26.6	26.4	26.8
Fuel temperature	deg C : 34.0	36.0	36.0	39.0	39.0
Pump delivery/stroke	mm³ : 62.7	66.5	70.2	71.9	70.6
	mgms : 52.1	55.1	58.2	59.3	58.4
Start of injection	deg. max : 20.0	21.7	22.8	23.6	19.2
	min : 20.1	21.1	21.9	22.7	18.1
mean :	20.2	21.2	22.4	23.0	18.1
Start of combustion	deg. max : 8.3	11.0	12.9	13.8	11.9
	min : 8.2	10.8	11.8	13.6	11.0
mean :	8.2	10.9	12.4	13.7	11.5
Ignition delay	deg max : 12.0	10.8	10.9	10.0	7.1
	min : 11.9	10.1	9.1	9.0	6.2
mean :	11.9	10.3	10.0	9.3	6.6
Ignition delay	ms max : 0.975	1.031	1.050	1.416	1.416
	min : 0.963	0.962	1.050	1.236	1.236
mean :	0.969	0.983	1.153	1.355	1.311
Max. cylinder pressure	bar : 89.6	93.7	95.5	95.6	89.3
Max. pressure rise	bar/deg : 16.4	17.5	17.8	15.0	10.2
	bar/ms : 202.7	183.9	154.1	103.0	51.3
Oil temperature	deg C : 84.0	88.0	89.0	89.0	89.0
Water IN temperature	deg C : 48.0	63.0	63.0	63.0	62.0
Water OUT temperature	deg C : 79.0	80.0	79.0	80.0	80.0
Exhaust temperature	deg C : 364.0	377.0	375.0	348.0	314.0

ENGINE TEST RESULTS

DATE : 22/5/85  
TEST ID : UNID00\_2

EMULSION : E20/2.6TEBDM  
DENSITY Kg/l : 0.848  
CAL VALUE MJ/Kg : 38.69

ENGINE : FORD  
MAKE : FORD  
MODEL : 3000  
No. CYL : 3  
CAPACITY cc : 2850

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	N : 11.06	11.20	10.93	11.41	11.22
Observed torque	NM : 88.6	89.6	87.5	91.4	89.8
Observed speed	RPM : 2064	1734	1443	1139	823
Observed power	KW : 19.1	16.3	13.2	10.9	7.7
Air temperature	deg C : 30.0	31.0	30.0	30.0	30.0
Barometric pressure	mBar : 1020.5	1020.5	1020.5	1020.5	1020.5
Correction factor	0.992	0.993	0.992	0.992	0.992
Corrected torque	NM : 87.8	89.1	86.8	90.6	89.1
Corrected power	KW : 19.0	16.2	13.1	10.8	7.7
Fuel consumed	gms : 50.5	49.0	47.9	51.4	54.9
Measurement time	seconds : 29.990	34.990	41.990	53.120	73.380
Fuel mass flow	gms/sec : 1.71	1.40	1.14	0.97	0.75
B.S.F.C.	gms/KW/hr : 323.6	313.8	313.1	321.8	350.9
Thermal efficiency	% : 28.8	29.8	29.7	28.9	26.9
Fuel temperature	deg C : 40.0	39.0	40.0	40.0	39.0
Pump delivery/stroke	mm <sup>3</sup> : 40.1	39.1	38.3	41.1	44.0
	mgms : 33.1	32.3	31.6	33.9	36.4
Start of injection	deg. max : 16.0	17.6	18.2	20.1	19.1
	min : 14.7	16.5	17.4	20.0	17.5
mean	15.5	17.2	17.6	20.0	17.8
Start of combustion	deg. max : 4.8	7.4	8.5	11.9	11.9
	min : 4.5	7.3	8.2	11.0	11.0
mean	4.6	7.3	8.3	11.2	11.5
Ignition delay	deg max : 11.2	10.3	9.9	9.0	7.2
	min : 10.0	9.2	8.9	8.2	5.7
mean	10.9	9.9	9.3	8.8	6.3
Ignition delay	ms max : 0.902	0.987	1.147	1.321	1.450
	min : 0.803	0.986	1.032	1.204	1.145
mean	0.877	0.949	1.071	1.292	1.280
Max. cylinder pressure	bar : 71.1	75.8	77.2	80.6	78.9
Max. pressure rise	bar/deg : 10.4	9.9	11.7	13.2	9.5
	bar/ms : 129.4	102.6	101.6	90.1	47.0
Oil temperature	deg C : 93.0	94.0	92.0	89.0	84.0
Water IN temperature	deg C : 53.0	50.0	49.0	53.0	54.0
Water OUT temperature	deg C : 79.0	77.0	80.0	80.0	84.0
Exhaust temperature	deg C : 277.0	247.0	226.0	218.0	205.0

ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2860

FUEL EMULSION E20/2.8TEGIN  
 DENSITY Kg/l : 0.848  
 CAL VALUE MJ/Kg : 38.89

DATE : 22/5/85  
 TEST ID : UNIDO\_2

DYND TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
33 % LOAD (Nominal)	20 deg BTDC				
Observed load	N : 4.41	4.26	4.41	4.69	4.64
Observed torque	NM : 35.3	34.1	35.3	37.6	37.2
Observed speed	RPM : 2029	1742	1436	1123	849
Observed power	KW : 7.5	6.2	5.3	4.4	3.3
Air temperature	deg C : 29.0	29.0	28.0	30.0	30.0
Barometric pressure	mBar : 1020.5	1020.5	1020.5	1020.9	1020.9
Correction factor	: 0.990	0.990	0.989	0.992	0.992
Corrected torque	NM : 35.0	33.8	34.9	37.2	36.8
Corrected power	KW : 7.4	6.2	5.3	4.4	3.3
Fuel consumed	gms : 32.2	29.3	29.8	27.2	33.8
Measurement time	seconds : 29.990	34.790	42.190	53.790	71.180
Fuel mass flow	gms/sec : 1.07	0.84	0.71	0.51	0.47
B.S.F.C.	gms/KW/hr : 520.3	491.9	484.0	415.5	522.0
Thermal efficiency	% : 17.9	19.9	19.2	22.4	17.9
Fuel temperature	deg C : 39.0	39.0	39.0	39.0	39.0
Pump delivery/stroke	mm <sup>3</sup> : 25.6	23.4	23.9	21.8	27.1
	mgms : 21.2	19.3	19.7	18.0	22.4
Start of injection deg.	max : 13.2	12.2	13.7	17.3	17.4
	min : 12.8	12.1	12.8	17.3	17.2
mean :	13.1	12.1	13.4	17.3	17.3
Start of combustion deg.	max : 1.1	2.1	4.8	9.2	11.0
	min : 1.0	1.9	4.7	9.1	10.1
mean :	1.1	2.0	4.7	9.1	10.8
Ignition delay deg	max : 12.1	10.2	9.0	8.2	7.2
	min : 11.8	10.0	8.1	8.1	6.2
mean :	12.0	10.1	8.7	8.2	6.6
Ignition delay ms	max : 0.991	0.977	1.049	1.220	1.419
	min : 0.969	0.961	0.941	1.195	1.226
mean :	0.983	0.969	1.007	1.211	1.290
Max. cylinder pressure bar	: 58.8	59.3	61.1	65.8	68.3
Max. pressure rise bar/deg	: 7.7	6.9	7.5	8.9	10.7
bar/ms :	93.9	72.5	65.0	59.7	54.4
Oil temperature deg C :	88.0	83.0	88.0	84.0	84.0
Water IN temperature deg C :	40.0	40.0	44.0	54.0	59.0
Water OUT temperature deg C :	76.0	75.0	75.0	76.0	81.0
Exhaust temperature deg C :	191.0	169.0	153.0	135.0	138.0

ENGINE TEST RESULTS

DATE : 22/5/85  
TEST ID : UNCID0\_2

FUEL  
EMULSION : E20/2.61E6DN  
DENSITY kg/l : 0.948  
CAL VALUE MJ/Kg : 39.69

ENGINE MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYND TORQUE FACTOR : 35.61

800

ENGINE SPEED (NOMINAL)

IDLE CONDITION 20 deg BTDC

Observed load	N :	0.51
Observed torque	NM :	2.5
Observed speed	RPM :	830
Observed power	KW :	.2
Air temperature	deg C :	29.0
Barometric pressure	mBar :	1020.8
Correction factor		0.990
Corrected torque	NM :	2.5
Corrected power	KW :	.2
Fuel consumed	gms :	18.9
Measurement time	seconds :	72.760
Fuel mass flow	gms/sec :	0.23
B.S.F.C.	gms/KW/hr :	3867.3
Thermal efficiency	% :	2.4
Fuel temperature	deg C :	40.0
Pump delivery/stroke	mm <sup>3</sup> :	13.6
	mgms :	11.2
Start of injection	deg. max :	16.3
	min :	15.4
	mean :	15.9
Start of combustion	deg. max :	9.2
	min :	8.3
	mean :	8.0
Ignition delay	deg	7.1
	min :	6.4
	mean :	6.9
Ignition delay	ms	1.425
	min :	1.292
	mean :	1.385
Max. cylinder pressure	bar :	54.4
Max. pressure rise	bar/deg :	6.8
	bar/ms :	33.9
Oil temperature	deg C :	80.0
Water IN temperature	deg C :	65.0
Water OUT temperature	deg C :	76.0
Exhaust temperature	deg C :	100.0

ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2960

FUEL EMULSION : E20/5.2TE6DIN  
 DENSITY Kg/l : 0.850  
 CAL VALUE MJ/Kg : 38.55

DATE : 22/5/85  
 TEST ID : UNID00\_4

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
	100 % LOAD (Nominal) 20 deg BTDC				
Observed load	N : 17.01	17.88	18.19	18.32	18.32
Observed torque	NM : 136.2	143.1	145.7	146.6	146.7
Observed speed	RPM : 2015	1735	1438	1139	830
Observed power	KW : 28.7	26.1	21.9	17.5	12.8
Air temperature	deg C : 30.0	30.0	31.0	32.0	29.0
Barometric pressure	mBar : 1021.0	1021.1	1021.1	1021.1	1021.2
Correction factor	: 0.992	0.991	0.993	0.995	0.990
Corrected torque	NM : 135.0	141.3	144.7	145.3	145.2
Corrected power	KW : 28.5	25.8	21.8	17.4	12.6
Fuel consumed	gms : 81.4	85.4	90.1	91.1	99.3
Measurement time	seconds : 30.150	34.930	42.150	53.150	72.780
Fuel mass flow	gms/sec : 2.70	2.44	2.14	1.71	1.23
B.S.F.C.	gms/KW/hr : 340.6	340.0	353.0	354.3	350.0
Thermal efficiency	% : 27.4	27.5	26.5	26.4	26.7
Fuel temperature	deg C : 33.0	34.0	35.0	37.0	38.0
Pump delivery/stroke	mm+3 : 64.2	67.4	71.4	72.4	71.3
	mgms : 53.5	56.1	59.4	60.1	59.1
Start of injection	deg. max : 22.0	22.0	22.7	23.6	19.1
	min : 19.2	21.0	22.0	22.7	18.4
mean :	19.9	21.6	22.4	23.2	18.7
Start of combustion	deg. max : 10.0	11.9	12.8	14.6	12.8
	min : 9.2	11.0	12.7	14.5	12.7
mean :	9.7	11.7	12.7	14.5	12.8
Ignition delay	deg max : 10.7	10.2	10.0	9.1	8.3
	min : 10.1	9.2	9.2	8.2	5.6
mean :	10.3	9.9	9.6	9.7	5.9
Ignition delay	ms max : 0.882	0.979	1.165	1.326	1.265
	min : 0.833	0.883	1.061	1.192	1.129
mean :	0.849	0.949	1.118	1.271	1.187
Max. cylinder pressure	bar : 88.8	93.6	94.4	96.3	90.8
Max. pressure rise	bar/deg : 12.7	13.2	13.7	13.1	10.5
	bar/ms : 153.9	137.8	119.2	99.6	52.3
Oil temperature	deg C : 83.0	87.0	88.0	87.0	88.0
Water IN temperature	deg C : 57.0	63.0	65.0	64.0	61.0
Water OUT temperature	deg C : 79.0	80.0	80.0	81.0	79.0
Exhaust temperature	deg C : 393.0	395.0	377.0	349.0	315.0

ENGINE TEST RESULTS

DATE : 22/5/85  
TEST ID : UNID00\_4

FUEL  
EMULSION : E20/5.2TEGDN  
DENSITY Kg/l : 0.850  
CAL VALUE MJ/Kg : 38.55

ENGINE FORD  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
	57 % LOAD (Nominal) 20 deg BTDC				
Observed load	N : 11.23	11.11	11.14	11.15	11.63
Observed torque	NM : 89.9	89.0	89.2	89.3	93.1
Observed speed	RPM : 2101	1739	1443	1119	829
Observed power	KW : 19.9	16.2	13.5	10.5	8.1
Air temperature	deg C : 28.0	28.0	29.0	28.0	27.0
Barometric pressure	mBar : 1021.2	1021.0	1021.0	1021.0	1021.0
Correction factor		0.988	0.990	0.988	0.987
Corrected torque	NM : 28.9	37.9	88.3	89.2	91.9
Corrected power	KW : 19.5	16.0	13.3	10.3	8.0
Fuel consumed	gms : 54.9	49.7	49.1	50.0	51.0
Measurement time	seconds : 28.990	34.990	41.990	53.990	72.780
Fuel mass flow	gms/sec : 1.89	1.39	1.17	0.93	0.70
B.S.F.C.	gms/KW/hr : 348.9	312.9	315.4	322.5	316.2
Thermal efficiency	% : 26.8	29.8	29.6	29.0	29.5
Fuel temperature	deg C : 38.0	39.0	39.0	39.0	39.0
Pump delivery/stroke	mm+3 : 43.5	38.6	39.1	40.0	40.8
	mgms : 36.1	32.0	32.4	33.1	33.8
Start of injection	deg. max : 16.8	17.3	18.1	19.9	19.0
	min : 13.9	16.5	17.4	19.2	18.5
mean :	16.3	16.7	17.8	19.6	18.8
Start of combustion	deg. max : 6.5	7.4	9.2	11.9	12.9
	min : 5.4	7.3	9.1	11.8	12.7
mean :	5.7	7.3	9.2	11.8	12.7
Ignition delay	deg max : 11.3	9.9	8.9	8.1	6.3
	min : 9.4	9.1	8.2	7.3	5.7
mean :	10.6	9.3	8.6	7.7	6.1
Ignition delay	ms max : 0.898	0.954	1.026	1.207	1.267
	min : 0.749	0.873	0.946	1.081	1.148
mean :	0.839	0.896	0.995	1.154	1.216
Max. cylinder pressure	bar : 72.2	74.8	77.3	80.3	77.6
Max. pressure rise	bar/deg : 9.9	10.4	9.8	12.1	10.7
	bar/ms : 124.2	108.3	84.6	80.9	53.5
Oil temperature	deg C : 93.0	92.0	90.0	87.0	85.0
Water IN temperature	deg C : 51.0	48.0	47.0	52.0	55.0
Water OUT temperature	deg C : 80.0	79.0	79.0	79.0	83.0
Exhaust temperature	deg C : 285.0	248.0	231.0	1213.0	198.0



ENGINE TEST RESULTS

PAGE 15

ENGINE MAKE : FORD MODEL : 3000 No CYL : 3 CAPACITY cc : 2960  
 FUEL EMULSION : E20/S.2TE6UN DENSITY Kg/l : 0.850 CAL VALUE MJ/Kg : 38.55  
 DATE : 22/3/85 TEST ID : UNIDO\_4  
 DYNQ TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	N : 4.21	4.43	4.32	4.32	4.60
Observed torque	NM : 33.7	35.5	34.6	34.6	36.9
Observed speed	RPM : 2028	1734	1439	1139	826
Observed power	KW : 7.2	6.4	5.2	4.1	3.2
Air temperature	deg C : 27.0	28.0	29.0	28.0	28.0
Barometric pressure	mBar : 1021.2	1021.3	1021.2	1021.5	1021.5
Correction factor	0.985	0.988	0.990	0.988	0.988
Corrected torque	NM : 33.2	35.0	34.2	34.2	36.4
Corrected power	KW : 7.1	6.4	5.2	4.1	3.1
Fuel consumed	gms : 30.5	30.9	29.7	32.4	31.4
Measurement time	seconds : 30.000	34.990	41.990	33.190	73.160
Fuel mass flow	gms/sec : 1.02	0.88	0.68	0.61	0.43
B.S.F.C.	gms/KWhr : 518.4	459.8	477.5	537.7	490.8
Thermal efficiency	% : 18.0	18.7	19.6	17.4	19.0
Fuel temperature	deg C : 39.0	36.0	38.0	38.0	35.0
Pump delivery/stroke	mm <sup>3</sup> : 24.2	24.5	22.9	25.8	25.0
	mgms : 20.1	20.4	19.0	21.4	20.8
Start of injection	deg. max : 12.1	12.1	12.0	18.1	18.9
	min : 12.8	12.0	12.0	17.4	18.2
	mean : 12.9	12.0	12.2	17.6	18.4
Start of combustion	deg. max : 2.4	3.8	4.6	10.1	11.9
	min : 1.9	2.9	3.8	9.9	11.8
	mean : 2.1	3.4	4.0	10.0	11.9
Ignition delay	deg max : 11.1	9.2	8.4	8.1	7.1
	min : 10.6	8.2	8.0	7.4	6.3
	mean : 10.9	8.6	8.2	7.6	6.5
Ignition delay	ms max : 0.913	0.885	0.970	1.178	1.429
	min : 0.870	0.789	0.931	1.076	1.273
	mean : 0.892	0.825	0.951	1.105	1.317
Max. cylinder pressure	bar : 58.1	60.2	58.1	68.7	65.0
Max. pressure rise	bar/deg : 5.9	6.6	6.3	9.4	9.4
	bar/ms : 71.4	68.6	54.8	64.0	46.7
Oil temperature	deg C : 88.0	88.0	89.0	85.0	84.0
Water IN temperature	deg C : 47.0	48.0	51.0	35.0	34.0
Water OUF temperature	deg C : 80.0	80.0	62.0	76.0	75.0
Exhaust temperature	deg C : 180.0	171.0	152.0	144.0	133.0

DATE : 22/3/85  
TEST ID : UNIDO\_4

DYNO TORQUE FACTOR : 35.61

ENGINE TEST RESULTS

EMULSION : E20/S-2TEODIN  
DENSITY Kg/l : 0.850  
CAL VALUE MJ/Kg : 38.55

ENGINE MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2960

ENGINE SPEED (NOMINAL) 800 IDLE CONDITION 20 deg BTDC

Observed load	N	0.31
Observed torque	NM	2.5
Observed speed	RPM	828
Observed power	KW	0.2
Air temperature	deg C	28.0
Barometric pressure	mBar	1021.5
Correction factor		0.988
Corrected torque	NM	2.5
Corrected power	KW	0.2
Fuel consumed	gms	16.8
Measurement time	seconds	72.940
Fuel mass flow	gms/sec	0.23
B.S.F.C.	gms/KWh/hr	3852.5
Thermal efficiency	%	2.4
Fuel temperature	deg C	34.0
Pump delivery/stroke	mm <sup>3</sup>	13.4
	mgms	11.1
Start of injection	deg.	17.6
	min	17.1
	mean	17.3
Start of combustion	deg.	10.2
	min	10.1
	mean	10.1
Ignition delay	deg	7.5
	min	7.0
	mean	7.2
Ignition delay	ms	1.504
	min	1.415
	mean	1.452
Max. cylinder pressure	bar	96.5
Max. pressure rise	bar/deg	6.4
	bar/ms	31.6
Oil temperature	deg C	79.0
Water IN temperature	deg C	34.0
Water OUT temperature	deg C	74.0
Exhaust temperature	deg C	97.0

DATE : 22/5/85  
TEST ID : UNIDO.5

DYMO TORQUE FACTOR : 35.61

ENGINE TEST RESULTS

FUEL  
EMULSION : E20/.210N  
DENSITY Kg/l : 0.845  
CAL. VALUE MJ/Kg : 38.83

ENGINE MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	100 % LOAD (Nominal) 20 deg BTDC				
Observed load	N : 17.36	18.08	18.41	18.57	18.57
Observed torque	NM : 139.0	144.8	147.4	148.7	148.6
Observed speed	RPM : 2017	1751	1459	1140	839
Observed power	KW : 29.4	26.3	22.5	17.7	13.1
Air temperature	deg C : 34.0	30.0	32.0	30.0	28.0
Barometric pressure	mBar : 1021.5	1021.5	1021.5	1021.5	1021.5
Correction factor	0.988	0.991	0.994	0.991	0.988
Corrected torque	NM : 138.6	143.5	146.6	147.3	146.9
Corrected power	KW : 29.3	26.3	22.4	17.6	12.9
Fuel consumed	gms : 78.7	89.5	88.3	90.2	97.7
Measurement time	seconds : 30.130	34.790	41.590	52.590	71.980
Fuel mass flow	gms/sec : 2.61	2.40	2.14	1.70	1.22
B.S.F.C.	gms/KWhr : 320.4	328.5	343.8	349.3	340.1
Thermal efficiency	% : 28.4	28.2	27.0	26.8	27.3
Fuel temperature	deg C : 34.0	37.0	38.0	38.0	38.0
Pump delivery/stroke	mm+3 : 62.4	66.5	71.1	72.4	70.5
	mgms : 51.7	54.8	59.6	59.7	58.1
Start of injection	deg. max : 20.3	21.8	22.7	23.4	18.2
	min : 20.0	21.0	21.8	22.7	17.6
	mean : 20.1	21.2	22.3	23.0	18.1
Start of combustion	deg. max : 8.3	10.0	11.8	12.8	11.1
	min : 8.1	9.9	10.9	12.7	11.0
	mean : 8.2	10.0	11.3	12.8	11.0
Ignition delay	deg max : 12.2	11.8	11.8	10.6	7.3
	min : 11.7	11.0	10.0	9.9	6.6
	mean : 11.9	11.2	11.0	10.2	7.0
Ignition delay	ms max : 1.007	1.121	1.343	1.554	1.444
	min : 0.967	1.063	1.142	1.446	1.305
	mean : 0.980	1.084	1.261	1.495	1.400
Max. cylinder pressure	bar : 92.4	95.1	96.3	98.0	91.5
Max. pressure rise	bar/deg : 19.6	17.8	22.0	18.7	12.2
	bar/ms : 237.4	187.4	192.4	127.9	61.6
Oil temperature	deg C : 88.0	92.0	92.0	92.0	87.0
Water IN temperature	deg C : 63.0	66.0	66.0	66.0	61.0
Water OUT temperature	deg C : 83.0	83.0	83.0	81.0	82.0
Exhaust temperature	deg C : 390.0	380.0	376.0	350.0	317.0

ENGINE TEST RESULTS

DATE : 22/5/95  
TEST ID : UNID00\_5

FUEL  
EMULSION : E20/210M  
DENSITY Kg/l : 0.845  
CAL VALUE MJ/Kg : 38.83

ENGINE MAKE : FORU  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	67 % LOAD (Nominal) 20 deg BTDC				
Observed load	N : 10.82	10.94	11.13	11.41	11.61
Observed torque	NM : 96.6	87.6	89.1	91.3	93.0
Observed speed	RPM : 2017	1744	1436	1132	832
Observed Power	KW : 18.3	16.0	13.4	10.8	8.1
Air temperature	deg C : 29.0	27.0	26.0	26.0	29.0
Barometric pressure	mBar : 1021.5	1021.5	1021.5	1021.5	1021.7
Correction factor	0.990	0.986	0.988	0.988	0.989
Corrected torque	NM : 85.7	86.4	88.0	90.2	92.0
Corrected power	KW : 18.1	15.8	13.2	10.7	8.0
Fuel consumed	gms : 49.5	47.8	49.1	49.2	51.6
Measurement time	seconds : 30.190	34.790	42.190	53.390	72.580
Fuel mass flow	gms/sec : 1.61	1.37	1.14	0.92	0.71
B.S.F.C.	gms/KW/hr : 319.4	313.5	309.9	310.3	319.1
Thermal efficiency	% : 29.0	29.6	29.9	29.9	29.1
Fuel temperature	deg C : 38.0	38.0	39.0	39.0	39.0
Pump delivery/stroke	mm <sup>3</sup> : 38.6	38.2	38.6	39.5	41.5
	mgms : 31.9	31.5	31.7	32.6	34.2
Start of injection	deg. max : 15.9	17.1	18.2	19.8	19.1
	min : 14.7	16.4	17.3	19.1	18.1
mean : 15.2	16.7	17.6	19.4	18.7	
Start of combustion	deg. max : 3.8	5.6	8.3	11.0	11.9
	min : 3.6	5.5	8.1	10.1	10.9
mean : 3.7	5.5	8.2	10.8	11.2	
Ignition delay	deg max : 12.2	11.8	9.9	9.9	8.1
	min : 10.9	10.8	9.1	8.1	7.1
mean : 11.5	11.1	9.3	8.6	7.3	
Ignition delay	ms max : 1.007	1.107	1.147	1.318	1.616
	min : 0.901	1.034	1.057	1.195	1.430
mean : 0.951	1.065	1.083	1.263	1.505	
Max. cylinder pressure	bar : 72.3	75.7	78.8	80.7	79.5
Max. pressure rise	bar/deg : 11.5	10.6	12.0	14.4	11.5
	bar/ms : 139.2	110.7	103.1	97.5	57.2
Oil temperature	deg C : 93.0	92.0	92.0	87.0	88.0
Water IN temperature	deg C : 52.0	47.0	48.0	52.0	56.0
Water OUT temperature	deg C : 79.0	79.0	79.0	78.0	83.0
Exhaust temperature	deg C : 267.0	239.0	224.0	209.0	201.0

ENGINE TEST RESULTS

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ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2860

FUEL EMULSION : E20/.2ION  
 DENSITY Kg/l : 0.845  
 CAL VALUE MJ/Kg : 38.83

DATE : 22/3/85  
 TEST ID : UNIND\_5

DYNO TORQUE FACTOR : 35.81

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	N	4.55	4.07	4.88	4.44
Observed torque	NM	36.4	32.6	37.3	35.5
Observed speed	RPM	2017	1734	1423	827
Observed power	KW	7.7	5.9	4.4	3.1
Air temperature	deg C	27.0	28.0	28.0	27.0
Barometric pressure	mBar	1021.6	1021.5	1021.5	1021.5
Correction factor		0.986	0.988	0.988	0.986
Corrected torque	NM	35.9	32.2	36.8	35.1
Corrected power	KW	7.6	5.8	4.4	3.0
Fuel consumed	gms	31.6	28.1	28.3	30.1
Measurement time	seconds	30.190	34.980	53.350	72.980
Fuel mass flow	gms/sec	1.03	0.80	0.83	0.41
B.S.F.C.	gms/KWhr	496.9	495.1	437.3	489.1
Thermal efficiency	%	18.7	18.7	21.2	19.0
Fuel temperature	deg C	39.0	38.0	37.0	37.0
Pump delivery/stroke	mm <sup>3</sup>	25.2	22.5	22.7	24.0
	mgms	20.8	18.5	18.7	19.9
Start of injection	deg.	max : 13.2	12.1	13.1	17.5
	min :	13.0	11.9	12.0	17.2
	mean :	13.1	12.1	12.6	17.4
Start of combustion	deg.	max : 1.1	1.9	3.9	9.2
	min :	-3	1.2	2.9	8.3
	mean :	.5	1.5	3.4	8.5
Ignition delay	deg	max : 12.9	10.9	9.9	9.2
	min :	11.9	10.1	8.1	8.2
	mean :	12.6	10.5	9.1	8.9
Ignition delay	ms	max : 1.063	1.050	1.164	1.361
	min :	0.986	0.975	0.951	1.210
	mean :	1.041	1.013	1.068	1.307
Max. cylinder pressure	bar	61.3	59.9	61.0	66.3
Max. pressure rise	bar/deg	6.8	6.7	8.5	10.1
	bar/ms	82.9	70.2	72.7	88.4
Oil temperature	deg C	87.0	87.0	88.0	82.0
Water IN temperature	deg C	40.0	50.0	51.0	33.0
Water OUT temperature	deg C	77.0	79.0	83.0	78.0
Exhaust temperature	deg C	190.0	162.0	151.0	129.0

ENGINE TEST RESULTS

DATE : 22/3/85  
TEST ID : UNID0\_5

FUEL  
EMULSION : E20/210N  
DENSITY Kg/l : 0.845  
CAL VALUE MJ/Kg : 38.83

ENGINE  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2360

DYNO TORQUE FACTOR : 35.61

800

ENGINE SPEED (NOMINAL)

20 deg BTDC

IDLE CONDITION

N : 0.32  
NM : 2.5  
RPM : 821  
KW : .2

Observed Load  
Observed torque  
Observed speed  
Observed power

Air temperature deg C : 27.0  
Barometric pressure mBar : 1021.5  
Correction factor : 0.986  
Corrected torque NM : 2.3  
Corrected power KW : .2

Fuel consumed : 15.4  
Measurement time seconds : 23.580  
Fuel mass flow gms/sec : 0.21  
B.S.F.C. gms/KWhr : 3513.9  
Thermal efficiency % : 2.6

Fuel temperature deg C : 37.0  
Pump delivery/stroke mm<sup>3</sup> : 12.4  
mgms : 10.2

Start of injection deg. max : 17.1  
min : 15.8  
mean : 16.5

Start of combustion deg. max : 9.2  
min : 8.3  
mean : 8.8

Ignition delay deg max : 8.1  
min : 7.2  
mean : 7.7

Ignition delay ms max : 1.652  
min : 1.466  
mean : 1.554

Max. cylinder pressure bar : 55.6  
Max. pressure rise bar/deg : 7.2  
bar/ms : 35.7

Oil temperature deg C : 81.0  
Water IN temperature deg C : 52.0  
Water OUT temperature deg C : 74.0  
Exhaust temperature deg C : 94.0

ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2960

FUEL EMULSION : E20/.410N  
 DENSITY Kg/l : 0.845  
 CAL VALUE MJ/Kg : 38.83

DATE : 22/3/85  
 TEST ID : UNID00\_6

DYNO TORQUE FACTOR : 35.61

	ENGINE SPEED (NOMINAL)			
	2000	1700	1400	1100
Observed load	N : 17.20	15.11	13.50	12.61
Observed torque	NM : 137.7	145.0	143.1	143.1
Observed speed	RPM : 2015	1714	1438	1136
Observed power	KW : 29.1	26.0	22.3	17.7
Air temperature	deg C : 27.0	30.0	30.0	30.0
Barometric pressure	mBar : 1021.5	1021.5	1021.5	1021.5
Correction factor	: 0.986	0.991	0.991	0.991
Corrected torque	NM : 135.8	143.7	146.8	147.6
Corrected power	KW : 28.7	25.8	22.1	17.6
Fuel consumed	gms : 79.5	84.0	89.6	90.3
Measurement time	seconds : 30.190	35.390	42.190	53.190
Fuel mass flow	gms/sec : 2.63	2.37	2.12	1.70
B.S.F.C.	gms/KWhr : 330.8	331.2	345.9	348.0
Thermal efficiency	% : 28.0	28.0	28.8	26.8
Fuel temperature	deg C : 33.0	33.0	34.0	34.0
Pump delivery/stroke	mm³3 : 63.1	71.4	71.4	72.2
	mgms : 52.3	55.4	59.1	58.8
Start of injection	deg. max : 20.3	22.0	22.7	22.8
	min : 20.0	21.8	22.6	22.7
	mean : 20.1	21.9	22.7	22.8
Start of combustion	deg. max : 8.3	10.8	11.9	13.6
	min : 8.2	10.0	11.8	13.6
	mean : 8.2	10.2	11.9	13.6
Ignition delay	deg max : 12.1	11.9	10.9	9.2
	min : 11.6	11.0	10.8	9.1
	mean : 11.9	11.7	10.8	9.1
Ignition delay	ms max : 1.001	1.158	1.261	1.348
	min : 0.962	1.072	1.249	1.339
	mean : 0.982	1.135	1.254	1.342
Max. cylinder pressure	bar : 91.9	95.9	96.9	97.9
Max. pressure rise	bar/deg : 18.3	16.7	17.4	16.6
	bar/ms : 220.9	171.9	150.3	113.2
Oil temperature	deg C : 82.0	88.0	87.0	87.0
Water IN temperature	deg C : 49.0	62.0	65.0	61.0
Water OUT temperature	deg C : 78.0	81.0	81.0	79.0
Exhaust temperature	deg C : 365.0	374.0	375.0	349.0

ENGINE TEST RESULTS

DATE : 22/3/85  
TEST ID : UNIDO\_6

FUEL E20/410N  
EMULSION : 0.845  
DENSITY Kg/l : 0.845  
CAL VALUE MJ/Kg : 38.83

ENGINE FORD  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

	ENGINE SPEED (NOMINAL)			20 deg BTDC	800
	2000	1700	1400		
Observed load	N : 11.13	11.43	11.27	11.17	11.33
Observed torque	NM : 89.1	91.5	90.2	89.4	90.7
Observed speed	RPM : 2042	1731	1443	1140	823
Observed power	KW : 19.1	16.6	13.6	10.7	7.8
Air temperature	deg C : 28.0	28.0	27.0	28.0	27.0
Barometric pressure	mBar : 1021.5	1021.5	1021.5	1021.5	1021.5
Correction factor	0.988	0.988	0.988	0.988	0.988
Corrected torque	NM : 88.0	90.4	89.0	88.3	89.5
Corrected power	KW : 18.8	16.4	13.5	10.5	7.7
Fuel consumed	gms : 50.2	49.0	49.2	49.3	55.1
Measurement time	seconds : 29.800	35.000	41.990	52.990	73.980
Fuel mass flow	gms/sec : 1.68	1.40	1.15	0.94	0.75
B.S.F.C.	gms/KWhr : 322.2	307.6	307.2	321.4	350.4
Thermal efficiency	% : 28.8	30.1	30.2	29.8	26.5
Fuel temperature	deg C : 38.0	38.0	38.0	37.0	37.0
Pump delivery/stroke	mm+3 : 40.0	39.2	38.6	40.1	44.2
	mgms : 33.0	32.3	31.8	33.0	36.5
Start of injection	deg. max : 16.2	17.4	19.2	20.0	19.4
	min : 14.6	16.7	17.3	19.1	18.1
	mean : 15.4	17.0	17.8	19.4	18.2
Start of combustion	deg. max : 4.7	7.4	8.3	11.0	11.8
	min : 3.7	6.3	8.2	10.9	11.0
	mean : 4.0	6.8	8.3	10.9	11.2
Ignition delay	deg max : 12.0	10.9	9.8	9.0	7.3
	min : 10.7	10.0	9.1	8.2	6.3
	mean : 11.5	10.4	9.5	8.5	7.0
Ignition delay	ms max : 0.979	1.054	1.138	1.312	1.476
	min : 0.876	0.964	1.048	1.203	1.274
	mean : 0.935	1.005	1.101	1.246	1.421
Max. cylinder pressure	bar : 74.5	76.6	79.7	91.1	90.9
Max. pressure rise	bar/deg : 11.0	11.3	12.1	13.6	10.1
	bar/ms : 134.4	117.0	109.0	92.7	49.9
Oil temperature	deg C : 91.0	91.0	87.0	88.0	82.0
Water IN temperature	deg C : 53.0	47.0	47.0	51.0	55.0
Water OUT temperature	deg C : 78.0	79.0	79.0	79.0	82.0
Exhaust temperature	deg C : 289.0	242.0	227.0	209.0	209.0



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ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2960

FUEL EMULSION : E20/410N  
 DENSITY Kg/l : 0.845  
 CAL VALUE MJ/Kg : 38.83

DATE : 22/3/85  
 TEST ID : UNID0\_6

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	N : 4.25	4.38	4.37	4.59	4.62
Observed torque	NM : 34.0	35.0	35.0	36.7	37.0
Observed speed	RPM : 2092	1744	1436	1122	834
Observed power	KW : 7.3	6.4	5.3	4.3	3.2
Air temperature	deg C : 28.0	28.0	28.0	27.0	27.0
Barometric pressure	mBar : 1021.5	1021.5	1021.5	1021.5	1021.5
Correction factor	0.988	0.988	0.988	0.988	0.988
Corrected torque	NM : 33.8	34.6	34.6	36.2	36.5
Corrected power	KW : 7.2	6.3	5.2	4.3	3.2
Fuel consumed	gms : 30.2	28.4	27.6	26.9	30.0
Measurement time	seconds : 29.790	34.790	42.190	53.780	72.380
Fuel mass flow	gms/sec : 1.01	0.82	0.65	0.50	0.41
B.S.F.C.	gms/KW/hr : 508.1	484.8	453.0	422.9	488.2
Thermal efficiency	% : 19.2	19.9	20.5	21.9	19.8
Fuel temperature	deg C : 37.0	37.0	38.0	37.0	37.0
Pump delivery/stroke	mm <sup>3</sup> : 24.1	22.7	22.1	21.6	24.1
	mgms : 19.9	18.7	18.2	17.8	19.9
Start of injection	deg. max : 13.2	12.6	12.1	12.5	18.1
	min : 13.1	11.9	11.8	17.2	17.3
mean :	13.2	12.1	12.0	17.3	17.7
Start of combustion	deg. max : 1.4	2.9	3.0	9.2	10.9
	min : 1.0	2.0	2.8	9.1	10.1
mean :	1.1	2.2	2.9	9.1	10.3
Ignition delay	deg max : 12.2	10.5	9.2	8.3	7.9
	min : 11.8	9.0	8.9	8.1	7.2
mean :	12.0	9.9	9.0	8.2	7.4
Ignition delay	ms max : 0.992	1.008	1.073	1.235	1.585
	min : 0.964	0.965	1.032	1.204	1.438
mean :	0.982	0.943	1.050	1.215	1.479
Max. cylinder pressure	bar : 60.5	60.7	59.1	64.9	65.5
Max. pressure rise	bar/deg : 7.5	7.8	7.8	9.2	10.1
	bar/ms : 92.1	92.1	88.9	61.8	50.4
Oil temperature	deg C : 88.0	87.0	88.0	83.0	82.0
Water IN temperature	deg C : 47.0	51.0	53.0	52.0	53.0
Water OUT temperature	deg C : 79.0	78.0	77.0	78.0	65.0
Exhaust temperature	deg C : 187.0	185.0	148.0	133.0	129.0

ENGINE TEST RESULTS

DATE : 22/3/85  
TEST ID : UNIDO\_6

FUEL  
EMULSION : E20/.410N  
DENSITY kg/l : 0.845  
CAL VALUE MJ/kg : 38.88

ENGINE MAKE : FORD  
MODEL : 3000  
No. CYL : 3  
CAPACITY cc : 2960

DYNO TORQUE FACTOR 35.61

800

ENGINE SPEED (NOMINAL)

IDLE CONDITION 20 deg BTDC

Observed load	N :	0.31
Observed torque	NM :	2.5
Observed speed	RPM :	823
Observed power	KW :	.2
Air temperature	deg C :	26.0
Barometric pressure	mBar :	1021.5
Correction factor		0.985
Corrected torque	NM :	2.5
Corrected power	KW :	.2
Fuel consumed	gms :	15.6
Measurement time	seconds :	73.360
Fuel mass flow	gms/sec :	0.21
B.S.F.C.	gms/kWhr :	3579.1
Thermal efficiency	% :	2.6
Fuel temperature	deg C :	37.0
Pump delivery/stroke	mm+3 :	12.5
	mqms :	10.3
Start of injection	deg. max :	16.5
	min :	15.1
	mean :	15.8
Start of combustion	deg. max :	9.1
	min :	7.7
	mean :	8.5
Ignition delay	deg max :	7.5
	min :	7.1
	mean :	7.3
Ignition delay	ms max :	1.516
	min :	1.447
	mean :	1.478
Max. cylinder pressure	bar :	55.2
Max. pressure rise	bar/deg :	6.9
	bar/ms :	33.8
Oil temperature	deg C :	78.0
Water IN temperature	deg C :	59.0
Water OUT temperature	deg C :	76.0
Exhaust temperature	deg C :	92.0

ENGINE TEST RESULTS  
 DATE : 10/5/85  
 TEST ID : UNIDOLO

ENGINE TEST RESULTS

ENGINE : FORD  
 MAKE : FORD  
 MODEL : 3000  
 NO CYL : 3  
 CAPACITY cc : 2860

FUEL  
 DISTILLATE : DIST 100  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 42.75

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DYNO TORQUE FACTOR 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
	100 % LOAD (Nominal) 20 deg BTDC				
Observed load	N : 18.09	19.13	19.24	19.47	19.48
Observed torque	NM : 144.8	159.2	154.1	155.9	155.9
Observed speed	RPM : 2054	1750	1432	1149	844
Observed power	KW : 31.2	28.1	23.1	18.8	13.8
Air temperature	deg C : 31.0	31.0	30.0	30.0	29.0
Barometric pressure	mBar : 1023.2	1023.2	1023.2	1023.1	1023.1
Correction factor	0.992	0.992	0.990	0.990	0.989
Corrected torque	NM : 143.7	151.9	152.5	154.4	154.2
Corrected Power	KW : 30.9	27.8	22.9	18.6	13.6
Fuel Consumed	gms : 83.5	85.9	89.7	91.3	90.1
Measurement time	seconds : 23.590	34.590	42.190	52.590	71.580
Fuel mass flow	gms/sec : 2.82	2.48	2.13	1.74	1.28
B.S.F.C.	gms/KWhr. : 328.8	321.1	334.8	336.5	332.5
Thermal efficiency	% : 25.8	26.2	25.2	25.0	25.3
Fuel temperature	deg C : 30.0	32.0	32.0	31.0	31.0
Pump delivery/stroke	mm <sup>3</sup> : 65.8	88.1	71.2	72.4	71.5
	mgms : 55.0	56.8	59.4	60.4	59.6
Start of injection	deg. max : 21.2	21.9	22.8	23.6	19.9
	min : 20.3	21.8	22.7	23.5	19.3
	mean : 20.8	21.9	22.7	23.5	19.8
Start of combustion	deg. max : 10.0	11.0	12.8	14.6	12.8
	min : 9.1	10.9	12.7	13.8	12.7
	mean : 9.5	10.9	12.8	14.4	12.7
Ignition delay	deg max : 12.0	11.0	10.0	9.8	7.2
	min : 10.9	10.9	9.9	8.9	6.8
	mean : 11.4	10.9	10.0	9.2	7.1
Ignition delay	ms max : 0.875	1.046	1.170	1.419	1.491
	min : 0.882	1.033	1.151	1.297	1.295
	mean : 0.924	1.040	1.159	1.329	1.397
Max. cylinder pressure	bar : 95.4	99.0	99.5	101.0	95.7
Max. Pressure rise	bar/deg : 15.5	16.3	15.7	14.6	12.1
	bar/ms : 191.5	171.1	134.5	101.0	61.1
Oil temperature	deg C : 86.0	92.0	93.0	92.0	90.0
Water IN temperature	deg C : 83.0	87.0	89.0	88.0	84.0
Water OUT temperature	deg C : 85.0	85.0	84.0	84.0	84.0
Exhaust temperature	deg C : 420.0	415.0	405.0	366.0	327.0

ENGINE TEST RESULTS

PAGE 26

DATE : 10/5/85  
TEST ID : UNIDD010

FUEL  
DISTILLATE : DIST 100  
DENSITY Kg/l : 0.849  
CAL VALUE NJ/Kg : 42.75

ENGINE : FORD  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2960

DYND TORQUE FACTOR : 35.61

	2000		1700		1400		1100		800	
	67 % LOAD (Nominal)		20 deg BTDC		20 deg BTDC		20 deg BTDC		20 deg BTDC	
ENGINE SPEED (NOMINAL)										
Observed load	N	11.22	11.10	11.13	11.13	11.27	11.19	11.13	11.19	11.19
Observed torque	NM	89.8	89.9	89.1	89.1	90.2	89.6	89.1	89.6	89.6
Observed speed	RPM	2050	1747	1447	1447	1136	833	1136	833	833
Observed power	KW	19.3	16.3	13.5	13.5	10.7	7.8	10.7	7.8	7.8
Air temperature	deg C	30.0	29.0	29.0	29.0	30.0	28.0	30.0	28.0	28.0
Barometric pressure	mBar	1022.1	1022.2	1022.2	1022.2	1022.2	1022.2	1022.2	1022.2	1022.2
Correction factor		0.991	0.989	0.989	0.989	0.991	0.987	0.991	0.987	0.987
Corrected torque	NM	89.0	87.9	88.1	88.1	89.4	88.4	89.4	88.4	88.4
Corrected power	KW	19.1	16.1	13.4	13.4	10.6	7.7	10.6	7.7	7.7
Fuel consumed	gms	45.8	44.6	43.5	43.5	46.6	49.1	46.6	49.1	49.1
Measurement time	seconds	29.990	34.790	41.790	41.790	53.190	72.380	53.190	72.380	72.380
Fuel mass flow	gms/sec	1.55	1.28	1.04	1.04	0.88	0.68	0.88	0.68	0.68
B.S.F.C.	gms/KW/hr	231.7	286.9	280.5	280.5	296.6	316.5	296.6	316.5	316.5
Thermal efficiency	%	28.9	29.4	30.0	30.0	28.6	26.6	28.6	26.6	26.6
Fuel temperature	deg C	32.0	32.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
Pump delivery/stroke	mm <sup>3</sup>	36.2	35.2	34.5	34.5	37.0	39.1	37.0	39.1	39.1
	mgms	30.2	29.4	28.8	28.8	30.9	32.6	30.9	32.6	32.6
Start of injection	deg.	max : 15.8	16.5	18.1	18.1	20.0	18.1	20.0	18.1	18.1
	min :	15.6	16.4	17.3	17.3	19.2	17.3	19.2	17.3	17.3
	mean :	15.7	16.4	17.5	17.5	19.7	17.7	19.7	17.7	17.7
Start of combustion	deg.	max : 5.5	7.4	9.1	9.1	11.8	11.0	11.8	11.0	11.0
	min :	4.6	6.5	8.2	8.2	11.0	10.9	11.0	10.9	10.9
	mean :	4.9	6.9	8.6	8.6	11.5	11.0	11.5	11.0	11.0
Ignition delay	deg	max : 11.2	9.9	9.2	9.2	9.9	7.2	9.9	7.2	7.2
	min :	10.1	9.0	8.3	8.3	7.5	6.4	7.5	6.4	6.4
	mean :	10.9	9.6	8.9	8.9	8.2	6.7	8.2	6.7	6.7
Ignition delay	ms	max : 0.908	0.949	1.054	1.054	1.305	1.431	1.305	1.431	1.431
	min :	0.818	0.854	0.958	0.958	1.099	1.283	1.099	1.283	1.283
	mean :	0.881	0.914	1.023	1.023	1.201	1.344	1.201	1.344	1.344
Max. cylinder pressure	bar	73.4	76.0	78.0	78.0	83.5	79.8	83.5	79.8	79.8
Max. pressure rise	bar/deg	10.1	10.4	10.7	10.7	12.7	9.1	12.7	9.1	9.1
	bar/ms	124.9	108.9	92.9	92.9	86.9	45.6	86.9	45.6	45.6
Oil temperature	deg C	89.0	89.0	89.0	89.0	87.0	85.0	87.0	85.0	85.0
Water IN temperature	deg C	51.0	44.0	43.0	43.0	42.0	44.0	42.0	44.0	44.0
Water OUT temperature	deg C	80.0	78.0	79.0	79.0	80.0	79.0	80.0	79.0	79.0
Exhaust temperature	deg C	279.0	242.0	225.0	225.0	211.0	200.0	211.0	200.0	200.0

ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No. CYL : 3  
 CAPACITY CC : 2960

FUEL  
 DISTILLATE : DIST 100  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 42.75

DATE : 10/5/85  
 TEST ID : UNIDOLO

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
33 % LOAD (Nominal)					
20 deg BTDC					
Observed load	N : 4.35	4.16	4.46	4.61	4.58
Observed torque	NM : 34.8	33.3	35.7	36.3	36.6
Observed speed	RPM : 2044	1732	1436	1127	843
Observed power	KW : 7.5	6.0	5.4	4.4	3.2
Air temperature	deg C : 28.0	28.0	28.0	28.0	28.0
Barometric pressure	mBar : 1022.2	1022.2	1022.2	1022.2	1022.2
Correction factor	0.987	0.987	0.987	0.987	0.987
Corrected torque	NM : 34.4	32.3	33.3	36.4	36.2
Corrected power	KW : 7.4	6.0	5.3	4.3	3.2
Fuel consumed	gms : 27.7	25.7	25.5	28.3	29.1
Measurement time	seconds : 29.790	34.990	42.190	53.590	71.580
Fuel mass flow	gms/sec : 0.93	0.73	0.60	0.53	0.41
B.S.F.C.	gms/KW/hr : 454.5	442.8	410.3	442.1	458.0
Thermal efficiency	% : 18.5	19.0	20.5	13.0	18.4
Fuel temperature	deg C : 32.0	33.0	33.0	33.0	32.0
Pump delivery/stroke	mm <sup>3</sup> : 21.8	20.4	20.2	22.5	23.1
	mgms : 18.2	17.0	16.8	18.7	19.3
Start of injection	deg. max : 13.2	12.9	14.8	18.2	17.2
	min : 11.2	12.2	14.6	17.3	16.4
mean	12.4	12.6	14.7	17.5	16.7
Start of combustion	deg. max : 2.0	3.0	5.7	10.0	10.0
	min : 1.1	2.1	5.5	9.1	10.0
mean	1.4	2.6	5.6	9.3	10.0
Ignition delay	deg max : 11.9	10.6	9.2	8.3	7.2
	min : 10.0	9.3	8.9	8.2	6.3
mean	11.0	10.0	9.0	8.2	6.7
Ignition delay	ms max : 0.989	1.024	1.062	1.230	1.431
	min : 0.818	0.900	1.032	1.207	1.253
mean	0.898	0.966	1.049	1.214	1.331
Max. cylinder pressure	bar : 60.1	59.4	63.2	66.4	66.4
Max. Pressure rise	bar/deg : 6.1	6.9	8.3	10.1	9.4
	bar/ms : 74.3	71.7	71.9	69.3	47.4
Oil temperature	deg C : 86.0	86.0	86.0	84.0	83.0
Water IN temperature	deg C : 39.0	42.0	52.0	53.0	57.0
Water OUT temperature	deg C : 77.0	77.0	78.0	82.0	79.0
Exhaust temperature	deg C : 187.0	165.0	151.0	143.0	136.0

ENGINE TEST RESULTS

PAGE 28

DATE : 10/5/85  
TEST ID : UNID010

FUEL  
DISTILLATE : DIST 100  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2960

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL) 800

IDLE CONDITION 20 deg BTDC

Observed load N : 0.38  
Observed torque NM : 3.0  
Observed speed RPM : 819  
Observed power KW : .3

Air temperature deg C : 29.0  
Barometric pressure mBar : 1022.2  
Correction factor 0.987  
Corrected torque NM : 3.0  
Corrected power KW : .3

Fuel consumed gms : 14.5  
Measurement time seconds : 73.580  
Fuel mass flow gms/sec : 0.20  
B.S.F.C. gms/KW/hr : 2788.2  
Thermal efficiency % : 3.0  
Fuel temperature deg C : 32.0  
Pump delivery/stroke mm³ : 11.5  
mgms : 9.6

Start of injection deg. max : 17.2  
min : 14.9  
mean : 16.1

Start of combustion deg. max : 9.2  
min : 7.5  
mean : 8.6

Ignition delay deg max : 8.1  
min : 7.0  
mean : 7.4

Ignition delay ms max : 1.647  
min : 1.421  
mean : 1.510

Max. cylinder pressure bar : 96.9  
Max. pressure rise bar/deg : 7.7  
bar/ms : 37.6

Oil temperature deg C : 81.0  
Water IN temperature deg C : 67.0  
Water OUT temperature deg C : 65.0  
Exhaust temperature deg C : 97.0

ENGINE TEST RESULTS

ENGINE : FORD  
 MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2860

FUEL  
 DISTILLATE : DIST 100  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 42.75

DATE : 10:05:85  
 TEST ID : UNID011

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
100 % LOAD (Nominal)	26 deg BTDC				
Observed load	N : 16.30	17.77	17.75	18.04	18.30
Observed torque	NM : 130.5	142.3	142.1	144.5	146.5
Observed speed	RPM : 2050	1744	1435	1136	826
Observed power	KW : 28.0	26.0	21.4	17.2	12.7
Air temperature	deg C : 30.0	31.0	30.0	30.0	29.0
Barometric pressure	mBar : 1022.2	1022.2	1022.2	1022.2	1022.2
Correction factor	0.991	0.992	0.991	0.991	0.989
Corrected torque	NM : 129.3	141.2	140.3	143.1	144.9
Corrected power	KW : 27.8	25.8	21.2	17.0	12.5
Fuel consumed	gms : 90.4	86.1	89.2	91.1	89.7
Measurement time	seconds : 29.590	34.790	42.190	53.190	72.980
Fuel mass flow	gms/sec : 2.72	2.47	2.11	1.71	1.23
B.S.F.C.	gms/KWhr : 352.5	345.5	359.8	362.2	353.0
Thermal efficiency	% : 23.9	24.4	23.4	23.3	23.9
Fuel temperature	deg C : 32.0	32.0	33.0	32.0	33.0
Pump delivery/stroke	mm <sup>3</sup> : 63.6	68.1	70.9	72.3	71.4
	mgms : 53.0	56.8	58.9	60.3	59.5
Start of injection	deg. max : 25.6	27.5	28.1	28.1	22.7
	min : 25.5	27.2	27.3	28.0	22.0
mean	25.6	27.3	27.7	28.1	22.4
Start of combustion	deg. max : 12.7	14.5	15.4	16.4	14.6
	min : 11.9	13.6	15.3	16.3	14.6
mean	12.5	13.8	15.4	16.4	14.6
Ignition delay	deg max : 13.7	13.8	12.7	11.8	8.0
	min : 12.8	12.7	12.0	11.6	7.4
mean	13.1	13.5	12.4	11.6	7.8
Ignition delay	ms max : 1.116	1.322	1.470	1.726	1.618
	min : 1.044	1.215	1.390	1.696	1.490
mean	1.063	1.268	1.437	1.709	1.567
Max. cylinder pressure	bar : 99.5	102.0	102.7	101.9	96.7
Max. pressure rise	bar/deg : 22.0	20.2	19.1	21.6	13.7
	bar/ms : 270.0	211.5	164.3	147.1	68.1
Oil temperature	deg C : 84.0	89.0	90.0	89.0	88.0
Water IN temperature	deg C : 64.0	71.0	74.0	74.0	72.0
Water OUT temperature	deg C : 83.0	84.0	84.0	84.0	83.0
Exhaust temperature	deg C : 410.0	412.0	397.0	355.0	324.0

ENGINE TEST RESULTS

DATE : 10-05-83  
TEST ID : UNI0011

FUEL  
DISTILLATE : DIST 100  
DENSITY KG/L : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL) 2000 1700 1400 800

67 % LOAD (Nominal) 26 deg BTDC

	2000	1700	1400	800
Observed load	N 11.48	10.84	11.38	11.27
Observed torque	NM 91.8	86.8	91.1	90.2
Observed speed	RPM 2050	1738	1432	815
Observed power	KW 19.7	15.8	13.7	7.7
Air temperature	deg C 29.0	29.0	30.0	29.0
Barometric pressure	mBar 1022.2	1022.2	1022.2	1022.2
Correction factor		0.989	0.991	0.989
Corrected torque	NM 90.8	85.9	90.3	89.3
Corrected power	KW 19.5	15.6	13.5	7.6
Fuel consumed	gms 48.4	45.1	47.8	53.4
Measurement time	seconds 29.590	34.790	42.190	73.980
Fuel mass flow	gms/sec 1.64	1.30	1.13	0.72
B.S.F.C.	gms/KWhr 302.2	298.5	301.3	341.1
Thermal efficiency	% 27.9	28.2	27.9	24.7
Fuel temperature	deg C 33.0	33.0	34.0	33.0
Pump delivery/stroke	mm <sup>3</sup> 38.3	35.8	38.0	42.5
	mgms 31.9	29.8	31.6	35.4
Start of injection	deg. max : 21.2 min : 20.8	21.9 21.7	23.7 23.5	22.7 22.6
	mean : 21.1	21.8	23.6	22.7
Start of combustion	deg. max : 9.1 min : 9.0	10.9 10.0	12.7 12.7	14.6 14.6
	mean : 9.1	10.7	12.7	14.6
Ignition delay	deg max : 12.0 min : 11.6	11.9 10.8	11.0 10.8	8.2 8.0
	mean : 12.0	11.1	10.9	8.1
Ignition delay	ms max : 0.979 min : 0.939	1.137 1.035	1.280 1.256	1.677 1.633
	mean : 0.972	1.068	1.268	1.663
Max. cylinder pressure	bar 90.3	82.3	85.2	84.2
Max. pressure rise	bar/deg 12.5	13.9	14.1	13.5
	bar/ms 153.6	144.6	120.9	68.0
Oil temperature	deg C 90.0	91.0	91.0	87.0
Water IN temperature	deg C 63.0	64.0	60.0	48.0
Water OUT temperature	deg C 80.0	79.0	79.0	79.0
Exhaust temperature	deg C 297.0	250.0	239.0	212.0



ENGINE TEST RESULTS

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ENGINE : FORD  
 MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2860

FUEL  
 DISTILLATE : DIST 100  
 DENSITY Kg/l : 0.843  
 CAL VALUE MJ/Kg : 42.75

DATE : 10:05:85  
 TEST ID : UNID011

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	N : 4.66	4.18	4.25	4.42	4.51
Observed torque	NM : 37.3	33.5	34.0	35.3	36.1
Observed speed	RPM : 2046	1744	1425	1129	822
Observed power	KW : 8.0	6.1	5.1	4.2	3.1
Air temperature	deg C : 29.0	28.0	28.0	28.0	28.0
Barometric pressure	mBar : 1022.2	1022.2	1022.2	1022.2	1022.2
Correction factor	0.989	0.987	0.987	0.987	0.987
Corrected torque	NM : 36.9	33.1	33.6	34.9	35.7
Corrected power	KW : 7.9	6.0	5.0	4.1	3.1
Fuel consumed	gms : 29.4	26.1	25.9	26.3	26.7
Measurement time	seconds : 29.790	34.790	42.390	53.390	73.390
Fuel mass flow	gms/sec : 0.99	0.75	0.61	0.49	0.36
B.S.F.C.	gms/(kW/hr) : 449.9	447.1	439.0	429.6	426.7
Thermal efficiency	% : 18.8	18.8	19.2	19.6	19.7
Fuel temperature	deg C : 33.0	33.0	33.0	33.0	33.0
Pump delivery/stroke	mm <sup>3</sup> : 23.2	20.7	20.6	20.9	21.3
	mgms : 19.3	17.2	17.1	17.4	17.7
Start of injection deg.	max : 18.6	17.5	20.0	22.7	20.9
	min : 17.7	17.3	19.9	21.6	20.8
	mean : 18.1	17.5	20.0	22.5	20.9
Start of combustion deg.	max : 5.7	6.5	9.2	12.7	12.7
	min : 5.5	6.4	9.1	11.9	12.7
	mean : 5.6	6.5	9.1	12.2	12.7
Ignition delay deg	max : 13.1	11.1	10.9	10.6	9.2
	min : 12.0	10.8	10.8	9.9	8.1
	mean : 12.5	11.0	10.8	10.3	8.1
Ignition delay ms	max : 1.067	1.056	1.273	1.539	1.639
	min : 0.977	1.037	1.261	1.469	1.649
	mean : 1.015	1.051	1.267	1.522	1.653
Max. cylinder pressure bar	66.9	64.0	66.9	69.6	67.2
Max. pressure rise bar/deg	8.3	7.5	9.6	10.8	9.1
	101.9	79.6	81.9	79.5	45.0
Oil temperature deg C	87.0	87.0	87.0	85.0	84.0
Water IN temperature deg C	41.0	37.0	35.0	38.0	43.0
Water OUT temperature deg C	78.0	77.0	77.0	77.0	77.0
Exhaust temperature deg C	193.0	168.0	151.0	136.0	128.0

DATE : 10.05.85  
TEST ID : UNID011

DYNO TORQUE FACTOR : 35.61

ENGINE TEST RESULTS

FUEL  
DISTILLATE : DIST 100  
DENSITY K9/L : 0.849  
CAL VALUE MJ/K9 : 42.75

ENGINE  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2850

ENGINE SPEED (NOMINAL) 800 IDLE CONDITION 26 deg BTDC

Observed load	N :	0.37
Observed torque	NM :	2.9
Observed speed	RPM :	826
Observed power	KW :	.3
Air temperature	deg C :	27.0
Barometric pressure	mBar :	1022.2
Correction factor	:	0.986
Corrected torque	NM :	2.9
Corrected power	KW :	.3
Fuel consumed	gms :	14.3
Measurement time	seconds :	72.990
Fuel mass flow	gms/sec :	0.20
B.S.F.C.	gms/KW/hr :	2811.5
Thermal efficiency	% :	3.0
Fuel temperature	deg C :	32.0
Pump delivery/stroke	mm <sup>3</sup> :	11.4
	mgms :	9.5
Start of injection	deg. max :	21.6
	min :	19.8
	mean :	20.2
Start of combustion	deg. max :	11.8
	min :	10.9
	mean :	11.1
Ignition delay	deg max :	9.8
	min :	8.8
	mean :	9.1
Ignition delay	ms max :	1.980
	min :	1.773
	mean :	1.842
Max. cylinder pressure	bar :	52.4
Max. pressure rise	bar/deg :	5.3
	bar/ms :	26.5
Oil temperature	deg C :	81.0
Water IN temperature	deg C :	47.0
Water OUT temperature	deg C :	75.0
Exhaust temperature	deg C :	99.0

PAGE 33  
 DATE : 10.05.85  
 TEST ID : UN10012

ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No. CYL : 6  
 CAPACITY cc : 2360

FUEL  
 DISTILLATE :  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 42.75

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	900
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	900
	100 % LOAD (Nominal) 14 deg BTDC				
Observed load	N : 19.05	20.42	20.76	20.85	20.59
Observed torque	NM : 152.5	163.5	166.2	166.9	164.7
Observed speed	RPM : 2052	1711	1428	1137	825
Observed power	KW : 32.8	23.3	24.9	19.9	14.2
Air temperature	deg C : 29.0	31.0	30.0	31.0	29.0
Barometric Pressure	mBar : 1022.3	1022.2	1022.2	1022.3	1022.2
Correction factor	: 0.989	0.992	0.991	0.992	0.989
Corrected torque	NM : 150.9	162.2	164.7	165.6	162.9
Corrected power	KW : 32.4	23.1	24.6	19.7	14.1
Fuel consumed	gms : 80.1	86.0	89.1	91.3	89.8
Measurement time	seconds : 29.590	35.390	42.390	53.190	72.980
Fuel mass flow	gms/sec : 2.71	2.43	2.10	1.72	1.23
B.S.F.C.	gms/KW/hr : 300.6	301.0	307.2	313.3	314.5
Thermal efficiency	% : 28.0	28.0	27.4	26.9	26.8
Fuel temperature	deg C : 32.0	33.0	32.0	33.0	33.0
Pump delivery/stroke	mm+3 : 63.3	68.2	70.6	72.6	71.6
	mgms : 52.8	56.8	58.9	60.4	59.6
Start of injection	deg. max : 14.0	15.6	16.4	16.4	11.0
	min : 13.9	14.8	13.7	16.4	10.1
	mean : 13.9	15.4	16.2	16.4	10.5
Start of combustion	deg. max : 4.7	7.3	8.3	10.0	5.6
	min : 4.5	6.5	8.2	9.2	5.5
	mean : 4.6	7.0	8.2	9.5	5.6
Ignition delay	deg max : 9.4	9.0	8.2	7.2	5.4
	min : 9.2	8.1	7.4	6.4	4.8
	mean : 9.3	8.4	8.0	6.9	4.9
Ignition delay	ms max : 0.768	0.990	0.955	1.038	1.095
	min : 0.749	0.793	0.865	0.937	0.930
	mean : 0.758	0.822	0.933	1.008	0.993
Max. cylinder pressure	bar : 81.5	98.0	89.8	90.8	79.9
Max. pressure rise	bar/deg : 11.2	11.3	11.0	9.5	7.0
	bar/ms : 137.9	145.7	94.6	65.1	34.7
Oil temperature	deg C : 87.0	89.0	89.0	89.0	86.0
Water IN temperature	deg C : 59.0	67.0	68.0	69.0	65.0
Water OUT temperature	deg C : 82.0	83.0	81.0	82.0	81.0
Exhaust temperature	deg C : 424.0	420.0	408.0	354.0	319.0

ENGINE TEST RESULTS

DATE : 10-05-85  
TEST ID : UNID012

FUEL  
DISTILLATE : DIST 100  
DENSITY KG/L : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE MAKE : FORD  
MODEL : 3000  
No. CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	800
	67 % LOAD (Nominal) 14 deg BTDC			
Observed load	11.07	10.97	11.15	11.55
Observed torque	88.7	87.8	89.2	95.5
Observed speed	2050	1740	1450	813
Observed power	19.0	16.0	13.6	8.1
Air temperature	30.0	29.0	29.0	28.0
Barometric pressure	1022.3	1022.3	1022.3	1022.3
Correction factor	0.991	0.989	0.989	0.987
Corrected torque	87.8	86.8	88.3	94.3
Corrected power	18.9	15.8	13.4	8.0
Fuel consumed	45.9	43.5	43.7	48.2
Measurement time	29.590	34.790	41.790	74.180
Fuel mass flow	1.55	1.25	1.05	0.65
B.S.F.C.	296.2	284.4	280.9	291.4
Thermal efficiency	28.4	29.6	30.0	28.9
Fuel temperature	34.0	34.0	34.0	33.0
Pump delivery/stroke	36.4	34.5	34.7	38.4
	30.3	28.7	28.8	32.0
Start of injection	deg. max : 9.3	deg. max : 10.2	deg. max : 11.0	deg. max : 13.7
	deg. min : 8.6	deg. min : 10.2	deg. min : 10.9	deg. min : 12.7
	deg. mean : 9.1	deg. mean : 10.2	deg. mean : 11.0	deg. mean : 13.0
Start of combustion	deg. max : -6	deg. max : 1.3	deg. max : 3.1	deg. max : 6.6
	deg. min : -1.7	deg. min : 1.0	deg. min : 2.9	deg. min : 6.4
	deg. mean : -1.4	deg. mean : 1.1	deg. mean : 2.9	deg. mean : 6.5
Ignition delay	deg max : 11.0	deg max : 9.2	deg max : 8.2	deg max : 7.2
	deg min : 9.9	deg min : 8.9	deg min : 7.8	deg min : 6.3
	deg mean : 10.5	deg mean : 9.1	deg mean : 8.0	deg mean : 6.5
Ignition delay	ms max : 0.892	ms max : 0.881	ms max : 0.937	ms max : 1.107
	ms min : 0.803	ms min : 0.836	ms min : 0.896	ms min : 0.946
	ms mean : 0.856	ms mean : 0.869	ms mean : 0.923	ms mean : 1.038
Max. cylinder pressure	bar : 60.3	bar : 64.7	bar : 66.8	bar : 69.1
Max. pressure rise	bar/deg : 7.1	bar/deg : 7.7	bar/deg : 8.2	bar/deg : 8.2
	bar/ms : 97.7	bar/ms : 80.6	bar/ms : 71.6	bar/ms : 40.2
Oil temperature	deg C : 88.0	deg C : 89.0	deg C : 89.0	deg C : 84.0
Water IN temperature	deg C : 49.0	deg C : 45.0	deg C : 43.0	deg C : 40.0
Water OUT temperature	deg C : 79.0	deg C : 78.0	deg C : 78.0	deg C : 77.0
Exhaust temperature	deg C : 278.0	deg C : 248.0	deg C : 229.0	deg C : 199.0

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ENGINE TEST RESULTS

ENGINE : FORD  
 MAKE : FORD  
 MODEL : 3000  
 No CYL : 2  
 CAPACITY cc : 2860

FUEL  
 DISTILLATE : DIST 100  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 42.75

DATE : 10:05:85  
 TEST ID : UNID012

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	33 % LOAD (Nominal) 14 deg BTDC				
Observed load	N : 4.68	3.96	4.55	4.44	4.25
Observed torque	NM : 37.5	31.7	36.4	35.5	34.0
Observed speed	RPM : 2031	1745	1430	1133	797
Observed power	KW : 8.0	5.8	5.4	4.2	2.8
Air temperature	deg C : 28.0	29.0	28.0	28.0	27.0
Barometric pressure	mBar : 1022.3	1022.3	1022.2	1022.2	1022.2
Correction factor	0.987	0.989	0.987	0.987	0.986
Corrected torque	NM : 37.0	31.4	35.9	35.1	33.5
Corrected power	KW : 7.9	5.7	5.4	4.2	2.8
Fuel consumed	gms : 29.3	25.2	26.1	27.3	26.9
Measurement time	seconds : 29.990	34.750	42.390	53.390	75.730
Fuel mass flow	gms/sec : 0.99	0.72	0.62	0.51	0.36
B.S.F.C.	gms/KW/hr : 446.9	454.9	411.9	442.4	457.0
Thermal efficiency	% : 18.8	18.5	20.4	19.0	18.4
Fuel temperature	deg C : 34.0	34.0	34.0	33.0	32.0
Pump delivery/stroke	mm <sup>3</sup> : 23.1	20.0	20.7	21.7	21.4
	mgms : 19.2	16.6	17.2	18.1	17.8
Start of injection	deg. max : 7.6	6.4	9.4	11.0	10.0
	min : 5.9	5.7	8.2	10.9	9.2
mean :	6.9	6.9	8.3	11.0	9.5
Start of combustion	deg. max : -5.0	-4.1	-3	4.7	4.6
	min : -5.7	-5.1	-6	3.8	3.7
mean :	-5.4	-4.5	-1	4.0	4.0
Ignition delay	deg max : 12.7	10.8	8.9	7.2	6.1
	min : 11.6	9.9	8.0	6.3	4.9
mean :	12.3	10.4	8.4	7.0	5.5
Ignition delay	ms max : 1.039	1.032	1.041	1.060	1.277
	min : 0.954	0.948	0.933	0.929	1.025
mean :	1.012	0.989	0.982	1.026	1.146
Max. cylinder pressure	bar : 49.3	49.9	56.6	61.7	59.2
Max. pressure rise	bar/deg : 3.4	3.9	6.8	8.1	7.7
	bar/ms : 41.0	40.3	58.4	55.3	36.7
Oil temperature	deg C : 87.0	87.0	86.0	84.0	82.0
Water IN temperature	deg C : 34.0	34.0	35.0	41.0	51.0
Water OUT temperature	deg C : 77.0	77.0	76.0	76.0	77.0
Exhaust temperature	deg C : 200.0	169.0	154.0	142.0	129.0

ENGINE TEST RESULTS

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DATE : 10:05:55  
TEST ID : UNID01Z

FUEL  
DISTILLATE : DIST 100  
DENSITY K9/L : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

800

ENGINE SPEED (NOMINAL)

14 deg BTDC

IDLE CONDITION

Observed load	N :	0.35
Observed torque	NM :	2.9
Observed speed	RPM :	828
Observed power	KW :	.2
Air temperature	deg C :	27.0
Barometric pressure	mBar :	1022.3
Correction factor		0.986
Corrected torque	NM :	2.8
Corrected power	KW :	.2
Fuel consumed	gms :	13.7
Measurement time	seconds :	72.750
Fuel mass flow	gms/sec :	0.19
B.S.F.C.	gms/KW/hr :	2826.4
Thermal efficiency	% :	3.0
Fuel temperature	deg C :	32.0
Pump delivery/stroke	mm <sup>3</sup> :	10.9
	mgms :	9.1
Start of injection	deg. max :	10.0
	min :	8.2
	mean :	9.1
Start of combustion	deg. max :	3.8
	min :	2.0
	mean :	2.9
Ignition delay	deg max :	6.3
	min :	6.2
	mean :	6.2
Ignition delay	ms max :	1.274
	min :	1.241
	mean :	1.257
Max. cylinder pressure	bar :	52.3
Max. pressure rise	bar/deg :	6.3
	bar/ms :	31.3
Oil temperature	deg C :	79.0
Water IN temperature	deg C :	52.0
Water OUT temperature	deg C :	75.0
Exhaust temperature	deg C :	94.0

DATE : 10:05:85  
TEST ID : UNID013

ENGINE TEST RESULTS

FUEL  
TESTING : TEGINS.8  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 38.62

ENGINE : FORD  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYND TORQUE FACTOR 35.61

800

1100

1400

1700

ENGINE SPEED (NOMINAL)

100 % LOAD (Nominal) 14 deg BTDC

	2000	1700	1400	1100	800
Observed load	18.58	19.58	19.50	19.66	19.23
Observed torque	148.7	156.7	159.3	157.4	154.0
Observed speed	2031	1709	1446	1132	823
Observed power	31.6	29.0	24.1	19.7	13.3
Air temperature	29.0	30.0	30.0	30.0	29.0
Barometric pressure	1022.2	1022.2	1022.2	1022.2	1022.5
Correction factor	0.989	0.991	0.991	0.991	0.989
Corrected torque	147.1	155.3	157.9	153.9	152.3
Corrected power	31.3	27.8	23.9	18.5	13.1
Fuel consumed	81.6	86.2	89.0	91.0	87.0
Measurement time	29.980	28.380	41.990	53.380	73.180
Fuel mass flow	2.72	2.44	2.12	1.70	1.19
B.S.F.C.	313.1	315.5	319.2	332.1	326.0
Thermal efficiency	29.8	29.5	29.2	28.1	24.6
Fuel temperature	30.0	30.0	30.0	32.0	32.0
Pump delivery/stroke	64.1	68.2	70.2	72.3	69.3
	53.6	57.0	58.8	60.2	57.8
Start of injection	deg. max : 13.9	deg. max : 15.6	deg. max : 16.4	deg. max : 17.3	deg. max : 11.9
	deg. min : 13.7	deg. min : 14.7	deg. min : 15.5	deg. min : 16.5	deg. min : 11.8
	deg. mean : 13.8	deg. mean : 15.1	deg. mean : 16.0	deg. mean : 17.1	deg. mean : 11.8
Start of combustion	deg. max : 4.8	deg. max : 7.4	deg. max : 8.4	deg. max : 10.1	deg. max : 6.6
	deg. min : 4.6	deg. min : 6.3	deg. min : 8.2	deg. min : 10.0	deg. min : 6.5
	deg. mean : 4.7	deg. mean : 7.1	deg. mean : 8.2	deg. mean : 10.1	deg. mean : 6.6
Ignition delay	deg. max : 9.3	deg. max : 8.3	deg. max : 8.2	deg. max : 7.3	deg. max : 5.3
	deg. min : 9.0	deg. min : 7.3	deg. min : 7.1	deg. min : 6.5	deg. min : 5.2
	deg. mean : 9.1	deg. mean : 7.9	deg. mean : 7.9	deg. mean : 7.0	deg. mean : 5.3
Ignition delay	ms. max : 0.783	ms. max : 0.811	ms. max : 0.941	ms. max : 1.069	ms. max : 1.077
	ms. min : 0.737	ms. min : 0.709	ms. min : 0.819	ms. min : 0.951	ms. min : 1.053
	ms. mean : 0.750	ms. mean : 0.771	ms. mean : 0.855	ms. mean : 1.035	ms. mean : 1.065
Max. cylinder pressure	bar : 81.5	bar : 86.6	bar : 88.6	bar : 90.3	bar : 82.6
Max. pressure rise	bar/deg : 10.5	bar/deg : 11.6	bar/deg : 10.8	bar/deg : 10.0	bar/deg : 8.0
	bar/ms : 127.4	bar/ms : 118.8	bar/ms : 93.5	bar/ms : 68.2	bar/ms : 39.6
Oil temperature	deg C : 84.0	deg C : 88.0	deg C : 88.0	deg C : 87.0	deg C : 86.0
Water IN temperature	deg C : 46.0	deg C : 58.0	deg C : 62.0	deg C : 64.0	deg C : 62.0
Water OUT temperature	deg C : 80.0	deg C : 80.0	deg C : 80.0	deg C : 81.0	deg C : 81.0
Exhaust temperature	deg C : 376.0	deg C : 383.0	deg C : 378.0	deg C : 340.0	deg C : 317.0

DATE : 10.05.85  
TEST ID : UNID013

DYNO TORQUE FACTOR : 85.61

ENGINE TEST RESULTS

FUEL  
EMULSION : TEGDNG.9  
DENSITY K9/1 : 0.949  
CAL VALUE MJ/Kg : 38.62

ENGINE  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	87 % LOAD (Nominal) 14 deg BTDC				
Observed load	N : 10.82	11.36	11.52	11.51	11.51
Observed torque	NM : 96.6	90.9	92.3	92.2	92.9
Observed speed	RPM : 2042	1744	1440	1145	813
Observed power	KW : 19.5	16.6	13.9	11.0	7.9
Air temperature	deg C : 28.0	28.0	28.0	29.0	28.0
Barometric pressure	mBar : 1022.5	1022.5	1022.5	1022.5	1022.5
Correction factor	0.987	0.987	0.987	0.989	0.987
Corrected torque	NM : 85.5	89.9	91.1	91.2	91.7
Corrected power	KW : 18.3	16.4	13.7	10.9	7.8
Fuel consumed	gms : 49.5	49.0	43.0	49.4	52.2
Measurement time	seconds : 29.790	34.790	42.000	52.790	74.180
Fuel mass flow	gms/sec : 1.66	1.41	1.17	0.94	0.70
B.S.F.C.	gms/KWhr : 327.1	309.4	305.8	308.4	324.4
Thermal efficiency	% : 28.5	30.1	30.5	30.2	28.7
Fuel temperature	deg C : 32.0	32.0	32.0	32.0	32.0
Pump delivery/stroke	mm+3 : 39.0	38.8	38.9	39.2	41.5
	mgms : 32.5	32.3	32.4	32.7	34.6
Start of injection	deg. max : 9.3	11.1	12.1	13.6	12.7
	min : 8.5	10.3	11.2	12.9	12.1
	mean : 9.0	10.9	11.8	13.3	12.4
Start of combustion	deg. max : -1.7	2.0	4.0	6.5	7.4
	min : -1.4	2.0	3.7	6.4	7.3
	mean : -1.9	2.0	3.8	6.5	7.3
Ignition delay	deg max : 10.0	9.2	8.4	7.1	5.3
	min : 9.2	8.3	7.5	6.4	4.8
	mean : 9.8	8.9	8.0	6.8	5.1
Ignition delay	ms max : 0.817	0.878	0.970	1.033	1.088
	min : 0.752	0.794	0.866	0.925	0.987
	mean : 0.803	0.849	0.930	0.989	1.040
Max. cylinder pressure	bar : 61.3	65.6	69.6	73.7	72.6
Max. pressure rise	bar/deg : 6.6	7.3	8.3	9.3	10.5
	bar/ms : 80.4	78.6	71.6	63.7	51.2
Oil temperature	deg C : 87.0	87.0	86.0	85.0	83.0
Water INT temperature	deg C : 53.0	47.0	43.0	41.0	40.0
Water OUT temperature	deg C : 78.0	78.0	78.0	77.0	77.0
Exhaust temperature	deg C : 277.0	249.0	229.0	209.0	197.0



ENGINE TEST RESULTS  
 ENGINE : FORD  
 MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2950

EMULSION : FUEL  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 38.62

DATE : 10.05.85  
 TEST ID : UNID013

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DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	N : 4.09	4.08	4.28	4.54	4.75
Observed torque	NM : 32.8	32.6	34.3	36.3	38.1
Observed speed	RPM : 2044	1727	1432	1135	823
Observed power	KW : 7.0	5.9	5.1	4.3	3.3
Air temperature	deg C : 28.0	26.0	27.0	28.0	29.0
Barometric pressure	mBar : 1022.5	1022.5	1022.5	1022.5	1022.5
Correction factor	NM : 0.987	0.984	0.986	0.987	0.987
Corrected torque	NM : 32.3	32.1	33.8	35.9	37.6
Corrected power	KW : 6.9	5.8	5.1	4.3	3.2
Fuel consumed	gms : 30.0	28.2	27.4	28.2	27.0
Measurement time	seconds : 29.790	35.190	42.190	53.190	73.390
Fuel mass flow	gms/sec : 1.01	0.80	0.65	0.53	0.37
B.S.F.C.	gms/KW/hr : 523.6	496.5	461.7	447.6	409.3
Thermal efficiency	% : 17.8	18.9	20.2	20.8	22.8
Fuel temperature	deg C : 33.0	32.0	32.0	33.0	32.0
Pump delivery/stroke	mm <sup>3</sup> : 23.7	22.3	21.8	22.4	21.5
	mgms : 19.7	18.6	18.1	19.7	17.9
Start of injection	deg. max : 6.5	5.8	5.7	11.1	11.7
	min : 6.2	4.8	5.6	10.4	11.1
	mean : 6.4	5.5	5.6	10.9	11.3
Start of combustion	deg. max : -5.2	-4.1	-2.9	3.9	6.4
	min : -6.6	-4.7	-3.5	3.7	5.6
	mean : -5.9	-4.3	-3.1	3.6	5.8
Ignition delay	deg max : 13.1	10.5	9.2	7.2	5.7
	min : 11.6	9.1	8.5	6.6	5.3
	mean : 12.3	9.9	8.8	7.1	5.5
Ignition delay	ms max : 1.067	1.014	1.037	1.063	1.160
	min : 0.948	0.879	0.936	0.971	1.073
	mean : 1.005	0.953	1.020	1.040	1.122
Max. cylinder pressure	bar : 48.7	50.3	51.6	61.5	60.8
Max. pressure rise	bar/deg : 3.6	4.1	4.5	7.6	9.2
	bar/ms : 44.3	42.3	39.0	51.6	45.3
Oil temperature	deg C : 85.0	85.0	84.0	83.0	81.0
Water IN temperature	deg C : 35.0	34.0	34.0	44.0	53.0
Water OUT temperature	deg C : 76.0	76.0	76.0	76.0	77.0
Exhaust temperature	deg C : 190.0	168.0	150.0	137.0	126.0

ENGINE TEST RESULTS

DATE : 10/05/85  
TEST ID : UNIDD013

FUEL  
EMULSION : TEGDND3.9  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 38.62

ENGINE  
MAKE : FORD  
MODEL : 3000  
No. CYL : 3  
CAPACITY cc : 2960

DYNO TORQUE FACTOR : 35.61

800

14 deg BTDC

IDLE CONDITION

ENGINE SPEED (NOMINAL)

Observed load N : 0.37  
Observed torque NM : 3.0  
Observed speed RPM : 824  
Observed power KW : .3  
Air temperature deg C : 27.0  
Barometric pressure mBar : 1022.5  
Correction factor : 0.986  
Corrected torque NM : 2.9  
Corrected Power KW : .3

Fuel consumed gms : 14.9  
Measurement time seconds : 73.210  
Fuel mass flow gms/sec : 0.20  
B.S.F.C. gms/KWhr : 2915.9  
Thermal efficiency % : 3.2  
Fuel temperature deg C : 32.0  
Pump delivery/stroke mm<sup>3</sup> : 11.9  
mgms : 9.9

Start of injection deg. max : 10.0  
min : 9.2  
mean : 9.7

Start of combustion deg. max : 4.7  
min : 3.8  
mean : 4.0

Ignition delay deg max : 8.1  
min : 5.4  
mean : 5.7

Ignition delay ms max : 1.242  
min : 1.083  
mean : 1.152

Max. cylinder pressure bar : 52.1  
Max. pressure rise bar/deg : 5.7  
bar/ms : 28.3

Oil temperature deg C : 79.0  
Water IN temperature deg C : 52.0  
Water OUT temperature deg C : 75.0  
Exhaust temperature deg C : 97.0

ENGINE TEST RESULTS  
PAGE 41

ENGINE : FORD  
MAKE : FORD  
MODEL : 3000  
No. CYL : 3  
CAPACITY cc : 2860

FUEL : TEGONS.9  
EMISSION :  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 38.62

DATE : 10.05.85  
TEST ID : UNID014  
DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
100 % LOAD (Nominal)	20 deg BTDC				
Observed load	N : 17.46	19.77	18.98	19.02	18.64
Observed torque	NM : 139.8	150.3	152.0	152.3	142.2
Observed speed	RPM : 2027	1727	1435	1136	834
Observed power	KW : 29.7	27.2	22.8	19.1	13.0
Air temperature	deg C : 29.0	30.0	30.0	31.0	29.0
Barometric pressure	mBar : 1022.5	1022.5	1022.5	1022.5	1022.5
Correction factor		0.989	0.991	0.992	0.989
Corrected torque	NM : 138.2	149.9	150.5	151.1	147.6
Corrected power	KW : 29.3	26.9	22.6	18.0	12.9
Fuel consumed	gms : 80.2	95.9	89.7	91.3	93.0
Measurement time	seconds : 29.990	36.190	42.190	53.190	72.380
Fuel mass flow	gms/sec : 2.67	2.44	2.13	1.72	1.23
B.S.F.C.	gms/KWhr : 328.1	326.4	328.4	343.8	343.5
Thermal efficiency	% : 28.4	28.6	27.5	27.1	27.1
Fuel temperature	deg C : 32.0	32.0	32.0	33.0	32.0
Pump delivery/stroke	mm <sup>3</sup> : 63.3	67.8	71.1	72.6	70.7
	mgms : 52.8	56.5	59.3	60.4	59.0
Start of injection	deg. max : 19.3	21.0	21.8	22.7	17.3
	min : 19.2	20.9	21.8	21.9	16.6
	mean : 19.2	20.9	21.8	22.2	17.1
Start of combustion	deg. max : 9.1	11.1	12.7	13.9	11.1
	min : 8.3	10.9	11.8	13.6	10.9
	mean : 8.6	11.0	12.1	13.7	11.0
Ignition delay	deg max : 10.9	10.1	10.0	9.0	8.3
	min : 10.1	9.8	9.1	8.2	8.6
	mean : 10.6	10.0	9.7	8.5	6.1
Ignition delay	ms max : 0.838	0.970	1.161	1.319	1.265
	min : 0.833	0.949	1.061	1.206	1.127
	mean : 0.873	0.963	1.125	1.250	1.228
Max. cylinder pressure	bar : 90.8	95.2	95.9	97.8	90.6
Max. pressure rise	bar/deg : 13.8	14.5	15.0	14.9	10.5
	bar/ms : 167.6	149.8	129.8	101.2	52.3
Oil temperature	deg C : 82.0	85.0	87.0	87.0	85.0
Water in temperature	deg C : 46.0	59.0	63.0	65.0	63.0
Water OUT temperature	deg C : 80.0	81.0	81.0	82.0	81.0
Exhaust temperature	deg C : 361.0	372.0	372.0	372.0	305.0

ENGINE TEST RESULTS

DATE : 10.25.85  
TEST ID : UNID014

FUEL  
EMULSION : TEBONS.9  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 38.62

ENGINE  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

DYMO TORQUE FACTOR : 35.61

800

1100

1400

1700

2000

ENGINE SPEED (NOMINAL)

67 % LOAD (Nominal) 20 deg BTDC

	800	1100	1400	1700	2000
Observed load	10.96	11.23	10.62	11.32	10.99
Observed torque	87.8	89.9	85.0	90.6	88.0
Observed speed	819	1132	1446	1745	2038
Observed power	7.5	10.7	12.9	16.6	18.8
Air temperature	28.0	28.0	29.0	29.0	29.0
Barometric pressure	1022.5	1022.5	1022.5	1022.5	1022.5
Correction factor	0.987	0.987	0.989	0.989	0.989
Corrected torque	86.7	88.9	84.1	89.6	87.0
Corrected power	7.4	10.5	12.7	16.4	18.6
Fuel consumed	52.0	49.0	46.8	49.0	50.8
Measurement time	73.580	53.390	41.790	34.790	29.790
Fuel mass flow	0.71	0.90	1.12	1.41	1.71
B.S.F.C.	342.4	307.7	316.8	309.6	300.7
Thermal efficiency	27.2	30.3	29.4	30.1	28.2
Fuel temperature	32.0	32.0	32.0	32.0	32.0
Pump delivery/stroke	41.4	38.1	37.2	38.8	40.1
	34.5	31.8	31.0	32.3	33.5
Start of injection	deg. max : 19.2	deg. max : 18.9	deg. max : 17.3	deg. max : 16.5	deg. max : 14.9
	deg. min : 17.2	deg. min : 18.2	deg. min : 16.5	deg. min : 15.5	deg. min : 14.7
	deg. mean : 17.6	deg. mean : 18.4	deg. mean : 17.1	deg. mean : 16.0	deg. mean : 14.9
Start of combustion	deg. max : 11.0	deg. max : 11.1	deg. max : 8.3	deg. max : 7.3	deg. max : 4.7
	deg. min : 10.9	deg. min : 10.9	deg. min : 8.2	deg. min : 6.4	deg. min : 3.7
	deg. mean : 11.0	deg. mean : 11.0	deg. mean : 8.3	deg. mean : 6.6	deg. mean : 4.1
Ignition delay	deg. max : 7.3	deg. max : 7.9	deg. max : 9.1	deg. max : 10.0	deg. max : 11.0
	deg. min : 6.2	deg. min : 7.1	deg. min : 8.3	deg. min : 9.1	deg. min : 10.2
	deg. mean : 8.6	deg. mean : 7.4	deg. mean : 8.8	deg. mean : 9.3	deg. mean : 10.7
Ignition delay	ms max : 1.476	ms max : 1.170	ms max : 1.047	ms max : 0.953	ms max : 0.900
	ms min : 1.270	ms min : 1.047	ms min : 0.957	ms min : 0.868	ms min : 0.835
	ms mean : 1.351	ms mean : 1.089	ms mean : 1.018	ms mean : 0.889	ms mean : 0.872
Max. cylinder pressure	bar : 78.9	bar : 79.2	bar : 78.7	bar : 75.4	bar : 71.2
Max. pressure rise	bar/deg : 10.4	bar/deg : 10.8	bar/deg : 9.9	bar/deg : 9.3	bar/deg : 9.8
	bar/ms : 51.3	bar/ms : 73.2	bar/ms : 85.8	bar/ms : 97.4	bar/ms : 119.6
Oil temperature	deg C : 84.0	deg C : 86.0	deg C : 87.0	deg C : 88.0	deg C : 87.0
Water IN temperature	deg C : 42.0	deg C : 43.0	deg C : 45.0	deg C : 49.0	deg C : 55.0
Water OUT temperature	deg C : 78.0	deg C : 77.0	deg C : 78.0	deg C : 78.0	deg C : 80.0
Exhaust temperature	deg C : 192.0	deg C : 200.0	deg C : 222.0	deg C : 244.0	deg C : 275.0

ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2960

FUEL  
 EMULSION : TEGDN3.9  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 38.52

DATE : 10/05/85  
 TEST ID : UNID0014

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	4.53	4.45	4.41	4.45	4.28
Observed torque	36.3	35.5	35.3	35.6	34.3
Observed speed	2032	1744	1440	1129	807
Observed Power	7.7	6.5	5.3	4.2	2.9
Air temperature	29.0	28.0	27.0	28.0	27.0
Barometric pressure	1022.5	1022.5	1022.5	1022.5	1022.5
Correction factor	0.989	0.987	0.986	0.987	0.986
Corrected torque	35.2	35.0	34.9	35.1	33.8
Corrected power	7.6	6.4	5.2	4.2	2.9
Fuel consumed	31.6	29.1	28.4	30.7	31.3
Measurement time	29.970	34.730	41.390	53.550	74.780
Fuel mass flow	1.05	0.84	0.69	0.57	0.42
B.S.F.C.	497.3	470.7	464.4	456.6	527.6
Thermal efficiency	19.7	19.8	20.1	18.8	17.7
Fuel temperature	32.0	33.0	32.0	32.0	32.0
Pump delivery/stroke	24.9	23.0	22.5	24.4	24.9
	20.8	19.2	18.8	20.3	20.7
Start of injection	deg. max : 12.7	deg. max : 11.2	deg. max : 11.9	deg. max : 17.2	deg. max : 17.2
	deg. min : 12.3	deg. min : 11.1	deg. min : 11.1	deg. min : 16.3	deg. min : 16.3
	deg. mean : 12.4	deg. mean : 11.2	deg. mean : 11.7	deg. mean : 16.9	deg. mean : 16.6
Start of combustion	deg. max : 1.2	deg. max : 2.1	deg. max : 3.8	deg. max : 9.3	deg. max : 10.9
	deg. min : 1.0	deg. min : 2.0	deg. min : 3.0	deg. min : 9.1	deg. min : 10.0
	deg. mean : 1.1	deg. mean : 2.1	deg. mean : 3.6	deg. mean : 9.2	deg. mean : 10.3
Ignition delay	deg. max : 11.5	deg. max : 9.2	deg. max : 8.2	deg. max : 8.0	deg. max : 6.5
	deg. min : 11.2	deg. min : 9.0	deg. min : 8.1	deg. min : 7.2	deg. min : 6.2
	deg. mean : 11.3	deg. mean : 9.1	deg. mean : 8.1	deg. mean : 7.7	deg. mean : 6.3
Ignition delay	ms max : 0.943	ms max : 0.881	ms max : 0.949	ms max : 1.186	ms max : 1.344
	ms min : 0.919	ms min : 0.856	ms min : 0.933	ms min : 1.067	ms min : 1.289
	ms mean : 0.931	ms mean : 0.870	ms mean : 0.940	ms mean : 1.141	ms mean : 1.309
Max. cylinder pressure	bar : 60.1	bar : 60.2	bar : 60.5	bar : 69.6	bar : 66.5
Max. pressure rise	bar/deg : 7.6	bar/deg : 6.1	bar/deg : 6.9	bar/deg : 9.8	bar/deg : 9.4
	bar/ms : 93.0	bar/ms : 64.0	bar/ms : 59.3	bar/ms : 66.6	bar/ms : 45.6
Oil temperature	deg C : 85.0	deg C : 86.0	deg C : 85.0	deg C : 84.0	deg C : 82.0
Water IN temperature	deg C : 38.0	deg C : 37.0	deg C : 40.0	deg C : 49.0	deg C : 52.0
Water OUT temperature	deg C : 77.0	deg C : 76.0	deg C : 77.0	deg C : 78.0	deg C : 77.0
Exhaust temperature	deg C : 186.0	deg C : 167.0	deg C : 149.0	deg C : 139.0	deg C : 131.0

DATE : 10-05-85  
TEST ID : UNID014

ENGINE TEST RESULTS

FUEL : TEGDN3.9  
EMULSION : 0.949  
DENSITY Kg/l : 38.62  
CAL VALUE MJ/Kg :

DYNO TORQUE FACTOR 35.61

ENGINE : FORD  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2960

ENGINE SPEED (NOMINAL) 800

IDLE CONDITION 20 deg BTDC

Observed load m : 0.34  
Observed torque Nm : 2.7  
Observed speed RPM : 818  
Observed power kW : .2

Air temperature deg C : 27.0  
Barometric pressure mBar : 1022.5  
Correction factor : 0.988  
Corrected torque Nm : 2.7  
Corrected power kW : .2

Fuel consumed gms : 15.5  
Measurement time seconds : 73.610  
Fuel mass flow gms/sec : 0.21  
B.S.F.C. gms/KWhr : 3316.0  
Thermal efficiency % : 2.8  
Fuel temperature deg C : 32.0  
Pump delivery/stroke mm³ : 12.3  
mgms : 10.3

Start of injection deg. max : 15.5  
min : 14.6  
mean : 15.0

Start of combustion deg. max : 9.2  
min : 8.2  
mean : 8.5

Ignition delay deg max : 7.2  
min : 6.2  
mean : 6.5

Ignition delay ms max : 1.458  
min : 1.263  
mean : 1.327

Max. cylinder pressure bar : 58.1  
Max. pressure rise bar/deg : 7.1  
bar/ms : 34.7

Oil temperature deg C : 80.0  
Water IN temperature deg C : 51.0  
Water OUT temperature deg C : 76.0  
Exhaust temperature deg C : 98.0

ENGINE TEST RESULTS

DATE : 10:05 '95  
TEST ID : UNID015

FUEL  
EMULSION : TEGDMS-3  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 38.62

ENGINE  
MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2850

DYNG TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
100 % LOAD (Nominal)					
26 deg BDC					
Observed load	N : 15.92	17.82	17.78	18.04	18.10
Observed torque	NM : 127.4	142.7	142.3	144.5	144.9
Observed speed	RPM : 2019	1732	1447	1119	814
Observed power	KW : 26.3	25.9	21.6	16.9	12.4
Air temperature	deg C : 29.0	29.0	29.0	30.0	28.0
Barometric pressure	mBar : 1022.5	1022.5	1022.5	1022.5	1022.5
Correction factor	0.989	0.989	0.989	0.991	0.987
Corrected torque	NM : 126.0	141.1	140.8	143.1	143.0
Corrected power	KW : 26.6	25.6	21.3	16.8	12.2
Fuel consumed	gms : 80.5	85.6	89.5	91.4	89.2
Measurement time	seconds : 30.190	34.990	41.790	53.990	73.990
Fuel mass flow	gms/sec : 2.67	2.45	2.14	1.69	1.21
B.S.F.C.	gms/(KW/hr) : 360.3	344.2	361.4	363.4	355.9
Thermal efficiency	% : 25.9	27.1	25.8	25.8	26.2
Fuel temperature	deg C : 31.0	31.0	31.0	32.0	31.0
Pump delivery/stroke	mm*3 : 63.3	67.7	70.9	72.6	71.0
	mgms : 52.8	58.5	59.2	60.5	59.2
Start of injection	deg. max : 24.7	26.4	27.3	29.0	22.6
	min : 24.5	26.3	27.1	27.2	21.7
	mean : 24.6	26.4	27.2	27.7	21.9
Start of combustion	deg. max : 12.0	14.7	15.4	16.4	14.6
	min : 11.8	13.6	14.5	16.3	14.5
	mean : 11.9	14.1	15.2	16.4	14.6
Ignition delay	deg max : 12.9	12.7	12.7	11.6	9.0
	min : 12.6	11.6	11.7	10.8	7.1
	mean : 12.7	12.3	12.0	11.3	7.4
Ignition delay	ms max : 1.085	1.226	1.457	1.733	1.640
	min : 1.044	1.120	1.349	1.615	1.462
	mean : 1.052	1.183	1.379	1.687	1.508
Max. cylinder pressure	bar : 97.4	100.7	101.7	101.7	95.0
Max. pressure rise	bar/deg : 19.4	20.3	20.2	21.7	12.2
	bar/ms : 234.7	210.8	175.5	145.9	59.4
Oil temperature	deg C : 83.0	87.0	88.0	88.0	87.0
Water IN temperature	deg C : 58.0	65.0	68.0	71.0	68.0
Water OUT temperature	deg C : 81.0	82.0	83.0	83.0	83.0
Exhaust temperature	deg C : 377.0	373.0	369.0	341.0	309.0

DATE : 10-05-85  
TEST ID : UNID015

DYNO TORQUE FACTOR : 35.61

ENGINE TEST RESULTS

FUEL  
EMULSION : TEGDN3.9  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 38.62

ENGINE MAKE : FORD  
MODEL : 3000  
No. CYL : 6  
CAPACITY cc : 2880

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	87 % LOAD (Nominal) 26 deg BTDC				
Observed load	11.37	10.46	11.41	11.10	10.97
Observed torque	31.0	83.8	91.3	88.9	87.9
Observed speed	2033	1738	1427	1139	808
Observed power	13.4	15.3	13.6	10.6	7.4
Air temperature	29.0	29.0	28.0	28.0	28.0
Barometric pressure	1022.5	1022.5	1022.5	1022.5	1022.5
Correction factor	0.989	0.989	0.987	0.987	0.987
Corrected torque	30.0	82.9	90.2	87.7	86.7
Corrected power	13.2	15.1	13.5	10.5	7.3
Fuel consumed	52.9	49.9	52.2	51.7	51.1
Measurement time	29.990	34.790	42.390	52.990	74.590
Fuel mass flow	1.76	1.41	1.23	0.98	0.89
B.S.F.C.	331.3	335.5	329.1	335.6	335.9
Thermal efficiency %	28.1	27.8	29.3	27.8	27.8
Fuel temperature	32.0	32.0	33.0	33.0	33.0
Pump delivery/stroke	41.8	39.8	41.5	41.1	40.7
	34.7	32.3	34.5	34.3	33.9
Start of injection	deg. max : 21.0	deg. max : 22.0	deg. max : 23.5	deg. max : 24.5	deg. max : 22.8
	deg. min : 20.9	deg. min : 21.0	deg. min : 22.7	deg. min : 23.8	deg. min : 21.8
	deg. mean : 21.0	deg. mean : 21.7	deg. mean : 23.0	deg. mean : 24.3	deg. mean : 22.3
Start of combustion	deg. max : 9.1	deg. max : 10.1	deg. max : 12.8	deg. max : 14.7	deg. max : 14.6
	deg. min : 8.3	deg. min : 9.9	deg. min : 12.0	deg. min : 13.6	deg. min : 13.7
	deg. mean : 8.9	deg. mean : 10.0	deg. mean : 12.6	deg. mean : 14.4	deg. mean : 14.1
Ignition delay	deg. max : 12.7	deg. max : 12.1	deg. max : 10.8	deg. max : 10.7	deg. max : 8.8
	deg. min : 11.8	deg. min : 10.8	deg. min : 9.9	deg. min : 9.2	deg. min : 7.5
	deg. mean : 12.0	deg. mean : 11.7	deg. mean : 10.4	deg. mean : 9.8	deg. mean : 8.2
Ignition delay	ms max : 1.042	ms max : 1.155	ms max : 1.263	ms max : 1.371	ms max : 1.819
	ms min : 0.969	ms min : 1.038	ms min : 1.159	ms min : 1.344	ms min : 1.542
	ms mean : 0.986	ms mean : 1.120	ms mean : 1.219	ms mean : 1.438	ms mean : 1.698
Max. cylinder pressure	bar : 82.2	bar : 83.2	bar : 85.4	bar : 85.3	bar : 81.3
Max. pressure rise	bar/deg : 12.6	bar/deg : 12.6	bar/deg : 14.5	bar/deg : 15.5	bar/deg : 11.1
	bar/ms : 154.0	bar/ms : 131.4	bar/ms : 123.9	bar/ms : 105.7	bar/ms : 53.9
Oil temperature	deg C : 90.0	deg C : 90.0	deg C : 90.0	deg C : 88.0	deg C : 87.0
Water IN temperature	deg C : 54.0	deg C : 48.0	deg C : 45.0	deg C : 45.0	deg C : 46.0
Water OUT temperature	deg C : 80.0	deg C : 79.0	deg C : 79.0	deg C : 80.0	deg C : 80.0
Exhaust temperature	deg C : 271.0	deg C : 237.0	deg C : 232.0	deg C : 213.0	deg C : 195.0



ENGINE TEST RESULTS

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ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2860

FUEL EMULSION : TEGDN3.9  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 38.62

DATE : 10/05/85  
 TEST ID : UNID015

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	N : 4.75	4.23	4.65	4.47	4.70
Observed torque	NM : 38.0	33.9	37.2	35.8	37.6
Observed speed	RPM : 2038	1732	1442	1130	821
Observed power	KW : 8.1	6.1	5.6	4.2	3.2
Air temperature	deg C : 27.0	27.0	27.0	27.0	27.0
Barometric pressure	mBar : 1022.5	1022.5	1022.5	1022.5	1022.5
Correction factor	: 0.986	0.986	0.986	0.986	0.986
Corrected torque	NM : 37.5	33.4	36.7	35.3	37.1
Corrected power	KW : 8.0	6.1	5.5	4.2	3.2
Fuel consumed	gms : 32.3	29.7	29.5	30.1	35.1
Measurement time	seconds : 29.790	34.990	41.990	53.590	73.380
Fuel mass flow	gms/sec : 1.08	0.85	0.70	0.56	0.48
B.S.F.C.	gms/KW/hr : 488.3	504.5	456.5	484.3	540.1
Thermal efficiency	% : 19.1	18.5	20.4	19.2	17.3
Fuel temperature	deg C : 33.0	33.0	32.0	32.0	32.0
Pump delivery/stroke	mm <sup>3</sup> : 25.5	23.5	23.4	23.9	23.0
	mgms : 21.3	19.6	19.5	19.9	23.3
Start of injection	deg. max : 18.3	17.5	18.2	22.6	22.6
	min : 17.8	16.5	17.3	21.9	22.5
	mean : 18.1	16.9	17.6	22.3	22.6
Start of combustion	deg. max : 5.7	6.6	8.3	12.9	14.6
	min : 5.8	8.4	8.2	11.9	13.7
	mean : 5.6	6.8	8.4	12.6	13.9
Ignition delay	deg max : 12.7	10.9	9.9	10.0	8.9
	min : 12.1	10.0	8.9	9.1	8.0
	mean : 12.5	10.4	9.2	9.7	8.7
Ignition delay	ms max : 1.036	1.053	1.141	1.474	1.806
	min : 0.927	0.965	1.029	1.336	1.621
	mean : 1.020	1.001	1.084	1.435	1.761
Max. cylinder pressure	bar : 67.3	66.3	65.3	70.2	71.4
Max. pressure rise	bar/deg : 8.6	8.6	8.9	10.0	10.8
	bar/ms : 105.6	89.5	76.7	67.9	53.9
Oil temperature	deg C : 87.0	87.0	87.0	85.0	84.0
Water IN temperature	deg C : 41.0	41.0	49.0	54.0	53.0
Water OUT temperature	deg C : 78.0	78.0	78.0	80.0	83.0
Exhaust temperature	deg C : 187.0	185.0	150.0	138.0	133.0

DATE : 10:05:85  
TEST ID : UNID015

DYND TORQUE FACTOR : 35.61

ENGINE TEST RESULTS

FUEL : TEBDN3.9  
EMULSION :  
DENSITY Kg/l : 0.949  
CAL VALUE MJ/Kg : 38.62

ENGINE : FORD  
MAKE : FORD  
MODEL : 3000  
NO CYL : 3  
CAPACITY CC : 2860

ENGINE SPEED (NOMINAL) : 800  
IDLE CONDITION : 25 deg BTDC

Observed load	N	0.37
Observed torque	NM	3.0
Observed speed	RPM	829
Observed power	KW	.3
Air temperature	deg C	26.0
Barometric pressure	mBar	1022.6
Correction factor		0.984
Corrected torque	NM	2.9
Corrected power	KW	.3
Fuel consumed	gms	15.9
Measurement time	seconds	72.780
Fuel mass flow	gms/sec	0.22
B.S.F.C.	gms/KW/hr	3086.9
Thermal efficiency	%	3.0
Fuel temperature	deg C	31.0
Pump delivery/stroke	mm <sup>3</sup>	12.5
	mgms	10.5
Start of injection	deg.	20.9
	min	20.2
	mean	20.7
Start of combustion	deg.	12.0
	min	11.9
	mean	12.1
Ignition delay	deg	8.9
	min	8.1
	mean	8.6
Ignition delay	ms	1.784
	min	1.624
	mean	1.723
Max. cylinder pressure	bar	57.2
Max. pressure rise	bar/deg	6.4
	bar/ms	31.9
Oil temperature	deg C	79.0
Water IN temperature	deg C	62.0
Water OUT temperature	deg C	69.0
Exhaust temperature	deg C	89.0

ENGINE TEST RESULTS  
 MAKE : FORD  
 MODEL : 3000  
 No. CYL : 3  
 CAPACITY CC : 2800

FUEL  
 DISTILLATE :  
 DENSITY Kg/l : 0.849  
 CAL VALUE MJ/Kg : 42.75

DATE : 14/6/85  
 TEST ID : UNIDC18  
 DYNQ TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	18.89	20.11	19.93	19.42	19.40
Observed torque	151.2	161.0	159.6	155.5	155.3
Observed speed	2038	1714	1432	1142	839
Observed power	32.3	28.9	24.3	18.6	13.6
Air temperature	deg C : 32.0	32.0	33.0	30.0	30.0
Barometric pressure	mBar : 1021.5	1021.5	1021.5	1021.5	1021.5
Correction factor	0.994	0.994	0.996	0.991	0.991
Corrected torque	NM : 150.4	160.1	159.0	154.1	153.9
Corrected power	KW : 32.1	28.7	24.2	18.4	13.5
Fuel consumed	gms : 82.3	86.8	89.1	92.5	91.5
Measurement time	seconds : 30.000	35.390	41.780	52.990	71.780
Fuel mass flow	gms/sec : 2.76	2.45	2.13	1.75	1.27
B.S.F.C.	gms/KWhr : 309.6	306.5	317.7	340.9	339.2
Thermal efficiency	% : 27.2	27.5	28.5	24.7	24.9
Fuel temperature	deg C : 30.0	32.0	33.0	32.0	32.0
Pump delivery/stroke	mm <sup>3</sup> : 64.8	68.5	70.5	73.3	72.9
	mgms : 54.2	57.1	59.8	61.1	60.8
Start of injection	deg. max : 18.2	19.1	19.9	20.9	14.6
	min : 17.4	19.0	19.2	20.8	13.9
	mesh : 17.7	19.1	19.3	20.3	14.4
Start of combustion	deg. max : 8.2	10.1	10.9	12.9	9.2
	min : 7.3	9.1	10.8	11.9	9.1
	mean : 7.7	9.6	10.8	12.6	9.1
Ignition delay	deg max : 10.9	10.0	9.1	8.9	5.5
	min : 9.3	9.0	8.4	8.1	4.8
	mean : 10.0	9.4	9.9	8.3	5.3
Ignition delay	ms max : 0.888	0.968	1.047	1.301	1.091
	min : 0.758	0.877	0.964	1.178	0.955
	mean : 0.818	0.916	1.025	1.208	1.032
Max. cylinder pressure	bar : 90.8	95.5	98.9	98.6	89.0
Max. pressure rise	bar/deg : 13.6	14.9	12.4	14.1	9.4
	bar/ms : 186.8	147.1	108.0	96.6	47.5
Oil temperature	deg C : 83.0	94.0	94.0	92.0	89.0
Water IN temperature	deg C : 55.0	68.0	69.0	68.0	67.0
Water OUT temperature	deg C : 85.0	87.0	87.0	86.0	86.0
Water temperature	deg C : 420.0	412.0	400.0	380.0	322.0

ENGINE TEST RESULTS

PAGE 50

DATE : 14/6/85  
TEST ID : UNID0016

FUEL  
DISTILLATE : DIST 100  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE  
MAKE : FORD  
MODEL : 3000  
NO CYL : 3  
CAPACITY cc : 2950

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	57 % LOAD (Nominal) 12 deg BTDC				
Observed load	N : 10.82	10.86	11.49	10.39	11.59
Observed torque	NM : 86.7	86.9	92.0	83.2	92.8
Observed speed	RPM : 2044	1732	1438	1127	835
Observed power	KW : 18.6	15.8	13.8	9.8	8.1
Air temperature	deg C : 30.0	30.0	29.0	29.0	28.0
Barometric pressure	mBar : 1021.0	1021.0	1021.0	1021.0	1021.0
Correction factor	0.992	0.992	0.990	0.990	0.988
Corrected torque	NM : 85.9	86.2	91.0	82.4	91.7
Corrected power	KW : 18.4	15.6	13.7	9.7	8.0
Fuel consumed	gms : 45.1	44.0	45.5	41.3	43.5
Measurement time	seconds : 29.750	24.990	42.190	53.590	72.180
Fuel mass flow	gms/sec : 1.51	1.26	1.08	0.78	0.60
B.S.F.C.	gms/KW/hr : 286.3	289.6	283.2	289.6	270.7
Thermal efficiency	% : 28.4	29.1	29.7	29.1	31.1
Fuel temperature	deg C : 32.0	33.0	32.0	32.0	31.0
Pump delivery/stroke	mm <sup>3</sup> : 35.5	34.9	36.0	33.3	34.6
	mgms : 29.6	29.0	30.0	27.7	28.9
Start of injection	deg. max : 12.9	13.8	15.8	16.4	12.7
	min : 12.6	13.7	15.4	16.4	12.0
mean :	12.8	13.7	15.5	16.4	12.6
Start of combustion	deg. max : 2.8	4.7	6.6	9.1	6.6
	min : 2.8	4.6	6.5	8.4	6.5
mean :	2.8	4.6	6.5	9.0	6.5
Ignition delay	deg max : 10.1	9.2	9.0	7.9	6.2
	min : 9.8	9.0	8.8	7.2	5.5
mean :	10.0	9.1	8.9	7.4	6.0
Ignition delay	ms max : 0.820	0.881	1.043	1.175	1.237
	min : 0.799	0.867	1.023	1.070	1.103
mean :	0.814	0.876	1.035	1.099	1.203
Max. cylinder pressure	bar : 69.2	71.9	75.0	76.5	70.4
Max. pressure rise	bar/deg : 9.6	9.2	10.6	10.2	9.2
	105.7	95.3	91.8	69.0	46.0
Oil temperature	deg C : 90.0	91.0	90.0	88.0	86.0
Water IN temperature	deg C : 52.0	45.0	40.0	40.0	39.0
Water OUT temperature	deg C : 83.0	82.0	81.0	81.0	81.0
Exhaust temperature	deg C : 269.0	239.0	226.0	196.0	185.0

ENGINE TEST RESULTS

PAGE 51

DATE : 14/5/85  
TEST ID : UNID0018

FUEL  
DISTILLATE : DIST 100  
DENSITY K9/1 : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE  
MAKE : FORD  
MODEL : 3000  
NO CYL : 3  
CAPACITY cc : 2900

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
	33 % LOAD (Nominal) 18 deg BTDC				
Observed load	N : 4.44	4.55	4.77	4.56	4.51
Observed torque	NH : 36.5	36.5	38.2	36.5	36.1
Observed speed	RPM : 2033	1724	1427	1106	813
Observed power	KW : 7.6	6.6	5.7	4.2	3.1
Air temperature	deg C : 29.0	29.0	28.0	28.0	27.0
Barometric pressure	mBar : 1021.0	1021.0	1021.0	1021.0	1021.0
Correction factor	: 0.990	0.990	0.988	0.988	0.987
Corrected torque	NM : 35.2	36.1	37.7	36.1	35.7
Corrected power	KW : 7.5	6.5	5.6	4.2	3.0
Fuel consumed	gms : 27.8	27.0	26.0	28.2	26.2
Measurement time	seconds : 29.990	35.190	42.990	54.590	74.180
Fuel mass flow	gms/sec : 0.93	0.77	0.61	0.52	0.35
B.S.F.C.	gms/KW/hr : 445.9	423.9	391.8	444.8	419.0
Thermal efficiency	% : 18.9	19.9	21.5	18.9	20.1
Fuel temperature	deg C : 32.0	32.0	32.0	31.0	31.0
Pump delivery/stroke	mm <sup>3</sup> : 21.9	21.4	20.9	22.4	20.8
	mgms : 18.2	17.8	17.2	18.7	17.4
Start of injection	deg. max : 9.3	10.1	12.1	15.4	11.9
	min : 9.3	9.5	12.0	13.7	11.0
	mean : 9.4	10.0	12.1	14.6	11.2
Start of combustion	deg. max : -1.0	.4	3.9	7.4	5.5
	min : -1.6	-1	3.0	6.5	5.5
	mean : -1.4	.3	3.4	6.9	5.5
Ignition delay	deg max : 11.1	9.9	9.1	8.0	8.4
	min : 10.4	9.1	8.2	7.2	5.5
	mean : 10.8	9.7	8.7	7.7	5.7
Ignition delay	ms max : 0.907	0.982	1.062	1.210	1.313
	min : 0.855	0.891	0.955	1.091	1.123
	mean : 0.887	0.940	1.016	1.160	1.167
Max. cylinder pressure	bar : 55.5	57.9	60.5	65.4	59.9
Max. Pressure rise	bar/deg : 5.6	6.5	7.9	9.8	6.7
	bar/ms : 68.4	67.6	67.8	64.7	32.8
Oil temperature	deg C : 88.0	89.0	87.0	84.0	83.0
Water IN temperature	deg C : 43.0	38.0	26.0	34.0	38.0
Water OUT temperature	deg C : 81.0	79.0	79.0	79.0	78.0
Exhaust temperature	deg C : 184.0	167.0	151.0	186.0	127.0

ENGINE TEST RESULTS

DATE : 14/6/85  
TEST ID : UNID016

DYND TORQUE FACTOR : 35.61

FUEL  
DISTILLATE : DIST 100  
DENSITY Kg/l : 0.849  
CAL VALUE MJ/Kg : 42.75

ENGINE MAKE : FORD  
MODEL : 3000  
No CYL : 3  
CAPACITY cc : 2860

ENGINE SPEED (NOMINAL) : 800  
IDLE CONDITION : 18 deg U10C

Observed load	N :	0.39
Observed torque	NM :	3.1
Observed speed	RPM :	814
Observed power	KW :	.3
Air temperature	deg C :	26.0
Barometric pressure	mBar :	1021.0
Correction factor	:	0.985
Corrected torque	NM :	3.0
Corrected power	KW :	.3
Fuel consumed	gms :	14.0
Measurement time	seconds :	74.010
Fuel mass flow	gms/sec :	0.19
B.S.F.C.	gms/KW/hr :	2642.6
Thermal efficiency	% :	3.2
Fuel temperature	deg C :	30.0
Pump delivery/stroke	mm <sup>3</sup> :	11.1
	mgms :	9.3
Start of injection	deg. max :	10.9
	min :	10.4
	mean :	10.6
Start of combustion	deg. max :	4.7
	min :	4.1
	mean :	4.5
Ignition delay	deg max :	6.3
	min :	5.9
	mean :	6.1
Ignition delay	ms max :	1.288
	min :	1.203
	mean :	1.239
Max. cylinder pressure	bar :	51.7
Max. pressure rise	bar/deg :	5.5
	bar/ms :	26.8
Oil temperature	deg C :	80.0
Water IN temperature	deg C :	38.0
Water OUT temperature	deg C :	76.0
Exhaust temperature	deg C :	93.0

ENGINE TEST RESULTS

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ENGINE : FORD  
 MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2860

FUEL : E25/G. STEERN  
 EMULSION : 0.848  
 DENSITY Kg/l : 0.848  
 CAL VALUE MJ/Kg : 37.66

DATE : 14/8/85  
 TEST ID : UNID017

DYNO TORQUE FACTOR : 35.61

ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
Observed load	N : 17.73	18.77	19.29	18.77	18.55
Observed torque	NM : 141.9	150.3	155.2	150.3	148.5
Observed speed	RPM : 2040	1724	1439	1126	833
Observed power	KW : 30.3	27.1	23.4	17.7	13.0
Air temperature	deg C : 30.0	29.0	30.0	29.0	29.0
Barometric pressure	mBar : 1020.0	1020.0	1020.0	1020.0	1020.0
Correction factor	0.992	0.990	0.992	0.990	0.990
Corrected torque	NM : 140.8	148.9	154.0	148.9	147.1
Corrected power	KW : 30.1	26.9	23.2	17.6	12.8
Fuel consumed	gms : 82.7	94.9	90.8	93.4	91.6
Measurement time	seconds : 29.790	35.150	42.000	53.590	72.380
Fuel mass flow	gms/sec : 2.78	2.41	2.18	1.74	1.27
B.S.F.C.	gms/KW/hr : 322.2	322.5	335.4	357.4	355.1
Thermal efficiency	% : 28.8	29.6	28.5	26.7	26.9
Fuel temperature	deg C : 26.0	27.0	27.0	28.0	29.0
Pump delivery/stroke	mm*3 : 64.3	66.8	71.9	74.0	72.7
	mgms : 54.4	55.9	60.1	61.9	60.8
Start of injection	deg. max : 17.4	18.3	20.0	21.0	15.5
	min : 17.3	18.2	19.2	20.0	15.3
mean :	17.3	18.2	19.5	20.4	15.4
Start of combustion	deg. max : 7.2	8.8	10.9	12.9	9.3
	min : 7.2	9.1	10.1	11.8	9.2
mean :	7.2	9.3	10.7	12.1	9.2
Ignition delay	deg max : 10.1	9.1	9.9	9.1	6.3
	min : 10.1	8.4	8.3	7.2	6.1
mean :	10.1	9.0	8.8	8.3	6.2
Ignition delay	ms max : 0.829	0.884	1.143	1.352	1.288
	min : 0.823	0.817	0.985	1.065	1.220
mean :	0.826	0.868	1.020	1.228	1.245
Max. cylinder pressure	bar : 89.3	93.3	94.6	97.1	89.1
Max. pressure rise	bar/deg : 15.5	15.4	14.2	15.5	10.1
	bar/ms : 189.7	159.3	122.6	104.9	50.7
Oil temperature	deg C : 77.0	82.0	83.0	84.0	83.0
Water IN temperature	deg C : 50.0	57.0	61.0	63.0	63.0
Water OUT temperature	deg C : 82.0	82.0	82.0	83.0	83.0
Exhaust temperature	deg C : 372.0	364.0	366.0	336.0	308.0

ENGINE TEST RESULTS

DATE : 14/8/85  
TEST ID : UMID017

FUEL E25/3.9TEGON  
EMULSION : 0.848  
DENSITY Kg/l : 37.66  
CAL VALUE MJ/Kg :

ENGINE MAKE : FORD  
MODEL : 3000  
No. CYL : 2  
CAPACITY cc : 2860

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
	67% LOAD (Nominal) 18 deg BTDC				
Observed load	N : 11.23	11.00	11.13	11.45	11.10
Observed torque	NM : 89.9	88.1	89.1	91.7	88.9
Observed speed	RPM : 2025	1732	1428	1141	814
Observed power	KW : 19.1	16.0	13.3	11.0	7.6
Air temperature	deg C : 29.0	28.0	28.0	28.0	27.0
Barometric pressure	mBar : 1020.0	1020.0	1020.0	1020.0	1020.0
Correction factor		0.989	0.989	0.989	0.987
Corrected torque	NM : 89.0	87.1	88.1	90.7	87.7
Corrected power	KW : 18.9	15.8	13.2	10.8	7.5
Fuel consumed	gms : 52.4	50.3	50.1	49.9	53.9
Measurement time	seconds : 29.990	34.990	42.390	52.990	74.180
Fuel mass flow	gms/sec : 1.75	1.44	1.18	0.94	0.73
B.S.F.C.	gms/KW/hr : 333.2	327.6	323.0	312.2	350.0
Thermal efficiency	% : 28.7	29.2	29.8	30.6	27.3
Fuel temperature	deg C : 29.0	30.0	30.0	30.0	30.0
Pump delivery/stroke	mm <sup>3</sup> : 41.3	39.8	39.7	39.5	42.8
	mgms : 34.5	33.2	33.1	32.9	35.7
Start of injection	deg. max : 13.7	13.8	15.4	17.1	13.7
	min : 13.0	13.7	14.8	16.4	12.8
mean :	13.4	13.9	15.1	16.6	13.2
Start of combustion	deg. max : 2.9	4.7	7.3	9.3	8.2
	min : 2.8	4.6	6.4	8.4	7.4
mean :	2.8	4.6	6.7	9.1	7.6
Ignition delay	deg max : 10.8	9.2	8.9	8.0	6.2
	min : 10.2	9.0	7.6	7.3	4.7
mean :	10.6	9.1	8.5	7.6	5.6
Ignition delay	ms max : 0.892	0.884	1.043	1.167	1.276
	min : 0.838	0.869	0.985	1.064	0.987
mean :	0.870	0.877	0.988	1.108	1.138
Max. cylinder pressure	bar : 72.1	73.7	76.0	77.7	74.9
Max. pressure rise	bar/deg : 11.2	9.5	11.0	10.0	9.0
	bar/ms : 136.3	98.2	94.1	88.7	43.9
Oil temperature	deg C : 85.0	87.0	87.0	85.0	84.0
Water IN temperature	deg C : 51.0	45.0	43.0	42.0	42.0
Water OUT temperature	deg C : 81.0	80.0	79.0	79.0	79.0
Exhaust temperature	deg C : 270.0	236.0	221.0	201.0	190.0



ENGINE TEST RESULTS

ENGINE MAKE : FORD  
 MODEL : 3000  
 No CYL : 3  
 CAPACITY cc : 2960

FUEL EMULSION : E25/3.9TEGDN  
 DENSITY Kg/l : 0.848  
 CAL VALUE MJ/Kg : 37.66

DATE : 14/6/85  
 TEST ID : UNID017

DYNO TORQUE FACTOR : 35.61

	2000	1700	1400	1100	800
ENGINE SPEED (NOMINAL)	2000	1700	1400	1100	800
	33 % LOAD (Nominal) 18 deg BDC				
Observed load	N : 4.59	4.50	4.29	4.72	4.77
Observed torque	NM : 36.7	36.0	34.3	37.8	38.2
Observed speed	RPM : 2062	1734	1424	1125	807
Observed power	KW : 7.9	6.5	5.1	4.4	3.2
Air temperature	deg C : 28.0	28.0	27.0	27.0	26.0
Barometric pressure	mBar : 1020.0	1020.0	1020.0	1020.0	1020.0
Corrected torque	NM : 36.3	35.6	33.9	37.3	37.6
Corrected power	KW : 7.8	6.5	5.1	4.4	3.2
Fuel consumed	gms : 31.8	30.2	28.1	32.3	29.2
Measurement time	seconds : 22.350	34.950	42.590	53.590	74.780
Fuel mass flow	gms/sec : 1.08	0.86	0.66	0.60	0.38
B.5.F.C.	gms/KW/hr : 496.7	480.6	469.6	494.1	427.1
Thermal efficiency	% : 19.2	19.9	20.4	19.3	22.4
Fuel temperature	deg C : 31.0	30.0	30.0	30.0	29.0
Pump delivery/stroke	mm <sup>3</sup> : 25.2	23.9	22.2	25.7	22.4
	mgms : 21.0	19.9	18.5	21.4	18.7
Start of injection	deg. max : 9.3	10.1	10.1	15.5	12.8
	min : 9.2	9.8	10.1	14.6	12.1
	mean : 9.3	9.8	10.1	14.9	12.5
Start of combustion	deg. max : -1.4	.3	2.0	7.4	7.3
	min : -1.7	.2	1.1	7.3	6.5
	mean : -1.6	.2	1.8	7.4	6.8
Ignition delay	deg max : 11.0	10.0	8.9	8.1	6.3
	min : 10.6	9.0	8.0	7.3	4.8
	mean : 10.8	9.6	8.3	7.5	5.7
Ignition delay	ms max : 0.887	0.960	1.045	1.203	1.295
	min : 0.859	0.868	0.937	1.076	0.936
	mean : 0.875	0.924	0.968	1.110	1.177
Max. cylinder pressure	bar : 57.1	58.2	59.9	65.8	62.0
Max. pressure rise	bar/deg : 6.3	6.0	7.2	9.5	9.7
	bar/ms : 78.0	62.8	61.8	64.0	47.1
Oil temperature	deg C : 85.0	86.0	85.0	83.0	81.0
Water IN temperature	deg C : 42.0	33.0	30.0	29.0	30.0
Water OUT temperature	deg C : 79.0	78.0	78.0	78.0	77.0
Exhaust temperature	deg C : 185.0	184.0	145.0	139.0	122.0

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DATE : 14/6/85  
TEST ID : UNIDG17

DYNO TORQUE FACTOR : 35.61

ENGINE TEST RESULTS

FUEL : C25/3.91ESDN  
EMULSION :  
DENSITY Kg/l : 0.848  
CAL VALUE MJ/Kg : 37.66

ENGINE : FORD  
E.P. : 3000  
REL. : 3  
CYL : 3  
CAPACITY cc : 2860

800

SPEED (NOMINAL)

18 deg BTDC

IDLE CONDITION

load : 0.34  
torque : 2.7  
RPM : 805  
power : .2  
temperature : 26.0  
cylinder pressure : 1020.0  
torque factor : 0.988  
ind torque : 2.7  
ind power : .2

measured : 15.8  
vent time : 74.420  
mass flow : 0.21  
efficiency : 2055.2  
temperature : 2.8  
delivery/stroke : 60.0  
 : 12.4  
 : 10.4

injection deg. max : 11.1  
min : 10.9  
mean : 11.0  
deg. max : 5.6  
min : 4.8  
mean : 5.2  
deg. max : 6.1  
min : 5.4  
mean : 5.7  
ms max : 1.268  
min : 1.115  
mean : 1.176

cylinder pressure bar : 53.6  
pressure rise bar/deg : 6.1  
 : 29.7

temperature deg C : 79.0  
IN temperature deg C : 33.0  
OUT temperature deg C : 76.0  
 : 92.0