

EXHIBIT-A1 COLUMN-4 FREQUENCY, POWER & BANDWIDTH DETAILS

COMM-1 Uplink Transmitter:

Frequency Band:
1st choice 400--500 MHz
2nd choice 100--200 MHz

Power: 2--5 Watts

Maximum data rate: 10K bits/sec

Modulation Technique: BPSK/FSK

Necessary Bandwidth: 12 KHz

Formula used to calculate bandwidth:

$$B_n = 2M + 2DK, \quad \begin{aligned} M &= B/2 \\ K &= 1.2 \\ B &= 10K \text{ bps} \\ D &= 1 \text{ KHz} \end{aligned}$$

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Approved by OMB
 3060-0065
 Expires 12/31/92

Public reporting burden for this collection of information is estimated to average 4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Federal Communications Commission, Office of Managing Director, Washington, DC 20554, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Paperwork Reduction Project (3060-0065), Washington, DC 20503.

**APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION UNDER PART 5
 OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER) THAN BROADCAST)**

A. Applicant's Name and Post Office address (Give street, city, state, and ZIP Code. See Instruction No. 4) Iowa Satellite Company, Inc. 806 7th Street, Suite S4 Boone, IA 50036				DO NOT WRITE IN THIS BLOCK File No.																																																																																		
2.(a) Application for (check only one box) ☒ New Station ☐ Modification of existing authorization				2.(b) For Modification indicate below File No.: Call Sign:																																																																																		
3. Application for modification indicate change in (check all that apply) ☐ Frequency ☐ Emission ☐ Power ☐ Location ☐ Other particulars (describe below or in attached Exhibit No. _____)																																																																																						
4. Particulars of Operation (See instructions below) <table border="1" style="width:100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th rowspan="2">Frequency (State Whether kHz or MHz) (A)</th> <th colspan="3">POWER</th> <th rowspan="2">EMISSION (E)</th> <th rowspan="2">MODULATING SIGNAL (F)</th> <th rowspan="2">NECESSARY BANDWIDTH (kHz) (G)</th> </tr> <tr> <th>(B)</th> <th>(C)</th> <th>(D)</th> </tr> </thead> <tbody> <tr> <td>100-200MHz</td> <td>5W</td> <td>4W</td> <td>Mean</td> <td>F2D</td> <td>50K bauds</td> <td>52 KHz</td> </tr> <tr> <td>400-500MHz</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr><td> </td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>							Frequency (State Whether kHz or MHz) (A)	POWER			EMISSION (E)	MODULATING SIGNAL (F)	NECESSARY BANDWIDTH (kHz) (G)	(B)	(C)	(D)	100-200MHz	5W	4W	Mean	F2D	50K bauds	52 KHz	400-500MHz																																																														
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5(a). Proposed location of transmitter and transmitting antenna (Check only one box) (1B)

☐ FIXED/BASE

☒ MOBILE
On-board Satellite

☐ BASE & MOBILE

(b) If permanently located at a fixed location, give below

(d) If mobile, describe the exact area of operation

State _____ County _____ City or Town _____

Number and street (or other indication of location) _____

(c) Geographical coordinates exact to the nearest second

(e) Geographical coordinates of the approximate center of proposed area of operation (mobile applications)

North Latitude _____

West Longitude _____

North Latitude _____

West Longitude _____

6. Is a directional antenna (other than radar) used?

☒ Yes

☐ No

If "YES", give the following information:

(a) Width of beam in degrees at the half-power point 150 Deg.

(b) Orientation in horizontal plane _____ see Exhibit C2

(c) Orientation in vertical plane _____

7. Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government?

☐ Yes

☒ No

If "Yes", attach as EXHIBIT No. _____, a narrative statement describing the government project, agency, and contact number.

8. Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government?

☐ Yes

☒ No

If "Yes", attach as EXHIBIT No. _____, the following information:

(a) The contract number and the name of the foreign government concerned.

9. Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project).

☒ Yes

☐ No

If "Yes", attach as EXHIBIT No. D, a narrative statement providing the following information:

(a) A description of the nature of the research project being conducted.

(b) A showing that the communications facilities requested are necessary for the research project involved.

(c) A showing that existing communications facilities are inadequate.

10. If all the answers to Items 7, 8, and 9, are "No", attach as EXHIBIT No. _____, a narrative statement describing in detail the following:

(a) The complete program of research and experimentation proposed including description of equipment and theory of operation.

(b) The specific objectives sought to be accomplished.

(c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.

11. (a) Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application.

(b) If less than 2 years, give the length of time in months that the authorization requested in this application will be required. Exhibit E

12. Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact?

☐ Yes

☒ No

If you answer yes, submit an Environmental Assessment required by Section 1.1311.

13. List below transmitting equipment to be installed (if experimental, so state): MANUFACTURER TYPE NO. OF UNITS (Not selected yet)	(1B)				
14. Is the equipment listed in Item 13 capable of station identification pursuant to Section 5.152? ☐ Yes ☐ No					
15. Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building? ☐ Yes ☒ No If "Yes", give the following (See Instruction 9): (a) Overall height above ground to tip of antenna is _____ meters. (b) Elevation of ground at antenna site above mean sea level is _____ meters. (c) Distance to nearest aircraft landing area is _____ kilometers. (d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna. (e) Submit as EXHIBIT No. _____, a vertical profile sketch of total structure including supporting building, if any, giving heights in meters above ground for all significant features. Clearly indicate existing portion, noting particulars of aviation obstruction lighting already available.					
16. Applicant is (check only one box) ☐ Individual ☐ Other (describe below) ☐ Association ☐ Partnership ☒ Corporation (non-profit)					
17. Is applicant a foreign government or a representative of a foreign government? ☐ Yes ☒ No					
18. Has applicant or any party to this application had any FCC station license or permit revoked or had any application for permit, license or renewal denied by this Commission? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, a statement giving call sign of license or permit revoked and relate circumstances.					
19. Will applicant be owner and operator of station? ☒ Yes ☐ No					
20. Give name, title, and telephone number (include area code) of person who can best handle inquiries pertaining to this application. Dr. Leverne K. Seversike, President, Iowa Satellite Co. (515)294-5760					
21. List below all exhibits in numerical sequence and the item number of form requiring the exhibit identified.					
EXHIBITS AND ITEM NO. OF FORM					
Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form
A2	4	D	9		
C2	6	E	11		

22. CERTIFICATION

ATTENTION: Read this certification carefully before signing this application.

THE APPLICANT CERTIFIES THAT:

- (a) Copies of the FCC Rules Parts 2 and 5 are on hand; and
- (b) Adequate financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and
- (c) All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
- (d) Grant of the authorization requested herein will not be construed as a finding on the part of the Commission
 - (1) that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and
 - (2) that the applicant will be authorized to operate on any basis other than experimental, and
 - (3) that the Commission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.

APPLICANT CERTIFIES FURTHER THAT:

- (e) All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
- (f) The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
- (g) The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

Signed and dated this 12th day of November, 1992.

Name of Applicant Iowa Satellite Company, Inc.

(correspond with name given on page 1)

By Dr. Leverage K. Seversike
(print)

Leverage K. Seversike
(signature)

Title President, Iowa Satellite Company

WILLFUL FALSE STATEMENTS MADE ON THIS FORM
ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S.
CODE, TITLE 18, SECTION 1001.

Check Appropriate Classification:

- ☐ Individual Applicant
- ☐ Member of Applicant Partnership
- ☒ Office of Applicant Corporation or Association
- ☐ Authorized Employee

NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974
AND THE PAPERWORK REDUCTION ACT OF 1980

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specifically by Section 308 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to Section 0.459 of FCC Rules and Regulations. Your response is required to obtain this authorization.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), and the Paperwork Reduction Act of 1980, P.L. 96-511, December 11, 1980, 44 U.S.C. 3507.

EXHIBIT-A2 COLUMN-4 FREQUENCY, POWER & BANDWIDTH DETAILS

COMM-1 Downlink Transmitter:

Frequency Band:

1st choice 100--200 MHz

2nd choice 400--500 MHz

Power: 2--5 Watts

Maximum data rate: 50K bits/sec

Modulation Technique: BPSK/FSK

Necessary Bandwidth: 52 KHz

Formula used to calculate bandwidth:

$$B_n = 2M + 2DK, \quad M = B/2$$
$$K = 1.0$$
$$B = 50K \text{ bps}$$
$$D = 1 \text{ KHz}$$

EXHIBIT-C2 COLUMN-6 ANTENNA SPECIFICATIONS

Description of Satellite Antenna:

The satellite antenna would consist of four to eight elements attached perpendicular to the satellite body, thus forming two symmetrical main beams of about 150 degrees, one facing the earth while the other facing opposite to earth.

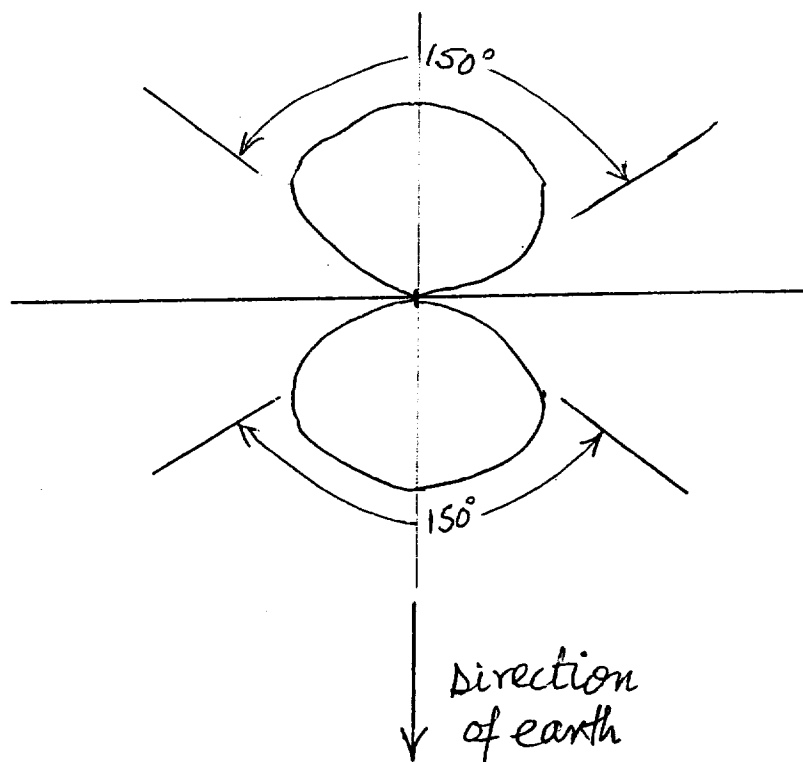


EXHIBIT-D COLUMN-9 PROJECT DESCRIPTION

IOWA SATELLITE PROJECT (ISAT)

DESCRIPTION:

This project aims at design/construction and launch of a small (less than 200 lbs) Low-Earth-Orbit satellite to provide a space-borne platform for conducting different space related experiments.

OBJECTIVES:

1. Educational: To educate people of Iowa at all educational levels about satellite design, launch and operation.
2. Public Awareness: To raise the public's awareness of the benefits of space utilization.
3. Space-related Research: To conduct various experiments in space environment.
4. Agricultural Studies: To provide agricultural industry of Iowa agricultural studies from space.
5. Experience: To develop an expertise in satellite design and development.

ON-BOARD EXPERIMENTS:

1. Plant/sead growing in space environment.
2. Radiation detection in space.
3. Earth imaging from space.
4. Earth radio frequency measurement.
5. Remote weather/soil data collection.
6. Micrometeroid detection.
7. Robotic arm movement in space.
8. Solar cell deterioration in space environment.
9. Space batteries performance measurement.

COMMUNICATION SYSTEM REQUIREMENT:

1. Telemetry/Telecomand & Control Link: This would be the main link between the satellite and ground station. It consists of one Transmitter/Receiver pair on-board satellite and a second pair located at the ground station. All the command control and telemetry data would be handled through this link.
2. Remote Ground Transponders: Communication equipment required for "Remote weather/soil data collection experiment" consists of multiple "Ground Transponders" (about 100--200) spread all over the state which could relay some kind of local weather/soil data up to the satellite whenever the satellite passes over them. The satellite would in turn downlink data acquired from all the ground transponders to the ground station. An additional transmitter/receiver on-board satellite and a receiver at the ground station would be required to accomplish this task.

EXHIBIT-E COLUMN-11 TIME SCHEDULE (Estimate)

	<u>From</u>	<u>TO</u>
System Design	-----	Jun,93
Equipment Selection	Jan,93	Dec,93
Equipment Procurement	Jan,93	Dec,93
System Construction	Jun,93	Jun,94
Integrated Testing	Sep,94	May,94
Prelaunch Integration	Jun,94	Dec,94
Launch	Jan,95	Jun,95
Operational Life	Jun,95	Jun,2000 (5 Yrs)

Public reporting burden for this collection of information is estimated to average 4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Federal Communications Commission, Office of Managing Director, Washington, DC 20554, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Paperwork Reduction Project (3060-0065), Washington, DC 20503.

APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION UNDER PART 5
OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER) THAN BROADCAST

A. Applicant's Name and Post Office address (Give street, city, state, and ZIP Code. See Instruction No. 4) Iowa Satellite Company, Inc. 806 7th Street, Suite S4 Boone, IA 50036	DO NOT WRITE IN THIS BLOCK File No.
---	--

2.(a) Application for <i>(check only one box)</i> ☒ New Station ☐ Modification of existing authorization	2.(b) For Modification indicate below File No.: _____ Call Sign: _____
--	--

3. Application for modification indicate change in (check all that apply)

☐ Frequency ☐ Emission ☐ Power ☐ Location

☐ Other particulars (describe below or in attached Exhibit No. _____)

[illegible]

- (A) List each frequency or frequency band separately. (If more space is required, attach as Exhibit No. A3).
- (B) Insert maximum R.F. output power at the transmitter terminals. Specify units.
- (C) Insert maximum effective radiated power from the antenna (If pulsed emission specify peak power).
- (D) Insert "MEAN" or "PEAK" (See definitions in Part 5).
- (E) List each type of emission separately for each frequency. (See Section 2.201 FCC Rules.)
- (F) Insert as appropriate for the type of modulation:
- (1) the maximum speed of keying in bauds;
 - (2) maximum audio modulating frequency;
 - (3) frequency deviation of carrier;
 - (4) pulse duration and repetition rate.
- For complex emissions, describe in detail in the space provided below.
- (G) Describe how the necessary bandwidth was determined in space provided below.

$$B_n = 2M + 2DK$$

5(a). Proposed location of transmitter and transmitting antenna (Check only one box) (2A)			
☒ FIXED/BASE see Exhibit B		☐ MOBILE	
☐ BASE & MOBILE			
(b) If permanently located at a fixed location, give below		(d) If mobile, describe the exact area of operation	
State	County	City or Town	
Number and street (or other indication of location)			
(c) Geographical coordinates exact to the nearest second		(e) Geographical coordinates of the approximate center of proposed area of operation (mobile applications)	
North Latitude	West Longitude	North Latitude	West Longitude
6. Is a directional antenna (other than radar) used? ☒ Yes ☐ No If "YES", give the following information: (a) Width of beam in degrees at the half-power point <u>120 Deg.</u> (b) Orientation in horizontal plane <u>see Exhibit C3</u> (c) Orientation in vertical plane _____			
7. Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, a narrative statement describing the government project, agency, and contact number.			
8. Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, the following information: (a) The contract number and the name of the foreign government concerned.			
9. Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project). ☒ Yes ☐ No If "Yes", attach as EXHIBIT No. <u>D</u> , a narrative statement providing the following information: (a) A description of the nature of the research project being conducted. (b) A showing that the communications facilities requested are necessary for the research project involved. (c) A showing that existing communications facilities are inadequate.			
10. If all the answers to Items 7, 8, and 9, are "No", attach as EXHIBIT No. _____, a narrative statement describing in detail the following: (a) The complete program of research and experimentation proposed including description of equipment and theory of operation. (b) The specific objectives sought to be accomplished. (c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.			
11. (a) Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application. (b) If less than 2 years, give the length of time in months that the authorization requested in this application will be required. <u>see Exhibit E</u>			
12. Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact? ☐ Yes ☒ No If you answer yes, submit an Environmental Assessment required by Section 1.1311.			

13. List below transmitting equipment to be installed (if experimental, so state): MANUFACTURER (Not selected yet)	TYPE (2A)	NO. OF UNITS			
14. Is the equipment listed in Item 13 capable of station identification pursuant to Section 5.152? ☐ Yes ☐ No					
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20. Give name, title, and telephone number (include area code) of person who can best handle inquiries pertaining to this application. Dr. Leverne K. Seversike, President, Iowa Satellite Co. (515)294-5760					
21. List below all exhibits in numerical sequence and the item number of form requiring the exhibit identified.					
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Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form
A3	4	D	9		
B	5	E	11		
C3	6				

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- (c) All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
- (d) Grant of the authorization requested herein will not be construed as a finding on the part of the Commission

(1) that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and

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APPLICANT CERTIFIES FURTHER THAT:

- (e) All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
- (f) The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
- (g) The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

Signed and dated this 12th day of November, 1992

Name of Applicant Iowa Satellite Company, Inc.

(correspond with name given on page 1)

By Dr. Leverne K. Seversike
(print)

Leverne K. Seversike
(signature)

Title President, Iowa Satellite Company

WILLFUL FALSE STATEMENTS MADE ON THIS FORM
ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S.
CODE, TITLE 18, SECTION 1001.

Check Appropriate Classification:

- ☐ Individual Applicant
- ☐ Member of Applicant Partnership
- ☒ Office of Applicant Corporation
or Association
- ☐ Authorized Employee

NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974
AND THE PAPERWORK REDUCTION ACT OF 1980

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EXHIBIT-A3 COLUMN-4 FREQUENCY, POWER & BANDWIDTH DETAILS

COMM-2 Ground Transponder Uplink:

Frequency Band:

1st choice 400--500 MHz

2nd choice 100--200 MHz

Power: 2--3 Watts

Maximum data rate: 100 bits/sec (per ground transponder)

Maximum number of ground transponders: 200

Multiple Access Technique: Frequency Division Multiple Access

Modulation Technique: BPSK/FSK

Necessary Bandwidth: 80 KHz

Formula used to calculate bandwidth:

$$B_n = 2M + 2DK, \quad M = B/2$$
$$K = 1.0$$
$$B = 100 \text{ bps}$$
$$D = 100 \text{ Hz}$$

$$B_n = 100 + 200 = 300 \text{ Hz}$$

Inter channel spacing = 100 Hz

Total necessary bandwidth = $(300+100)200 = 80 \text{ KHz}$

EXHIBIT-B COLUMN-5 LOCATION OF TRANSMITTER & ANTENNA

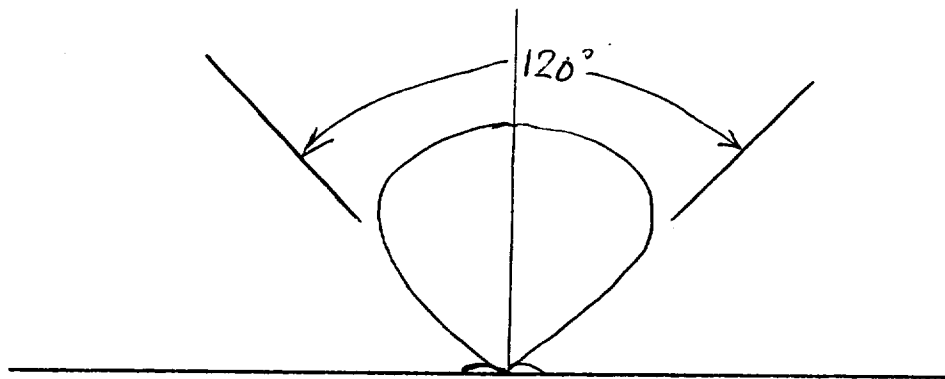
Ground Transponders:

There would be a total of 200 (including future expansion) ground transponders spread all over the state. A ground transponder once installed at a particular location would remain fixed until it is relocated for some experimental purposes.

EXHIBIT-C3 COLUMN-6 ANTENNA SPECIFICATIONS

Ground Transponder Antenna:

The ground transponder antenna would be pointing vertically upwards with a horizontal beam width of 360 degrees and a vertical beam width of about 120 degrees.



Vertical Antenna Beam Pattern

EXHIBIT-D COLUMN-9 PROJECT DESCRIPTION

IOWA SATELLITE PROJECT (ISAT)

DESCRIPTION:

This project aims at design/construction and launch of a small (less than 200 lbs) Low-Earth-Orbit satellite to provide a space-borne platform for conducting different space related experiments.

OBJECTIVES:

1. Educational: To educate people of Iowa at all educational levels about satellite design, launch and operation.
2. Public Awareness: To raise the public's awareness of the benefits of space utilization.
3. Space-related Research: To conduct various experiments in space environment.
4. Agricultural Studies: To provide agricultural industry of Iowa agricultural studies from space.
5. Experience: To develop an expertise in satellite design and development.

ON-BOARD EXPERIMENTS:

1. Plant/sead growing in space environment.
2. Radiation detection in space.
3. Earth imaging from space.
4. Earth radio frequency measurement.
5. Remote weather/soil data collection.
6. Micrometeoroid detection.
7. Robotic arm movement in space.
8. Solar cell deterioration in space environment.
9. Space batteries performance measurement.

COMMUNICATION SYSTEM REQUIREMENT:

1. Telemetry/Telecommand & Control Link: This would be the main link between the satellite and ground station. It consists of one Transmitter/Receiver pair on-board satellite and a second pair located at the ground station. All the command control and telemetry data would be handled through this link.
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EXHIBIT-E COLUMN-11 TIME SCHEDULE (Estimate)

	<u>From</u>	<u>TO</u>
System Design	-----	Jun, 93
Equipment Selection	Jan, 93	Dec, 93
Equipment Procurement	Jan, 93	Dec, 93
System Construction	Jun, 93	Jun, 94
Integrated Testing	Sep, 94	May, 94
Prelaunch Integration	Jun, 94	Dec, 94
Launch	Jan, 95	Jun, 95
Operational Life	Jun, 95	Jun, 2000 (5 Yrs)

(2B)
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Approved by OMB
3060-0065
Expires 12/31/92

Public reporting burden for this collection of information is estimated to average 4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Federal Communications Commission, Office of Managing Director, Washington, DC 20554, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Paperwork Reduction Project (3060-0065), Washington, DC 20503.

APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION UNDER PART 5
OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER) THAN BROADCAST

A. Applicant's Name and Post Office address (Give street, city, state, and ZIP Code. See Instruction No. 4) Iowa Satellite Company, Inc. 806 7th Street, Suite S4 Boone, IA 50036	DO NOT WRITE IN THIS BLOCK File No.
---	--

2.(a) Application for (check only one box) ☒ New Station ☐ Modification of existing authorization	2.(b) For Modification indicate below File No.: Call Sign:
---	--

3. Application for modification indicate change in (check all that apply)

☐ Frequency ☐ Emission ☐ Power ☐ Location

☐ Other particulars (describe below or in attached Exhibit No. _____)

4. Particulars of Operation (See instructions below)						
Frequency (State Whether kHz or MHz) (A)	POWER			EMISSION (E)	MODULATING SIGNAL (F)	NECESSARY BANDWIDTH (kHz) (G)
	(B)	(C)	(D)			
100-200MHz	5W	4W	Mean	F2D	60K bauds	62 KHz
400-500MHz						

- (A) List each frequency or frequency band separately. (If more space is required, attach as Exhibit No. A4).
- (B) Insert maximum R.F. output power at the transmitter terminals. Specify units.
- (C) Insert maximum effective radiated power from the antenna (If pulsed emission specify peak power).
- (D) Insert "MEAN" or "PEAK" (See definitions in Part 5).
- (E) List each type of emission separately for each frequency. (See Section 2.201 FCC Rules.)
- (F) Insert as appropriate for the type of modulation:
- (1) the maximum speed of keying in bauds;
 - (2) maximum audio modulating frequency;
 - (3) frequency deviation of carrier;
 - (4) pulse duration and repetition rate.
- For complex emissions, describe in detail in the space provided below.
- (G) Describe how the necessary bandwidth was determined in space provided below.

$$B_n = 2M + 2DK$$

5(a). Proposed location of transmitter and transmitting antenna (Check only one box) (2B) ☐ FIXED/BASE ☒ MOBILE ☐ BASE & MOBILE On-board Satellite											
(b) If permanently located at a fixed location, give below <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">State</td> <td style="width: 25%;">County</td> <td style="width: 50%;">City or Town</td> </tr> <tr> <td colspan="3">Number and street (or other indication of location)</td> </tr> </table>		State	County	City or Town	Number and street (or other indication of location)			(d) If mobile, describe the exact area of operation			
State	County	City or Town									
Number and street (or other indication of location)											
(c) Geographical coordinates exact to the nearest second <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">North Latitude</td> <td style="width: 25%;">West Longitude</td> <td style="width: 25%;">North Latitude</td> <td style="width: 25%;">West Longitude</td> </tr> </table>		North Latitude	West Longitude	North Latitude	West Longitude	(e) Geographical coordinates of the approximate center of proposed area of operation (mobile applications) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">North Latitude</td> <td style="width: 25%;">West Longitude</td> <td style="width: 25%;">North Latitude</td> <td style="width: 25%;">West Longitude</td> </tr> </table>		North Latitude	West Longitude	North Latitude	West Longitude
North Latitude	West Longitude	North Latitude	West Longitude								
North Latitude	West Longitude	North Latitude	West Longitude								
6. Is a directional antenna (other than radar) used? ☒ Yes ☐ No If "YES", give the following information: (a) Width of beam in degrees at the half-power point <u>150 Deg.</u> (b) Orientation in horizontal plane <u>see Exhibit C4</u> (c) Orientation in vertical plane _____											
7. Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, a narrative statement describing the government project, agency, and contact number.											
8. Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government? ☐ Yes ☒ No If "Yes", attach as EXHIBIT No. _____, the following information: (a) The contract number and the name of the foreign government concerned.											
9. Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project). ☒ Yes ☐ No If "Yes", attach as EXHIBIT No. <u>D</u> , a narrative statement providing the following information: (a) A description of the nature of the research project being conducted. (b) A showing that the communications facilities requested are necessary for the research project involved. (c) A showing that existing communications facilities are inadequate.											
10. If all the answers to Items 7, 8, and 9, are "No", attach as EXHIBIT No. _____, a narrative statement describing in detail the following: (a) The complete program of research and experimentation proposed including description of equipment and theory of operation. (b) The specific objectives sought to be accomplished. (c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.											
11. (a) Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application. (b) If less than 2 years, give the length of time in months that the authorization requested in this application will be required. <u>Exhibit E</u>											
12. Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact? ☐ Yes ☒ No If you answer yes, submit an Environmental Assessment required by Section 1.1311.											

13. List below transmitting equipment to be installed (if experimental, so state):
MANUFACTURER

TYPE

(2B)

NO. OF UNITS

(Not selected yet)

14. Is the equipment listed in Item 13 capable of station identification pursuant to Section 5.152?

☐ Yes

☐ No

15. Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building?

☐ Yes

☒ No

If "Yes", give the following (See Instruction 9):

(a) Overall height above ground to tip of antenna is _____ meters.

(b) Elevation of ground at antenna site above mean sea level is _____ meters.

(c) Distance to nearest aircraft landing area is _____ kilometers.

(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna.

(e) Submit as EXHIBIT No. _____, a vertical profile sketch of total structure including supporting building, if any, giving heights in meters above ground for all significant features. Clearly indicate existing portion, noting particulars of aviation obstruction lighting already available.

16. Applicant is (check only one box)

☐ Individual

☐ Association

☐ Partnership

☒ Corporation (non-profit)

☐ Other (describe below)

17. Is applicant a foreign government or a representative of a foreign government?

☐ Yes

☒ No

18. Has applicant or any party to this application had any FCC station license or permit revoked or had any application for permit, license or renewal denied by this Commission?

☐ Yes

☒ No

If "Yes", attach as EXHIBIT No. _____, a statement giving call sign of license or permit revoked and relate circumstances.

19. Will applicant be owner and operator of station?

☒ Yes

☐ No

20. Give name, title, and telephone number (include area code) of person who can best handle inquiries pertaining to this application.

Dr. Leverne K. Seversike, President, Iowa Satellite Co. (515)294-5760

21. List below all exhibits in numerical sequence and the item number of form requiring the exhibit identified.

EXHIBITS AND ITEM NO. OF FORM

Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form	Exhibit Number	Item No. of Form
A4	4	D	9		
C4	6	E	11		

22. CERTIFICATION

ATTENTION: Read this certification carefully before signing this application.

THE APPLICANT CERTIFIES THAT:

- (a) Copies of the FCC Rules Parts 2 and 5 are on hand; and
- (b) Adequate financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and
- (c) All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
- (d) Grant of the authorization requested herein will not be construed as a finding on the part of the Commission
 - (1) that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and
 - (2) that the applicant will be authorized to operate on any basis other than experimental, and
 - (3) that the Commission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.

APPLICANT CERTIFIES FURTHER THAT:

- (e) All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
- (f) The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
- (g) The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

Signed and dated this 12th day of November, 1992.

Name of Applicant Iowa Satellite Company, Inc.
(correspond with name given on page 1)

By Dr. Leverne K. Seversike
(print)

Leverne K. Seversike
(signature)

Title President, Iowa Satellite Company

WILLFUL FALSE STATEMENTS MADE ON THIS FORM
ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S.
CODE, TITLE 18, SECTION 1001.

Check Appropriate Classification:

- ☐ Individual Applicant
- ☐ Member of Applicant Partnership
- ☒ Office of Applicant Corporation or Association
- ☐ Authorized Employee

NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974
AND THE PAPERWORK REDUCTION ACT OF 1980

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specifically by Section 308 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to Section 0.459 of FCC Rules and Regulations. Your response is required to obtain this authorization.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), and the Paperwork Reduction Act of 1980, P.L. 96-511, December 11, 1980, 44 U.S.C. 3507.

EXHIBIT-A4 COLUMN-4 FREQUENCY, POWER & BANDWIDTH DETAILS

COMM-2 Downlink Transmitter:

Frequency Band:	
1st choice	100--200 MHz
2nd choice	400--500 MHz
Power:	2--5 Watts
Maximum data rate:	60K bits/sec
Modulation Technique:	BPSK/FSK
Necessary Bandwidth:	62 KHz

Formula used to calculate bandwidth:

$$B_n = 2M + 2DK \quad , \quad M = B/2$$

$K = 1.0$
 $B = 60K \text{ bps}$
 $D = 1 \text{ KHz}$

EXHIBIT-C4 COLUMN-6 ANTENNA SPECIFICATIONS

Description of Satellite Antenna:

The satellite antenna would consist of four to eight elements attached perpendicular to the satellite body, thus forming two symmetrical main beams of about 150 degrees, one facing the earth while the other facing opposite to earth.

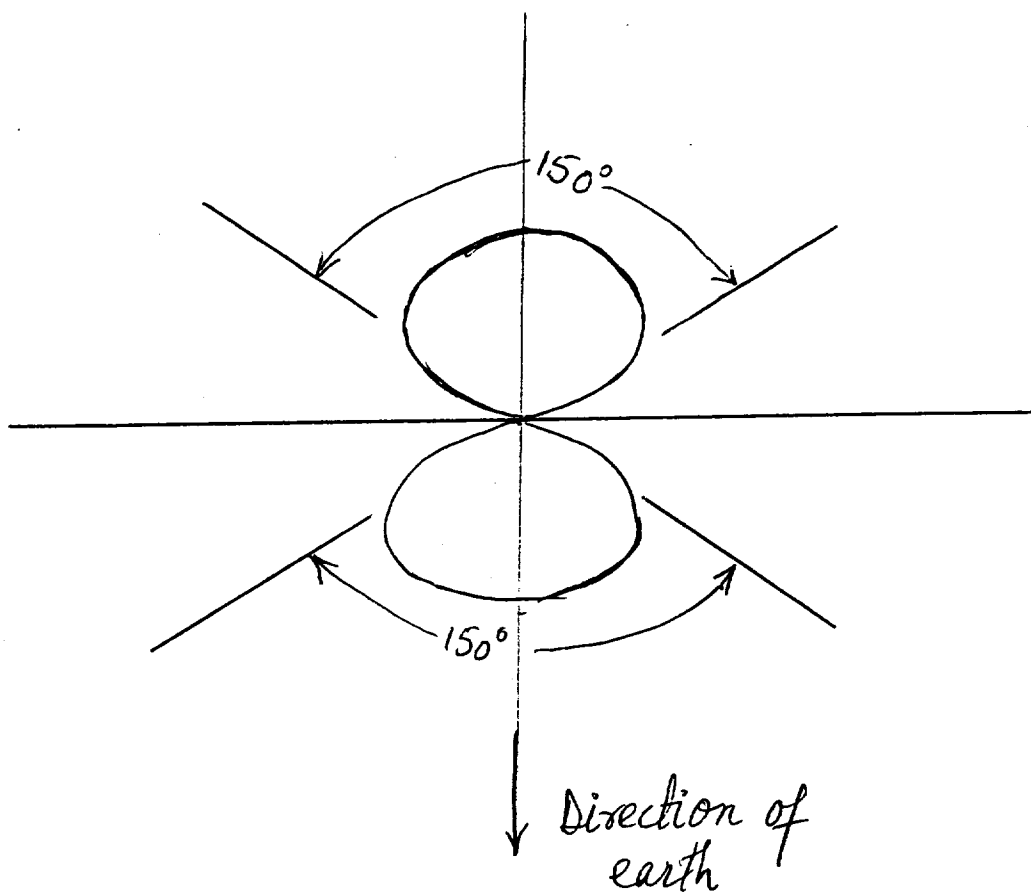


EXHIBIT-D COLUMN-9 PROJECT DESCRIPTION

IOWA SATELLITE PROJECT (ISAT)

DESCRIPTION:

This project aims at design/construction and launch of a small (less than 200 lbs) Low-Earth-Orbit satellite to provide a space-borne platform for conducting different space related experiments.

OBJECTIVES:

1. Educational: To educate people of Iowa at all educational levels about satellite design, launch and operation.
2. Public Awareness: To raise the public's awareness of the benefits of space utilization.
3. Space-related Research: To conduct various experiments in space environment.
4. Agricultural Studies: To provide agricultural industry of Iowa agricultural studies from space.
5. Experience: To develop an expertise in satellite design and development.

ON-BOARD EXPERIMENTS:

1. Plant/sead growing in space environment.
2. Radiation detection in space.
3. Earth imaging from space.
4. Earth radio frequency measurement.
5. Remote weather/soil data collection.
6. Micrometeroid detection.
7. Robotic arm movement in space.
8. Solar cell deterioration in space environment.
9. Space batteries performance measurement.

COMMUNICATION SYSTEM REQUIREMENT:

1. Telemetry/Telecommand & Control Link: This would be the main link between the satellite and ground station. It consists of one Transmitter/Receiver pair on-board satellite and a second pair located at the ground station. All the command control and telemetry data would be handled through this link.
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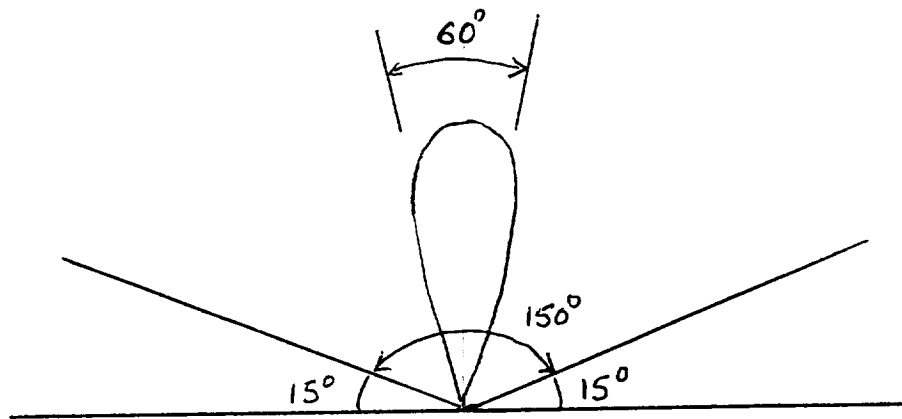
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EXHIBIT-C1 COLUMN-6 ANTENNA SPECIFICATIONS

Description of Ground Station Antenna:

A Crossed Yagi directional antenna would be utilized at the ground station for transmission/reception of signals to & from the satellite. The antenna would have a beam width of about 60 degrees but it will have tracking capability of scanning a sector of about 150 degrees (15 degrees above horizon on either side).



Antenna Vertical Beam Pattern

Hence the antenna has a tracking capability of complete 360 degrees in horizontal plane and 150 degrees in vertical plane.

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