

January 14, 1999

Wireless Telecommunications Bureau  
Federal Communications Commission  
Washington, DC 20554

Attention: Ms D'Wanna Terry:

Enclosed is technical information for pre-space station notification of intent to operate an amateur space station, STENSAT. This is being filed pursuant to FCC Rules and Regulations Subpart C, Special Operations, (Part 97.207 Subparagraph g) as adopted May 31, 1989.

A waiver is hereby requested for the normally required time prior to launch for the initial filing. This is necessary because of an imminent launch opportunity for this satellite. As space launches are difficult to obtain, it was not possible to identify the launch mission sufficiently far in advance to furnish the prescribed advance notifications.

As stated in the Attachments, STENSAT is being constructed by a small group of radio amateurs and enthusiasts based in the Virginia suburbs of Washington.

For further information, please contact Professor Bob Twiggs at the Stanford University Space Systems Development Laboratory at 650-723-8651 or Mr. Henry (Hank) Heidt the STENSAT station licensee at 703-610-5231.

Your consideration of this waiver and the material attached, will be greatly appreciated.

Very truly yours,

Henry Heidt, N4AFL  
STENSAT Licensee

January 14, 1999

Wireless Telecommunications Bureau  
Federal Communications Commission  
Washington, DC 20554

Attention: Ms D'Wanna Terry:

The following is the first pre-space notification of the intent to operate an amateur space station. This notice is being filed pursuant to FCC Rules and Regulations, Subpart C, Special Operations, (Part 97.207 Subparagraph g) as adopted May 31, 1989.

**NAME OF SATELLITE:** STENSAT

**PROJECTED LAUNCH DATE:** September 15, 1999 as a secondary payload on US  
Air Force Launch vehicle OSP, California Commercial Launch Center,  
Vandenberg AFB, California

**RESPONSIBLE ORGANIZATION:** Stanford University, Space Systems  
Development Laboratory (SSDL)

**SPACE STATION LICENSEE:** Mr. Henry (Hank) Heidt N4AFL  
9512 Rockport Road  
Vienna Virginia 22180  
703-319-0304

**ORBITAL PARAMETERS:** Sun-synchronous, circular, near-polar orbit  
(nominal) 750 km altitude  
98.39 degrees inclination  
99 minutes orbital period

STENSAT is a small (12 cubic inch, 1 pound) satellite which will be one of several demonstration vehicles to test the viability of such small free-flyers for various space missions. STENSAT is intended for use by amateur radio operators world wide, providing transponder service in accordance with Sections 3.34 and 3.35 of Article 1, Section III of the Radio Regulations and Part 97, Subpart A, Section 97.3 of the FCC Rules and Regulations. Details on the amateur space station, typical amateur earth station and telecommand station are provided in Attachments 1, 2 and 3, respectively.

STENSAT will operate as a single channel mode "J" FM repeater. A means of remotely controlling the satellite from the ground, including causing transmission to cease, will be provided. The earth-to-space uplink frequency will be 145.875 MHz and the space-to-earth downlink frequency will be 435.025 MHz. STENSAT will use 1200 bps AFSK for space-to-earth telemetry and DTMF tones for earth-to-space command control.

STENSAT is being developed by a very small team of amateurs and enthusiasts in their spare time, on a shoestring budget. The nature of conventional satellite design is such that very few non-engineer, non-professional individuals have an opportunity to participate; the exciting chance to experience this opportunity is the primary motivator of the STENSAT team.

Respectfully submitted,

Henry Heidt, N4AFL  
STENSAT Licensee

## Attachment 1

### Information On Amateur Space Station For Pre-Space Notification

**Space Operation Date:** 15 September 1999 (planned)

**Identity of Satellite:** STENSAT

**Service Area:** World-wide

**Orbital Parameters:**

(1) Angle of Inclination: 98.39 degrees

(2) Period 99 minutes

(3) Apogee 750 km

(4) Number of Satellites One

**Technical Parameters:**

(1) Carrier Frequencies: Uplink: 145.875 MHz; Downlink: 435.025 MHz

(2) Necessary Bandwidth: Uplink: 25 kHz; Downlink: 25 kHz  
(bandwidths do not include Doppler shift and transmitter frequency tolerances)

(3) Class of Emission: Uplink: 16KF9W FM; Downlink: 16KF9W FM  
Both up and downlink are a single channel carrying at various times analog telephony, 1200 bps AFSK (telemetry down), and/or DTMF tones (command channel up)

(4) Total Peak Power: Peak +28 dBm at 435.025 MHz  
Nominal 0.1 Watts (+20 dBm)

(5) Maximum Power Density  
at Earth surface: -93 dBm/m<sup>2</sup> (at +28 dBm)

(6) Antenna Radiation Pattern: Uplink: center fed dipole  
Downlink: center fed dipole

(7) Antenna Gain (main beam): Uplink: 2.1 dBi; Downlink: 2.1 dBi

(8) Antenna Pointing Accuracy: N/A

(9) Lowest Equivalent Satellite  
Link Noise Temperature: 300K (approximate)

## Attachment 2

### Information On Amateur Earth Station For Pre-Space Notification

#### **Technical Parameters:**

- (1) Carrier Frequencies: Uplink: 145.875 MHz; Downlink: 435.025 MHz
- (2) Necessary Bandwidth: Uplink: 25 kHz; Downlink: 45 kHz  
(bandwidth includes Doppler shift and transmitter frequency tolerance)
- (3) Class of Emission: Uplink: F3W NBFM; Downlink: F3W NBFM
- (4) Total Peak Power: 100 Watts maximum (at transmitter output terminals)
- (5) Maximum EIRP: +32 dBW
- (6) Antenna Radiation Pattern: Uplink: directional circularly-polarized, crossed yagi  
Downlink: directional circularly-polarized, crossed yagi
- (7) Antenna Gain (main beam): Uplink: 12 dBi; Downlink: 12 dBi
- (8) Antenna Pointing Accuracy: Within  $\pm 10$  degrees of satellite elevation and azimuth,  
computer controlled
- (9) Lowest Equivalent Satellite  
Link Noise Temperature: 300K (approximate)

### Attachment 3

#### Information On Amateur Telecommand Station For Pre-Space Notification

**Space Operation Date:** 15 September 1999 (planned)

**Location:** Vienna, Virginia

**Technical Parameters:**

- (1) Carrier Frequencies: Uplink: 145.875 MHz; Downlink: 435.025 MHz
- (2) Necessary Bandwidth: Uplink: 25 kHz; Downlink: 45 kHz  
(bandwidth includes Doppler shift and transmitter frequency tolerance)
- (3) Class of Emission: Uplink: F3 FM DTMF; Downlink: F3 FM (1200 bps AFSK)
- (4) Total Peak Power: 100 Watts maximum (at transmitter output terminals)
- (5) Maximum EIRP: +32 dBW
- (6) Antenna Radiation Pattern: Uplink: directional circularly-polarized, crossed yagi  
Downlink: directional circularly-polarized, crossed yagi
- (7) Antenna Gain (main beam): Uplink: 12 dBi; Downlink: 12 dBi
- (8) Antenna Pointing Accuracy: Within  $\pm 10$  degrees of satellite elevation and azimuth,  
computer controlled
- (9) Lowest Equivalent Satellite  
Link Noise Temperature: 300K (approximate)