1
00:00:32,870 --> 00:00:20,140
[Music]

2
00:00:34,790 --> 00:00:32,880
the sterling engine is recognized by the

3
00:00:36,950 --> 00:00:34,800
department of energy as a promising

4
00:00:38,630 --> 00:00:36,960
alternative to the internal combustion

5
00:00:43,990 --> 00:00:38,640
engine

6
00:00:45,830 --> 00:00:44,000
sterling burns any fuel creating heat

7
00:00:49,270 --> 00:00:45,840
for the cylinder

8
00:00:53,270 --> 00:00:49,280
the heat itself powers the engine

9
00:00:55,189 --> 00:00:53,280
any fuel can be used liquid solid or gas

10
00:00:58,389 --> 00:00:55,199
the sterling even operates on heat from

11
00:01:01,430 --> 00:00:58,399
nuclear and solar energy

12
00:01:04,310 --> 00:01:01,440
combustion is continuous and complete

13
00:01:06,630 --> 00:01:04,320

quiet and clean

14
00:01:08,950 --> 00:01:06,640
ongoing research in aeronautical and

15
00:01:11,590 --> 00:01:08,960
automotive engines at the nasa lewis

16
00:01:13,510 --> 00:01:11,600
research center in cleveland ohio

17
00:01:15,670 --> 00:01:13,520
indicates the sterling may be the engine

18
00:01:18,230 --> 00:01:15,680
of the future

19
00:01:20,149 --> 00:01:18,240
feasibility studies by manufacturers

20
00:01:22,710 --> 00:01:20,159
indicate the technology to produce

21
00:01:24,630 --> 00:01:22,720
sterling engines commercially exists

22
00:01:26,789 --> 00:01:24,640
today

23
00:01:29,030 --> 00:01:26,799
value engineering studies have shown the

24
00:01:33,030 --> 00:01:29,040
sterling can be manufactured in low

25
00:01:35,109 --> 00:01:33,040
production volumes at a competitive cost

26
00:01:37,510 --> 00:01:35,119
the engine can be built to provide power

27
00:01:39,990 --> 00:01:37,520
for both propulsion and stationary

28
00:01:41,590 --> 00:01:40,000
applications

29
00:01:44,069 --> 00:01:41,600
a sterling engine developed by

30
00:01:45,990 --> 00:01:44,079
mechanical technology incorporated for

31
00:01:48,469 --> 00:01:46,000
nasa lewis research center and the

32
00:01:51,429 --> 00:01:48,479
department of energy has been evaluated

33
00:01:55,270 --> 00:01:51,439
by a nasa technology utilization program

34
00:01:57,429 --> 00:01:55,280
under actual driving conditions

35
00:01:59,670 --> 00:01:57,439
the sterling engine was installed in an

36
00:02:02,550 --> 00:01:59,680
air force van

37
00:02:05,910 --> 00:02:02,560
the van's original 150 horsepower diesel

38
00:02:08,389 --> 00:02:05,920

engine was replaced by a 75 horsepower

39
00:02:10,710 --> 00:02:08,399
sterling and assigned actual duty

40
00:02:12,550 --> 00:02:10,720
service at langley air force base in

41
00:02:14,550 --> 00:02:12,560
virginia

42
00:02:17,110 --> 00:02:14,560
air force operators drove the van

43
00:02:19,990 --> 00:02:17,120
throughout the test serving 10 to 15

44
00:02:23,030 --> 00:02:20,000
aircraft on a flight line driving from

45
00:02:25,190 --> 00:02:23,040
base to aircraft moving about the field

46
00:02:26,470 --> 00:02:25,200
in and around aircraft

47
00:02:29,670 --> 00:02:26,480
stop and go

48
00:02:31,750 --> 00:02:29,680
hauling personnel and equipment

49
00:02:34,869 --> 00:02:31,760
performance was monitored by special

50
00:02:38,229 --> 00:02:34,879
equipment mounted in the van

51
00:02:41,670 --> 00:02:38,239
engine speed vehicle speed and miles

52
00:02:43,430 --> 00:02:41,680
accumulated were recorded daily

53
00:02:45,910 --> 00:02:43,440
during this air force mission three

54
00:02:48,070 --> 00:02:45,920
different fuels were used

55
00:02:50,790 --> 00:02:48,080
unleaded gasoline

56
00:02:53,509 --> 00:02:50,800
jp4 aircraft fuel

57
00:02:55,190 --> 00:02:53,519
and diesel fuel

58
00:02:57,509 --> 00:02:55,200
the van functioned normally during the

59
00:02:59,670 --> 00:02:57,519
one-year evaluation period on whatever

60
00:03:01,830 --> 00:02:59,680
fuel was available

61
00:03:04,390 --> 00:03:01,840
the sterling's high torque capability at

62
00:03:06,630 --> 00:03:04,400
low speeds enabled towing of all heavy

63
00:03:09,190 --> 00:03:06,640

support equipment

64
00:03:12,229 --> 00:03:09,200
after fourteen hundred hours and seven

65
00:03:14,869 --> 00:03:12,239
thousand miles results showed improved

66
00:03:17,589 --> 00:03:14,879
fuel economy

67
00:03:20,309 --> 00:03:17,599
a second vehicle a standard air force

68
00:03:22,790 --> 00:03:20,319
truck was also evaluated

69
00:03:25,509 --> 00:03:22,800
the truck's original 95 horsepower

70
00:03:29,430 --> 00:03:25,519
internal combustion engine was replaced

71
00:03:31,430 --> 00:03:29,440
by a 75 horsepower sterling engine

72
00:03:34,070 --> 00:03:31,440
tests were conducted over a one-year

73
00:03:36,630 --> 00:03:34,080
period for one thousand hours and

74
00:03:39,350 --> 00:03:36,640
nineteen thousand miles of open highway

75
00:03:42,949 --> 00:03:39,360
and city streets on rough and rural

76
00:03:46,229 --> 00:03:42,959
roads and in normal traffic in a variety

77
00:03:52,149 --> 00:03:49,110
in moderate climate the norfolk virginia

78
00:03:55,750 --> 00:03:52,159
area an expediter mission at langley air

79
00:04:01,270 --> 00:03:58,949
hot moist sea air environment a general

80
00:04:05,190 --> 00:04:01,280
transportation assignment at eglin air

81
00:04:13,589 --> 00:04:08,630
hot dry environment base taxi service at

82
00:04:20,069 --> 00:04:15,990
in the north a base supply mission at

83
00:04:24,550 --> 00:04:21,990
in addition the truck was driven from

84
00:04:28,150 --> 00:04:24,560
texas to washington dc

85
00:04:32,790 --> 00:04:28,160
a distance of 1600 miles the entire trip

86
00:04:38,310 --> 00:04:35,270
the sterling consistently delivered more

87
00:04:40,469 --> 00:04:38,320
miles per gallon

88
00:04:42,629 --> 00:04:40,479

current engines are a major contributor

89
00:04:45,590 --> 00:04:42,639
to the severe atmospheric pollution in

90
00:04:48,070 --> 00:04:45,600
our cities today

91
00:04:50,150 --> 00:04:48,080
exhaust emissions were evaluated and the

92
00:04:51,270 --> 00:04:50,160
sterling engine met federal emissions

93
00:04:53,590 --> 00:04:51,280
standards

94
00:04:55,590 --> 00:04:53,600
no catalytic converter or particulate

95
00:04:59,510 --> 00:04:55,600
trap was needed

96
00:05:01,350 --> 00:04:59,520
the exhaust is cool and clean

97
00:05:03,270 --> 00:05:01,360
the sterling engine can help reduce

98
00:05:06,550 --> 00:05:03,280
these pollutants to meet even the most

99
00:05:08,790 --> 00:05:06,560
stringent california standards

100
00:05:11,670 --> 00:05:08,800
also several maintenance requirements

101
00:05:13,270 --> 00:05:11,680
were eliminated with only one spark plug

102
00:05:14,870 --> 00:05:13,280
to start combustion

103
00:05:19,029 --> 00:05:14,880
no carburetor

104
00:05:21,189 --> 00:05:19,039
no catalytic converter and no muffler

105
00:05:24,029 --> 00:05:21,199
because the engine oil is not exposed to

106
00:05:26,390 --> 00:05:24,039
combustion products it stayed clean and

107
00:05:29,670 --> 00:05:26,400
uncontaminated throughout the test

108
00:05:31,430 --> 00:05:29,680
eliminating the oil changes

109
00:05:33,029 --> 00:05:31,440
the sterling engine offers increased

110
00:05:36,070 --> 00:05:33,039
fuel economy

111
00:05:38,230 --> 00:05:36,080
multi-fuel flexibility and reduced life

112
00:05:40,469 --> 00:05:38,240
cycle costs

113
00:05:42,950 --> 00:05:40,479

its economy and efficiency of operation

114
00:05:44,870 --> 00:05:42,960
are being demonstrated

115
00:05:47,110 --> 00:05:44,880
the sterling engine appears ready for

116
00:05:49,430 --> 00:05:47,120
market

117
00:05:52,070 --> 00:05:49,440
nasa's technical utilization division

118
00:05:54,870 --> 00:05:52,080
continues to work with u.s industry

119
00:05:57,270 --> 00:05:54,880
providing data to manufacturers and end

120
00:06:00,230 --> 00:05:57,280
users answering the questions on

121
00:06:02,870 --> 00:06:00,240
sterling technology

122
00:06:05,270 --> 00:06:02,880
and the technology is available now

123
00:06:07,029 --> 00:06:05,280
to build the power plant of the future

124
00:06:11,350 --> 00:06:07,039
today

125
00:06:13,270 --> 00:06:11,360
power for america on the land

126
00:06:15,110 --> 00:06:13,280
and in space

127
00:06:29,800 --> 00:06:15,120
the sterling engine