



1
00:00:35,010 --> 00:00:31,560
low thrust propulsion is essential for

2
00:00:37,110 --> 00:00:35,020
all space missions and NASA's Lewis

3
00:00:39,750 --> 00:00:37,120
research center is conducting programs

4
00:00:42,720 --> 00:00:39,760
to provide a broad range of low thrust

5
00:00:46,650 --> 00:00:42,730
propulsion concepts for these auxiliary

6
00:00:49,229 --> 00:00:46,660
and primary functions auxiliary

7
00:00:51,630 --> 00:00:49,239
propulsion basically is used for keeping

8
00:00:57,200 --> 00:00:51,640
space systems in desired locations or

9
00:01:00,060 --> 00:00:57,210
for orientation typical examples are the

10
00:01:03,900 --> 00:01:00,070
reaction control systems for earth to

11
00:01:07,050 --> 00:01:03,910
orbit vehicles drag makeup and attitude

12
00:01:10,410 --> 00:01:07,060
control for low Earth orbit systems such

13
00:01:13,230 --> 00:01:10,420

as the Space Station freedom station

14

00:01:17,190 --> 00:01:13,240

keeping for higher orbit systems such as

15

00:01:21,240 --> 00:01:17,200

geosynchronous satellites and then retro

16

00:01:23,490 --> 00:01:21,250

functions near planetary bodies primary

17

00:01:26,039 --> 00:01:23,500

propulsion functions include the moving

18

00:01:29,340 --> 00:01:26,049

of space vehicles from point to point in

19

00:01:32,300 --> 00:01:29,350

earth space as well as propulsion from

20

00:01:36,539 --> 00:01:32,310

Earth space to various planetary bodies

21

00:01:39,450 --> 00:01:36,549

on earth to orbit vehicles such as the

22

00:01:41,100 --> 00:01:39,460

Shuttle Orbiter low thrust propulsion

23

00:01:44,429 --> 00:01:41,110

systems are used to control the

24

00:01:46,440 --> 00:01:44,439

orientation of the vehicle examples

25

00:01:49,130 --> 00:01:46,450

would be to control the movement of the

26

00:01:51,810 --> 00:01:49,140

shuttle orbiter to face the Sun or

27

00:01:54,630 --> 00:01:51,820

reorient it to meet other specific

28

00:01:58,080 --> 00:01:54,640

requirements and then to deorbit the

29

00:01:59,730 --> 00:01:58,090

shuttle for its return to Earth the low

30

00:02:02,399 --> 00:01:59,740

thrust devices used for these

31

00:02:05,730 --> 00:02:02,409

applications are called reaction control

32

00:02:09,149 --> 00:02:05,740

systems for use on the space station

33

00:02:11,630 --> 00:02:09,159

freedom to different times of low thrust

34

00:02:15,930 --> 00:02:11,640

propulsion systems have been selected

35

00:02:17,490 --> 00:02:15,940

for drag makeup thrusters call resistor

36

00:02:20,440 --> 00:02:17,500

jets will be

37

00:02:22,570 --> 00:02:20,450

these resistor Jets will use the waste

38

00:02:26,050 --> 00:02:22,580

gas from the various Space Station

39

00:02:28,090 --> 00:02:26,060

modules this approach eliminates the

40

00:02:30,610 --> 00:02:28,100

requirement for the launch of drag

41

00:02:34,720 --> 00:02:30,620

makeup propellant and the return of

42

00:02:37,030 --> 00:02:34,730

waste gases for the attitude control of

43

00:02:40,900 --> 00:02:37,040

the space station lewis is working on

44

00:02:43,390 --> 00:02:40,910

small chemical rockets these engines are

45

00:02:45,610 --> 00:02:43,400

used to control the torques and forces

46

00:02:48,640 --> 00:02:45,620

that are created during shuttle birthing

47

00:02:52,720 --> 00:02:48,650

and other situations where moderate

48

00:02:55,390 --> 00:02:52,730

thrust levels are required high Earth

49

00:02:58,410 --> 00:02:55,400

orbit systems need two very different

50

00:03:01,840 --> 00:02:58,420

kinds of auxiliary propulsion systems

51
00:03:04,930 --> 00:03:01,850
first when geosynchronous satellites are

52
00:03:07,390 --> 00:03:04,940
placed into orbit an apogee propulsion

53
00:03:09,790 --> 00:03:07,400
system is required to circularize the

54
00:03:13,510 --> 00:03:09,800
satellite and place it into the correct

55
00:03:15,130 --> 00:03:13,520
orbit the geosynchronous orbit is the

56
00:03:16,960 --> 00:03:15,140
one that makes the satellite appear to

57
00:03:19,960 --> 00:03:16,970
be in a fixed position when viewed from

58
00:03:23,080 --> 00:03:19,970
the earth in order to keep the

59
00:03:25,690 --> 00:03:23,090
satellites in desired orbit NASA Lewis

60
00:03:30,160 --> 00:03:25,700
is working on very low thrust Electric

61
00:03:32,770 --> 00:03:30,170
Rockets called arc Jets a final example

62
00:03:35,650 --> 00:03:32,780
of auxiliary propulsion is the use of

63
00:03:38,770 --> 00:03:35,660

chemical rockets near planetary bodies

64

00:03:41,170 --> 00:03:38,780

it is necessary to provide a retro

65

00:03:43,930 --> 00:03:41,180

propulsion maneuver at planetary bodies

66

00:03:46,180 --> 00:03:43,940

so they may be captured and allow the

67

00:03:49,690 --> 00:03:46,190

spacecraft to go into orbit around the

68

00:03:54,009 --> 00:03:49,700

bodies or simply to slow down to obtain

69

00:03:56,199 --> 00:03:54,019

desired data primary propulsion is being

70

00:03:59,979 --> 00:03:56,209

developed for use in both Earth orbit

71

00:04:02,229 --> 00:03:59,989

and for planetary missions planetary

72

00:04:05,350 --> 00:04:02,239

missions include the transfer of systems

73

00:04:10,600 --> 00:04:05,360

to beyond Earth space to such targets as

74

00:04:13,630 --> 00:04:10,610

planets comets and asteroids in summary

75

00:04:17,770 --> 00:04:13,640

then all space missions use low thrust

76

00:04:19,870 --> 00:04:17,780

propulsion in one form or another the

77

00:04:22,870 --> 00:04:19,880

Lewis research center is conducting a

78

00:04:26,380 --> 00:04:22,880

low thrust propulsion program utilizing

79

00:04:27,480 --> 00:04:26,390

an in-house University and industrial

80

00:04:30,390 --> 00:04:27,490

team

81

00:04:32,939 --> 00:04:30,400

this blend of skill and capability

82

00:04:35,210 --> 00:04:32,949

assure that the program will develop

83

00:04:38,040 --> 00:04:35,220

practical devices for near-term

84

00:04:41,129 --> 00:04:38,050

applications and at the same time

85

00:04:44,700 --> 00:04:41,139

produce more advanced concepts for the