EXHIBIT 01

Pursuant to Part 5 (Experimental Radio Services), Title 47 (Telecommunication) of the US Code of Federal Regulations, Orbital Sciences Corporation ("Orbital", "OSC") submits this application for operating radio links necessary for supporting the BATSAT program.

The goal of the BATSAT (**B**asic, **A**dvanced **T**echnology **S**atellite) program is the development of a basic LEO (Low Earth Orbit) spacecraft platform configuration capable of supporting payloads conducting research in advanced technology for telecommunications, remote sensing, astronomical studies, and other research areas that require a space-based platform. BATSAT fundamentally reduces the cost and time associated with deploying a LEO advanced technology research program.

The baseline for the BATSAT is the OSC MicroStar spacecraft design. The BATSAT spacecraft has a standard bus configuration designed around a payload bay. This payload bay provides power, communications, and thermal control for a specific advanced technology research payload. This "plug and play" concept greatly reduces the life cycle cost and timelines for space access.

The MicroStar Spacecraft Platform

Designed to be launched in multiple or "piggyback" units, the innovative, disc-shaped MicroStar spacecraft platform supports payloads in the 50-kg class and provides a three- to five-year mission life. The baseline bus, or "ring," is approximately one meter in diameter and 16.5 cm deep. Payloads requiring a deeper bus can be easily accommodated by mating two or more rings, or by creating a custom-depth ring. Attitude control options range from gravity gradient to three-axis stabilized. Orbit average power available to the payload is approximately 55 Watts to 90 Watts, depending on the mission orbit.

The MicroStar platform was originally developed to support the ORBCOMM global communications system, which will provide real-time, mobile two-way data and messaging services worldwide. The first two ORBCOMM satellites and a companion satellite called MicroLab-1 were launched on a single Pegasus in April 1995. Orbital is now engaged in the design, development and production of 36 more MicroStar satellites (including 34 for the ORBCOMM constellation), all of which are scheduled to be launched on Orbital's Pegasus or Taurus vehicles.

Currently, OSC plans to launch the first BATSAT in October 1997 via the OSC owned and operated Pegasus XL launch vehicle. This spacecraft has already manifested an advance telecommunications research payload operated independent of the BATSAT by the researcher.

This application, under Part 5 (Experimental Radio Services), is only for the Telemetry, Tracking, and Commanding (TT&C) radio links necessary to support the BATSAT MicroStar spacecraft.

platform + payload

UPLINK2.XLS amended off 2

9.600 KHz DATA RATE UPLINK ANALYSIS

Fo = 0.45 GHz

COMMAND UPLINK PARAMETERS:

Frequency:	0.45	GHz	(Enter frequency)
Orbit Height in km	580	Km	(Enter orbit height)
Local elevation angle above hor.	5	degrees	(Enter min. elevation angle)
Data Rate	9.600	Kbps	
Spectral Efficiency	0.50		(.5 for QPSK, 2 for Bi-Phase BPSK, 1 for BPSK)
Bandwidth	4.8000	Kbps	
Uplink Ant EIRP @ max scan	56.0	dBm	
Slant Range:	2279.1	km	
Polarization Losses:	4.10	dB	(assume 2 db AR grd. ant., linear SC)
Atmospheric Losses:	0.6	dB	
Rain Attenuation	0.0	dB	10 mm/hr rain rate
Tracking Losses Grd. Ant.	0.4	dB	
Spacecraft Antenna G/T:	-38.00	dB/K	(input G/T including SC pointing loss)
BER	1.01E-06		
Required Eb/No	10.53		
Hardware BER Losses:	2.0	dB	(including loss effects of filtered sidelobes)

LINK CALCULATION:

TOTAL POWER TO SATELLITE:

2 watts (ERP)

Grd. Station EIRP dBm	56.01	dBm	
Path Loss:	-152.67	dB	
Polarization Loss:	-4.10	dB	
Atmospheric Loss + Rain Atten:	-0.60	dB	
Tracking Loss	-0.40	dB	(Ground antenna)
Isotropic Signal at Satellite:	**-101.77**	**dBm**	

RECEIVER SENSITIVITY:

Boltzmann's Constant:	-198.60	dBm/K-Hz	
Neg. Value of Spacecraft G/T	38.00	dB/K	
Noise Bandwidth:	36.81	dBHz	
Required Eb/No	10.53	dB	
Coding Gain	0.00	dB	
Correction for 2 bits/symbol	3.00	dB	(3 For QPSK , 0 for BPSK)
Hardware BER Losses:	2.00	dB	(including loss effects of filtered sidelobes)
Required Service Power:	**-108.26**	**dBm**	
COMMAND LINK MARGIN:	**6.5**	**dB**	

ANTENNA SIZES:

Ground Antenna Segment

Gain of Antenna	16.00		
Diplexer loss	1.00	dB	
Line Loss Diplexer to Antenna	2.00	dB	
Transmitter Po	20.00	Watts	(@ xmitter output)
EIRP of Ground Ant. System	56.01	dBm	

Spacecraft Antenna Segment

Antenna G/T:	-38.00	dB/K	(including pointing loss)
Aperture Input Noise Temp	290.00	K	(sees earths ambient temp)
Antenna I^2*R Loss	0.40	dB	
Line Loss From Antenna to Diplexer	0.50	dB	(including Hybrid)
Antenna Diplexer Loss	1.10	dB	
Total Pre-LNA Loss	2.00	dB	0.631
Pre-LNA Attenuation Noise	169.62	K	(Antenna plus front end losses)
LNA Noise Temp:	75.00	K	
LNA Gain	20.00	dB	100
Downconverter Noise Figure	10.00	dB	
System Noise Temperature:	619.85	K	(Referenced at Aperture)
Antenna Directivity Gain	-10.08	dBiL	

57.6 KHZ DATA RATE DOWNLINK ANALYSIS

Fo = 401.5 MHz

DOWNLINK PARAMETERS:

Modulation	qpsk		Enter QPSK,BPSK or Bi-Phase (for Bi-Phase BPSK)
Frequency:	401.5	MHz	(Enter frequency)
Orbit Height in km	580	Km	(Enter orbit height)
Local elevation angle above hor.	5	degrees	(Enter min. elevation angle)
Data Rate	57.6	Kbps	
Spectral Efficiency (QPSK or BPSK)	0.5		(.5 for QPSK, 2 for Bi-Phase BPSK, 1 for BPSK)
Spectral Efficiency (Bi-Phase BPSK)	0.5		
Bandwidth	29	Kbps	
Spacecraft Ant EIRP @ max scan	32.0	dBm	
Slant Range:	2279.1	km	
Polarization Losses:	-4.1	dB	(linear SC antenna, 2dB AR Ground)
Atmospheric Losses:	-0.6	dB	
Rain Attenuation 5mm/hr rate	0.0	dB	(Enter rain rate in cell K14)
Tracking Pointing Losses:	-0.4	dB	(ground antenna only)
Ground Antenna G/T:	-7.6	dB/K	(input G/T)
Required TLM SNR:	10.7	dB	(10.7 for 10e-6 BER, use 9.6 for 10e-5)
Hardware BER Losses:	2	dB	(including loss effects of filtered sidelobes)

LINK CALCULATION:

TOTAL POWER TO GROUND:

Satellite EIRP dBm	31.99	dBm	(including SC pointing loss)
Path Loss:	-151.68	dB	
Polarization Loss:	-4.10	dB	
Atmospheric Loss + Rain Atten:	-0.60	dB	
Radome and Pointing Loss:	-0.40	dB	
Isotropic Signal at Ground:	**-124.80**	**dBm**	

9.66 w (EIRP)

RECEIVER SENSITIVITY:

Boltzmann's Constant:	-198.60	dBm/K-Hz	
Neg. Value of Ground Antenna G/T	7.60	dB/K	
Noise Bandwidth:	44.59	dBHz	
Required Eb/No	10.70	dB	
Correction for 2 bits/symbol (QPSK)	3	dB	(3 For QPSK , 0 for BPSK)
Correction for symbols/bit	3	dB	(-3 For Bi-Phase BPSK)
Hardware BER Losses:	2.00	dB	(including loss effects of filtered sidelobes)
Required Service Power:	**-130.71**	**dBm**	
DOWNLINK MARGIN:	**5.9**	**dB**	

ANTENNA SIZES:

Wavelength	29.40	inches	
Spacecraft Antenna Gain	-2	dBiL	(including pointing loss)
Line losses (xmitter out to ant. input)	3	dB	(input losses)
Transmitter Po	5	Watts	(@ xmitter output)
EIRP of satellite Ant. System	**31.99**	dBm	
Ground Antenna G/T:	**-7.60**	dB/K	
Aperture Efficiency Ground Ant.:	0.65		
Sky Noise @ 5 deg. elevation:	280	K	(50 K @ 1 GHz,30 K @ 2 GHz, 5K@10GHz)
Antenna Noise Temp (I^2*R losses)	10	K	(Antenna plus front end losses)
LNA Noise Temp:	75	K	
System Noise Temperature:	365.00	K	
Directivity Gain Ground Antenna	**18.02**	dBiC	

Sciences Corporation

21700 Atlantic Boulevard • Dulles, VA 20166

Date: 11/27

Header+ 3 Pages

TO

Name:	Phone#:
Carl Huie	202) 418-2430
Organization:	Fax#: 202) 418-1918
FCC	Priority: Normal / Urgent

FROM

Name: James Byrd

		Fax#	Phone#
☐ OSC Corporate/Dulles	Executive	(703) 406-3509	(703) 406-5000
☐ OSC Corporate/Dulles	Finance	(703) 406-3502	"
☐ OSC Corporate/Dulles	Legal	(703) 406-5572	"
☐ OSC Corporate/Dulles	Personnel	(703) 404-8075	"
☐ OSC/Dulles	ORBCOMM Executive	(703) 406-3508	"
☐ OSC SESG/Dulles	Central Engineering	(703) 406-3503	"
☐ OSC/Dulles	ORBCOMM Inc.	(703) 406-3504	"
☐ OSC/Dulles	Marketing	(703) 406-3505	"
☐ OSC/Dulles	Purchasing/ Acctng./Graphics	(703) 406-3506	"
☐ OSC ASG/Dulles	ORBCOMM	(703) 406-5553	"
☐ OSC SESG/Dulles	Seastar/Contracts Advanced Projects Group	(703) 406-5461	"
☐ OSC LSG/Dulles	Pegasus	(703) 406-3412	"
☐ OSC LSG/Dulles	Taurus	(703) 406-3413	"
☐ OSC/Dulles	High Bay	(703) 406-5579	"

Instructions / Comments:

EXHIBIT 02

Item #4. Particulars of Operation

Space-to-Earth Telemetry Link

57.6 KHZ DATA RATE DOWNLINK ANALYSIS		Fo=	401.5 MHz
D/L PARAMETERS			
	Modulation	QPSK	
	Frequency:	401.5	MHz
	Orbit Height in km	580	Km
	Local elevation angle above hor.	5	degrees
	Data Rate	57.6	Kbps
	Spectral Efficiency (QPSK or BPSK)	0.5	0.5 for QPSK
	Spectral Efficiency (Bi-Phase BPSK)	0.5	
	Bandwidth	29	Kbps
	Spacecraft Ant EIRP @ max scan	28.8	dBm
	Slant Range:	2279.1	km
	Polarization Losses:	-3	dB
	Atmospheric Losses:	-0.5	dB
	Rain Attenuation 5mm/hr rate	-0.0	dB (Enter rain rate in cell K14)
	Tracking Pointing Losses:	-0.2	dB (including grd. & sat.antennas)
	Ground Antenna G/T:	-6	dB/K (input G/T)
	Required TLM SNR:	10.7	dB
	Hardware BER Losses:	2	dB (including loss effects of filtered sidelobes)
LINK CALCULATION: TOTAL POWER TO GROUND:			
	Satellite EIRP dBm	28.77	dBm
	Path Loss:	-151.68	dB
	Polarization Loss:	-3.00	dB
	Atmospheric Loss+ Rain Atten:	-0.50	dB
	Radome and Pointing Loss:	-0.20	dB
	Isotropic Signal at Ground:	**-126.61**	**dBm**
RECEIVER SENSITIVITY:			
	Boltzmann's Constant:	-198.60	dBm/K-Hz
	Neg. Value of Ground Antenna G/T	6.00	dB/K
	Noise Bandwidth:	44.59	dBHz
	Required Eb/No	10.70	dB
	Correction for 2 bits/symbol (QPSK)	3	dB (3 For QPSK , 0 for BPSK)
	Correction for symbols/bit	3	dB (-3 For Bi-Phase BPSK)
	Hardware BER Losses:	2.00	dB (including loss effects of filtered sidelobes)
	Required Service Power:	**-132.31**	**dBm**
	DOWNLINK MARGIN:	**5.7**	**dB**
ANTENNA SIZES:			
	Wavelength	29.40	inches
	Spacecraft Antenna Gain	-5	dBiL
	Line losses (xmitter out to ant. input)	1	dB (input losses)
	Transmitter Po	3	Watts (@ xmitter output)
	EIRP of satellite Ant. System	**28.77**	dBm
	Ground Antenna G/T:	**-6.00**	dB/K
	Aperture Efficiency Ground Ant.:	0.65	
	Sky Noise @ 5 deg. elevation:	30	K (30 K @ 2 GHz)
	Antenna Noise Temp (I^2*R losses)	120	K (Antenna plus front end losses)
	LNA Noise Temp:	75	K
	System Noise Temperature:	225.00	K
	Directivity Gain Ground Antenna	**17.52**	dBiC

-126.63 (460 mW EIRP)

? amended to 31.99 (1 W EIRP)

Earth-to-Space Telecommand Link

9.600 KHz DATA RATE UPLINK ANALYSIS			
		Fo=	0.45 GHz
COMMAND UPLINK PARAMETERS:			
	Frequency:	0.45	GHz
	Orbit Height in km	580	Km
	Local elevation angle above hor.	5	degrees
	Data Rate	9.600	Kbps
	Spectral Efficiency	0.50	(.5 for QPSK, 2 for Bi-Phase BPSK, 1 for BPSK)
	Bandwidth	4.80000	Kbps
	Spacecraft Ant EIRP @ max scan	54.5	dBm
	Slant Range:	2279.1	km
	Polarization Losses:	3.00	dB (assume 2 db AR grd. ant., 3 db SC)
	Atmospheric Losses:	0.3	dB
	Rain Attenuation	0.0	dB 10 mm/hr rain rate
	Tracking Losses Grd. Ant.	0.4	dB
	Spacecraft Antenna G/T:	-33.00	dB/K (input G/T)
	BER	1.01E-05	
	Required Eb/No	10.53	
	Hardware BER Losses:	2.0	dB (including loss effects of filtered sidelobes)
LINK CALCULATION: TOTAL POWER TO SATELLITE:			
	Grd. Station EIRP dBm	54.50	dBm
	Path Loss:	-152.67	dB
	Polarization Loss:	-3.00	dB
	Atmospheric Loss+ Rain Atten:	-0.30	dB
	Tracking Loss	-0.40	dB (including both grd. and satellite antennas)
	Isotropic Signal at Satellite:	**-101.88**	**dBm**
RECEIVER SENSITIVITY:			
	Boltzmann's Constant:	-198.60	dBm/K-Hz
	Neg. Value of Spacecraft G/T	33.00	dB/K
	Noise Bandwidth:	36.81	dBHz
	Required Eb/No	10.53	dB
	Coding Gain	0.00	dB
	Correction for 2 bits/symbol	3.00	dB (3 For QPSK , 0 for BPSK)
	Hardware BER Losses:	2.00	dB (including loss effects of filtered sidelobes)
	Required Service Power:	**-113.26**	**dBm**
	COMMAND LINK MARGIN:	**11.4**	**dB**
ANTENNA SIZES: **Ground Antenna Segment**			
	Gain of Antenna	17.00	
	Diplexer loss	1.00	dB
	Line Loss Diplexer to Antenna	1.50	dB
	Transmitter Po	10.00	Watts (@ xmitter output)
	EIRP of Ground Ant. System	54.50	dBm
Spacecraft Antenna Segment			
	Antenna G/T:	-33.00	dB/K
	Aperture Input Noise Temp	290.00	K (sees earths ambient temp)
	Antenna I^2*R Loss	0.40	dB
	Line Loss From Antenna to Diplexer	1.20	dB (including Hybrid)
	Antenna Diplexer Loss	0.60	dB
	Total Pre-LNA Loss	2.20	dB
	Pre-LNA Attenuation Noise	191.28	K (Antenna plus front end losses)
	LNA Noise Temp:	75.00	K
	LNA Gain	30.00	dB
	Downconverter Noise Figure	10.00	dB
	System Noise Temperature:	610.08	K (Referenced at Aperture)
	Antenna Directivity Gain	-5.15	dBiL

EXHIBIT 03

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

Yes.

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

The BATSAT will carry a research payload for an OSC customer. For this research project, the BATSAT communications system provides the method for downlinking research technology data gathered by the payload and for configuring the spacecraft platform to support the payload research operations.

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

The earth station performs telecommand uplink activity (command transmission) in order to configure the spacecraft and payload and to provide critical directions to the spacecraft in the event of anomalous events. These telecommands are critical to the operations of the spacecraft.

The earth station transmits only when the spacecraft is within line-of-sight visibility of the station (see exhibit 03).

The space station transmitter provides telemetry transmissions directly to the earth station relating directly to the functioning of the spacecraft and its payload. Telemetered data is relayed from the earth station to a Spacecraft Operations Control Center for parameter limit checking, engineering trend analysis, and data archiving. This data is critical to the operations of the spacecraft.

The space station transmits only when the spacecraft is within the visibility circle of the BATSAT earth station (see exhibit 03).

C) A showing that existing communications facilities are inadequate.

OSC has no other RF communications facilities compatible with the BATSAT.

EXHIBIT 04

BATSAT SYSTEM AREA of OPERATIONS

BATSAT SPACE STATION ORBITAL PARAMETERS

AREA OF OPERATION: NONGEOSTATIONARY CIRCULAR POLAR ORBIT

Radius	6958.14 km
Altitude	580 km
Velocity	7.56872 km/s
Period	5776.31 Sec / 96.27 Min
Distance to Horizon (0 degree elevation)	2781.19 km
Orbit Inclination	97.6884 degrees

PERTURBATIONS

Regression of Nodes	0.9830 Degrees/Day
Rotation of Apsides	0 Degrees/Day
Mean Motion	0.001087750

BATSAT EARTH STATION PHYSICAL PARAMETERS

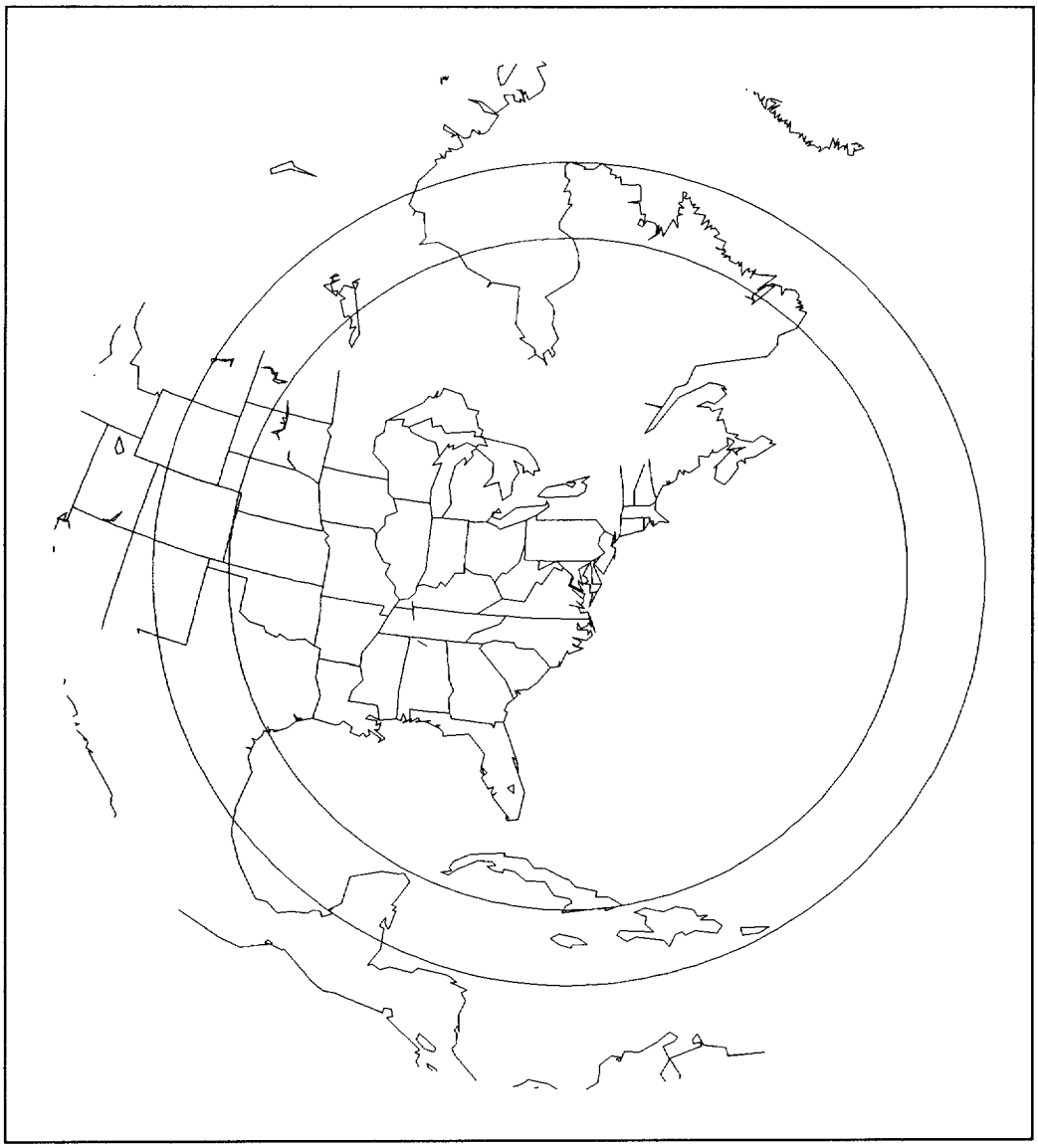
Location: *OSC-Dulles, 21700 Atlantic Blvd, Dulles, Virginia*
Function: *Serve as BATSAT Telemetry, Tracking, and Commanding (TT&C) earth station (fixed site)*

AREA OF OPERATION:

Latitude	39 degrees 00 m 56s N
Longitude	077 degrees 25m 42s W

EARTH STATION VISIBILITY CIRCLES

Orthographic Projection
580 km circular spacecraft orbit



Outer Circle = 0 degree horizon elevation
Inner Circle = 5 degree horizon elevation

TEMPORAL PARAMETERS

3 Day Orbit Cycle Analysis
Earth Station-to-Spacecraft Visibility

0 Degree Horizon

Calendar Date	Universal Time	Event Type	Duration (minutes)
9/26/96	3:18:44	Rise	0
9/26/96	3:29:50	Set	11.0859259
9/26/96	4:53:19	Rise	0
9/26/96	5:05:31	Set	12.2013554
9/26/96	16:35:46	Rise	0
9/26/96	16:48:01	Set	12.2482377
9/26/96	18:11:30	Rise	0
9/26/96	18:22:29	Set	10.9811407
9/27/96	3:24:23	Rise	0
9/27/96	3:35:46	Set	11.3739516
9/27/96	4:59:16	Rise	0
9/27/96	5:11:18	Set	12.0292414
9/27/96	16:41:34	Rise	0
9/27/96	16:53:56	Set	12.3775008
9/27/96	18:17:28	Rise	0
9/27/96	18:28:06	Set	10.6467759
9/28/96	3:30:04	Rise	0
9/28/96	3:41:42	Set	11.6297559
9/28/96	5:05:15	Rise	0
9/28/96	5:17:05	Set	11.8226442
9/28/96	15:15:27	Rise	0
9/28/96	15:19:22	Set	3.9189421
9/28/96	16:47:22	Rise	0
9/28/96	16:59:51	Set	12.4764179
9/28/96	18:23:26	Rise	0
9/28/96	18:33:42	Set	10.2743847
			11.00509802

5 Degree Horizon

Calendar Date	Universal Time	Event Type	Duration (minutes)
9/26/96	3:20:09	Rise	0
9/26/96	3:28:25	Set	8.2681125
9/26/96	4:54:34	Rise	0
9/26/96	5:04:14	Set	9.6659839
9/26/96	16:37:02	Rise	0
9/26/96	16:46:46	Set	9.7292043
9/26/96	18:12:56	Rise	0
9/26/96	18:21:04	Set	8.127328
9/27/96	3:25:45	Rise	0
9/27/96	3:34:24	Set	8.6517569
9/27/96	5:00:34	Rise	0
9/27/96	5:10:00	Set	9.4367234
9/27/96	16:42:49	Rise	0
9/27/96	16:52:43	Set	9.9009528
9/27/96	18:18:57	Rise	0
9/27/96	18:26:37	Set	7.6672614
9/28/96	3:31:23	Rise	0
9/28/96	3:40:22	Set	8.9860493
9/28/96	5:06:34	Rise	0
9/28/96	5:15:44	Set	9.1596103
9/28/96	16:48:36	Rise	0
9/28/96	16:58:38	Set	10.0329436
9/28/96	18:25:00	Rise	0
9/28/96	18:32:08	Set	7.1380207
			8.90

Maximum Transmitter Duty Cycle
[Space and Earth Station]
0 Degree Elevation = Worst Case

	0 Degree	5 Degree
Avg. Pass Duration	11.005 min	8.900 min
Avg. Number of Passes	4.330 / day	4.000 / day
Total Xmt Time Available	47.652 min/day	35.600 min/day
% of Day	3.310 %	2.470 %