



Morehead State University Space Science Center  
21 Meter Space Tracking Antenna  
(Latitude: 38° 11' 30.773 N,  
Longitude: 83° 26' 19.948 W) U.S.A

FUNCTION	PERFORMANCE
Antenna Diameter	21 Meter
Receive Polarization	RHCP,LHCP,VERT,HORZ
Travel Range	AZ +/- 275 degrees from due South (180 deg) EL -1 to 91 degrees POL +/- 90 degrees
Velocity	AZ Axis = 3 deg/sec EL Axis = 3 deg/sec POL Axis = 1 deg/sec
Acceleration	AZ = 1. 0 deg/sec/sec min EL = 0.5 deg/sec/sec min
Display Resolution	AZ/EL = 0.001 deg POL = 0.01 deg
Encoder Resolution	AZ/EL = 0.0003 deg (20 Bit)
Tracking Accuracy	<= 5% Received 3 dB Beamwidth (0.028 deg RMS L-band) (0.005 deg RMS Ku-Band)
Pointing Accuracy	<= 0.01 deg rms

## 21 M Space Tracking Antenna

The Space Science Center at **Morehead State University** has developed a full motion 21-meter class antenna system which is engaged in a rigorous research program in radio astronomy and also serves as an Earth Station for satellite mission support as well as a test bed for advanced RF systems. The instrument is staffed by university faculty and students and is available for a wide variety of TT&C services. Performance Characteristics are provided below:



21 M Mission Operations Center



Control Room at 21 M

### 21 M Antenna System Radio Frequency Operating Regimes

Radio Frequency (RF) Band	Bandwidth	
	Low End	High End
L-Band	1.4 GHz	1.7 GHz
S-Band	2.2 GHz	2.5 GHz
X-Band	7.0 GHz	7.8 GHz
Low C-Band	4.8 GHz	5.0 GHz
Ku-Band	11.2 GHz	12.7 GHz

### Radio Frequency Performance at L-Band and Ku-Band

Radio Frequency (RF) Performance Criterion	Measured Parameters	
	L-Band	Ku-Band
Frequency	1.40 GHz	11.2 GHz
Antenna Gain	47.80 dBi	65.50 dBi
LNA Temperature	25 K	70 K
System Temperature, T <sub>sys</sub>	83.8 K	139.0 K
G/T at 5° Elevation	28.6 dBi/K	44.1 dBi/K
HPBW	0.62°	0.08°

### Radio Frequency Performance at S-Band and X-Band

Radio Frequency (RF) Performance Criterion	Theoretical Parameters	
	S-Band	X-Band
Frequency	2.4-2.7 GHz	7.1-7.6 GHz
Antenna Gain	52.8 dBi	62.0 dBi
System Temperature, T <sub>sys</sub>	215K	215K
N <sub>0</sub>	-175dBm/Hz	-175dBm/Hz
G/T at 5° Elevation	29.5dBi/K	38.7dBi/K
HPBW	0.37°	0.13°

For Scheduling or Cost Structure contact:

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