

**FCC 312
Schedule S**

**FEDERAL COMMUNICATIONS COMMISSION
SATELLITE SPACE STATION AUTHORIZATIONS
(Technical and Operational Description)**

**Page 1: General,
Frequency Bands,
and GSO Orbit**

S1. GENERAL INFORMATION Complete for all satellite applications.

a. Space Station or Satellite Network Name: INMARSAT-5 F3		e. Estimated Date of Placement into Service: 5/1/2015		i. Will the space station(s) operate on a Common Carrier Basis: N	
b. Construction Commencement Date: 11/1/2012		f. Estimated Lifetime of Satellite(s): 15 Years		j. Number of transponders offered on a common carrier basis:	
c. Construction Completion Date: 10/1/2014		g. Total Number of Transponders: 161		k. Total Common Carrier Transponder Bandwidth: MHz	
d1. Est Launch Date Begin: 12/1/2014	d2. Est Launch Date End: 4/1/2015	h. Total Transponder Bandwidth (no. transponders x Bandwidth) 5778 MHz		l. Orbit Type: Mark all boxes that apply: ☒ GSO ☐ NGSO	

S2. OPERATING FREQUENCY BANDS Identify the frequency range and transmit/receive mode for all frequency bands in which this station will opera
Also indicate the nature of service(s) for each frequency band.

Frequency Band Limits				e. T/R Mode	Nature of Service(s): List all that apply to this band	f.
Lower Frequency (Hz)		Upper Frequency (Hz)				
a. Numeric	b. Unit (K/M/G)	c. Numeric	d. Unit (K/M/G)			
27500	M	30000	M	R	Fixed Satellite Service	
17700	M	20200	M	T	Fixed Satellite Service	

S3. ORBITAL INFORMATION FOR GEOSTATIONARY SATELLITES ONLY:

a. Nominal Orbital Longitude (Degrees E/W): 179.7 E		b. Alternate Orbital Longitude (Degrees E/W):		c. Reason for orbital location selection: The INMARSAT-5 F3 satellite will operate at the 179.7° E.L. orbital location and will provide fixed-satellite service ("FSS") to all visible parts of the Earth.			
Longitudinal Tolerance or E/W Station-Keeping:		f. Inclination Excursion or N/S Station-Keeping Tolerance:				Range of orbital are in which adequate service can be provided (Optional):	
d. Toward West:	0.05 Degrees	0.05 Degrees				<u>Degrees</u> <u>E/W</u> g. Westernmost: 108 E h. Easternmost: 108 W	
e. Toward East:	0.05 Degrees						
i. Reason for service are selection (Optional):							

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Page 2: NGSO Orbits

S4. ORBITAL INFORMATION FOR NON-GEOSTATIONARY SATELLITES ONLY

S4a. Total Number of Satellites in Network or System:

S4c. Celestial Reference Body (Earth, Sun, Moon, etc.):

S4b. Total Number of Orbital Planes in Network or System:

S4d. Orbit Epoch Date:

For each Orbital Plane Provide:

(e) Orbital Plane No.	(f) No. of Satellites in Plane	(g) Inclination Angle (degrees)	(h) Orbital Period (Seconds)	(i) Apogee (km)	(j) Perigee (km)	(k) Right Ascension of the Ascending Node (Deg.)	(l) Argument of Perigee (Degrees)	Active Service Arc Range (Degrees)		
								(m) Begin Angle	(n) End Angle	(o) Other

S5. INITIAL SATELLITE PHASE ANGLE For each satellite in each orbital plane, provide the intital phase angle.

(a) Orbital Plane No.	(b) Satellite Number	(c) Initial Phase Angle (Degrees)
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NO NGSO DATA FILED

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Page 3: Service Areas

S6. SERVICE AREA CHARACTERISTICS for each service area provide:

(a) Service Area ID	(b) Type of Associated Station (Earth or Space)	(c) Service Area Diagram File Name (GXT File)	(d) Service Area Description. Provide list of geographic areas (state postal codes or ITU 3-ltr codes), satellites or Figure No. of Service Area Diagram.
GLOBAL	S		All visible areas of the Earth.

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Page 4: Antenna Beams

S7. SPACE STATION ANTENNA BEAM CHARACTERISTICS For each antenna beam provide:

(a) Beam ID	(b) T/R Mode	Isotropic Antenna Gain		(e) Pointing Error (Degrees)	(f) Rotational Error (Degrees)	(g) Min. Cross- Polar Iso- lation (dB)	(h) Polar- ization Switch- able? (Y/N)	(i) Polarization Alignment Rel. Equatorial Plane (Degrees)	(j) Service Area ID	Transmit			Receive				
		(c) Peak (dBi)	(d) Edge (dBi)							(k) Input Losses (dB)	(l) Effective Output Power (W)	(m) Max. EIRP (dBW)	(n) System Noise Temp (k)	(o) G/T Max. Gain Pt. (db/K)	(p) Min. Saturation Flux Density (dBW/m2)	Input Attenuator (dB)	
																(q) Max. Value	(r) Step Size
S1DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S2DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S3DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S4DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S5DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S6DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S7DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S8DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S9DL	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S10D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S11D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S12D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S13D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S14D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S15D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S16D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S17D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S18D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S19D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S20D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S21D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S22D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S23D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S24D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S25D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S26D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S27D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S28D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S29D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					

S30D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S31D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S32D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S33D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S34D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S35D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S36D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S37D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S38D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S39D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S40D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S41D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S42D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S43D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S44D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S45D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S46D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S47D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S48D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S49D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S50D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S51D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S52D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S53D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S54D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S55D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S56D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S57D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S58D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S59D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S60D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S61D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S62D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S63D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S64D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S65D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S66D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S67D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S68D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					

S69D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S70D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S71D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S72D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S73D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S74D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S75D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S76D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S77D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S78D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S79D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S80D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S81D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S82D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S83D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S84D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S85D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S86D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S87D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S88D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S89D	T	40.3	37.3	0.2	0.1		N		GLOBAL	5	38	56.1					
S1UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S2UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S3UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S4UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S5UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S6UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S7UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S8UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S9UR	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S10U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S11U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S12U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S13U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S14U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S15U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S16U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S17U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S18U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1

S19U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S20U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S21U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S22U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S23U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S24U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S25U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S26U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S27U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S28U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S29U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S30U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S31U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S32U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S33U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S34U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S35U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S36U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S37U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S38U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S39U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S40U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S41U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S42U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S43U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S44U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S45U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S46U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S47U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S48U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S49U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S50U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S51U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S52U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S53U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S54U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S55U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S56U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1
S57U	R	41.3	38.3	0.2	0.1	N		GLOBAL				741	12.6	-93	12	1

S58U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S59U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S60U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S61U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S62U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S63U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S64U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S65U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S66U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S67U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S68U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S69U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S70U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S71U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S72U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S73U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S74U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S75U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S76U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S77U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S78U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S79U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S80U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S81U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S82U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S83U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S84U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S85U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S86U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S87U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S88U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
S89U	R	41.3	38.3	0.2	0.1		N		GLOBAL				741	12.6	-93	12	1
KFDR	T	40.3	37.3	0.2	0.1	30	N		GLOBAL	5	1.2	41.1					
KFDL	T	40.3	37.3	0.2	0.1	30	N		GLOBAL	5	1.2	41.1					
KFUR	R	42.4	39.4	0.2	0.1	30	N		GLOBAL				1346	11.1	-103	16	1
KFUL	R	42.4	39.4	0.2	0.1	30	N		GLOBAL				1346	11.1	-103	16	1
KF2D	T	40.3	37.3	0.2	0.1	30	N		GLOBAL	5	1.2	41.1					
KF2D	T	40.3	37.3	0.2	0.1	30	N		GLOBAL	5	1.2	41.1					
KF2U	R	42.4	39.4	0.2	0.1	30	N		GLOBAL				1346	11.1	-103	16	1

KF2U	R	42.4	39.4	0.2	0.1	30	N		GLOBAL				1346	11.1	-103	16	1
KHDL	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KH2D	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KH3D	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KH4D	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KH5D	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KH6D	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KHD	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KH5D	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KH6D	T	42.1	39.1	0.2	0.1	30	N		GLOBAL	5	30.9	57					
KHUL	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KH5U	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KH6U	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KHU	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KH2U	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KH3U	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KH4U	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KH5U	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KH6U	R	44.2	41.2	0.2	0.1	30	N		GLOBAL				1047	14	-96	12	1
KGD	T	21	16	0.2	0.1	30	N		GLOBAL	5	28.8	35.6					
KGDL	T	21	16	0.2	0.1	30	N		GLOBAL	5	28.8	35.6					
KGU	R	21	16	0.2	0.1	30	N		GLOBAL				339	-4.3	-100	16	2
KGUL	R	21	16	0.2	0.1	30	N		GLOBAL				339	-4.3	-100	16	2
COD	T	8.3	4.3	0.2	0.1	30	N	90	GLOBAL	3.5	2.3	11.9					
COD	T	8.3	4.3	0.2	0.1	30	N		GLOBAL	3.5	2.3	11.9					
COU	R	9	5	0.2	0.1	30	N		GLOBAL				501	-18	-107.6	12	2
COU	R	9	5	0.2	0.1	30	N	0	GLOBAL				501	-18	-107.6	12	2

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Page 5: Beam Diagrams

S8. ANTENNA BEAM DIAGRAMS For each beam pattern provide the reference to the graphic image and numerical data:
 Also provide the power flux density levels in each beam that result from the emission with the highest power flux density.

(a) Beam ID	(b) T/R Mode	(c) Co-or Cross Polar Mode ("C" or" X")	(d) GSO Ref. Orbital Longitude (Deg. E/W)	(e) NGSO Antenna Gain Contour Description (Figure/Table/ Exhibit)	(f) GSO Antenna Gain Contour Data (GXT File)	Max. Power Flux Density (dBW/M2/Hz)				
						At Angle of Arrival above horizontal (for emission with highest PFD)				
						(g) 5 Deg	(h) 10 Deg	(i) 15 Deg	(j) 20 Deg	(k) 25 Deg
S24D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S25D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S26D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S27D	T	C	179.7			-127.1	-127.1	-125.1	-125.1	-123.1
S28D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S29D	T	C	179.7			-123.1	-123.1	-123.1	-121.1	-121.1
S30D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S31D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S32D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S33D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S34D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S35D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S36D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S37D	T	C	179.7			-125.1	-125.1	-125.1	-123.1	-121.1
S38D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S39D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S40D	T	C	179.7			-141.1	-136.1	-131.1	-127.1	-127.1
S41D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S42D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S43D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S44D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S45D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S46D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S47D	T	C	179.7			-136.1	-136.1	-136.1	-131.1	-127.1
S48D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S49D	T	C	179.7			-125.1	-123.1	-123.1	-121.1	-121.1
S50D	T	C	179.7			-136.1	-136.1	-136.1	-136.1	-131.1
S51D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1

S52D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S53D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S54D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S55D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S56D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S57D	T	C	179.7			-125.1	-125.1	-123.1	-123.1	-121.1
S58D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S59D	T	C	179.7			-125.1	-125.1	-125.1	-123.1	-123.1
S60D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-136.1
S61D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S62D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S63D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S64D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S65D	T	C	179.7			-141.1	-141.1	-141.1	-136.1	-136.1
S66D	T	C	179.7			-127.1	-127.1	-125.1	-125.1	-123.1
S67D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S68D	T	C	179.7			-124.1	-124.1	-124.1	-123.1	-121.1
S69D	T	C	179.7			-141.1	-141.1	-141.1	-136.1	-129.1
S70D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S71D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S72D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S73D	T	C	179.7			-136.1	-136.1	-136.1	-136.1	-131.1
S74D	T	C	179.7			-127.1	-127.1	-125.1	-125.1	-123.1
S75D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S76D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S77D	T	C	179.7			-131.1	-129.1	-129.1	-127.1	-125.1
S78D	T	C	179.7			-136.1	-136.1	-131.1	-131.1	-131.1
S79D	T	C	179.7			-141.1	-136.1	-131.1	-131.1	-131.1
S80D	T	C	179.7			-131.1	-131.1	-131.1	-131.1	-127.1
S81D	T	C	179.7			-127.1	-123.1	-121.1	-121.1	-121.1
S82D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S83D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S84D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S85D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S86D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S87D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S88D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-127.1
S89D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S1UR	R	C	179.7							

S2UR	R	C	179.7							
S3UR	R	C	179.7							
S4UR	R	C	179.7							
S5UR	R	C	179.7							
S6UR	R	C	179.7							
S7UR	R	C	179.7							
S8UR	R	C	179.7							
S9UR	R	C	179.7							
S10U	R	C	179.7							
S11U	R	C	179.7							
S12U	R	C	179.7							
S13U	R	C	179.7							
S14U	R	C	179.7							
S15U	R	C	179.7							
S16U	R	C	179.7							
S17U	R	C	179.7							
S18U	R	C	179.7							
S19U	R	C	179.7							
S20U	R	C	179.7							
S21U	R	C	179.7							
S22U	R	C	179.7							
S23U	R	C	179.7							
S24U	R	C	179.7							
S25U	R	C	179.7							
S26U	R	C	179.7							
S27U	R	C	179.7							
S28U	R	C	179.7							
S29U	R	C	179.7							
S30U	R	C	179.7							
S31U	R	C	179.7							
S32U	R	C	179.7							
S33U	R	C	179.7							
S34U	R	C	179.7							
S35U	R	C	179.7							
S36U	R	C	179.7							
S37U	R	C	179.7							
S38U	R	C	179.7							
S39U	R	C	179.7							
S40U	R	C	179.7							

S41U	R	C	179.7							
S42U	R	C	179.7							
S43U	R	C	179.7							
S44U	R	C	179.7							
S45U	R	C	179.7							
S46U	R	C	179.7							
S47U	R	C	179.7							
S48U	R	C	179.7							
S49U	R	C	179.7							
S50U	R	C	179.7							
S51U	R	C	179.7							
S52U	R	C	179.7							
S53U	R	C	179.7							
S54U	R	C	179.7							
S55U	R	C	179.7							
S56U	R	C	179.7							
S57U	R	C	179.7							
S58U	R	C	179.7							
S59U	R	C	179.7							
S60U	R	C	179.7							
S61U	R	C	179.7							
S62U	R	C	179.7							
S63U	R	C	179.7							
S64U	R	C	179.7							
S65U	R	C	179.7							
S66U	R	C	179.7							
S67U	R	C	179.7							
S68U	R	C	179.7							
S69U	R	C	179.7							
S70U	R	C	179.7							
S71U	R	C	179.7							
S72U	R	C	179.7							
S73U	R	C	179.7							
S74U	R	C	179.7							
S75U	R	C	179.7							
S76U	R	C	179.7							
S77U	R	C	179.7							
S78U	R	C	179.7							
S79U	R	C	179.7							

S80U	R	C	179.7							
S81U	R	C	179.7							
S82U	R	C	179.7							
S83U	R	C	179.7							
S84U	R	C	179.7							
S85U	R	C	179.7							
S86U	R	C	179.7							
S87U	R	C	179.7							
S88U	R	C	179.7							
S89U	R	C	179.7							
KFDR	T	C	179.7			-140.9	-140.4	-139.4	-133.9	-124.4
KFDL	T	C	179.7			-140.9	-140.4	-139.4	-133.9	-124.4
KFUR	R	C	179.7							
KFUL	R	C	179.7							
KF2D	T	C	179.7			-140.9	-140.4	-139.4	-133.9	-124.4
KF2D	T	C	179.7			-140.9	-140.4	-139.4	-133.9	-124.4
KF2U	R	C	179.7							
KF2U	R	C	179.7							
KHDL	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
KH2D	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
S1DL	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S2DL	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S3DL	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S4DL	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S5DL	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S6DL	T	C	179.7			-131.1	-131.1	-131.1	-129.1	-125.1
S7DL	T	C	179.7			-141.1	-136.1	-136.1	-131.1	-131.1
S8DL	T	C	179.7			-141.1	-136.1	-136.1	-131.1	-131.1
S9DL	T	C	179.7			-131.1	-131.1	-129.1	-127.1	-125.1
S10D	T	C	179.7			-125.1	-125.1	-121.1	-121.1	-121.1
S11D	T	C	179.7			-123.1	-121.1	-121.1	-121.1	-121.1
S12D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1
S13D	T	C	179.7			-136.1	-136.1	-136.1	-136.1	-131.1
S14D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S15D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S16D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S17D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-131.1
S18D	T	C	179.7			-127.1	-127.1	-125.1	-123.1	-121.1
S19D	T	C	179.7			-121.1	-121.1	-121.1	-121.1	-121.1

S20D	T	C	179.7			-127.1	-125.1	-125.1	-123.1	-123.1
S21D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S22D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
S23D	T	C	179.7			-141.1	-141.1	-141.1	-141.1	-141.1
KH3D	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
KH4D	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
KH5D	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
KH6D	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
KHD	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
KH5D	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
KH6D	T	C	179.7			-125.1	-125.1	-122.1	-122.1	-122.1
KHUL	R	C	179.7							
KH5U	R	C	179.7							
KH6U	R	C	179.7							
KHU	R	C	179.7							
KH2U	R	C	179.7							
KH3U	R	C	179.7							
KH4U	R	C	179.7							
KH5U	R	C	179.7							
KH6U	R	C	179.7							
KGD	T	C	179.7			-141.1	-141	-140.8	-140.5	-140.1
KGDL	T	C	179.7			-141.1	-141	-140.8	-140.5	-140.1
KGU	R	C	179.7							
KGUL	R	C	179.7							
COD	T	C	179.7			-156.2	-156.1	-155.9	-155.6	-151.2
COD	T	C	179.7			-156.2	-156.1	-155.9	-155.6	-151.2
COU	R	C	179.7							
COU	R	C	179.7							

FEDERAL COMMUNICATIONS COMMISSION
SATELLITE SPACE STATION AUTHORIZATIONS
FCC Form 312 - Schedule S: (Technical and Operational Description)

**Page 6: Channels and
Transponders**

S9. SPACE STATION CHANNELS For each frequency channel provide: S10. SPACE STATION TRANSPONDERS For each transponder provide:

(a) Channel No.	(B) Assigned Bandwidth (kHz)	(c) T/R Mode	(d) Center Frequency (MHz)	(e) Polarization (H, V, L, R)	(f) TTC or Comm Channel (T or C)
GF51	32000	R	29080	R	C
GF52	32000	R	29120	R	C
GF53	32000	R	29160	R	C
GF54	32000	R	29200	R	C
GF55	32000	R	29240	R	C
GF56	32000	R	29280	R	C
GF57	32000	R	29320	R	C
GF58	32000	R	29360	R	C
GF59	32000	R	29400	R	C
GF60	32000	R	29440	R	C
GF61	32000	R	29000	L	C
GF62	32000	R	29040	L	C
GF63	32000	R	29080	L	C
GF64	32000	R	29120	L	C
GF65	32000	R	29160	L	C
GF66	32000	R	29200	L	C
GF67	32000	R	29240	L	C
GF68	32000	R	29280	L	C
GF69	32000	R	29320	L	C
GF70	32000	R	29360	L	C
GF71	32000	R	29400	L	C
GF72	32000	R	29440	L	C
GREC1	5000	T	18207	L	C
GR01	32000	T	18240	L	C
GR02	32000	T	18280	L	C
GR03	32000	T	18320	L	C
GR04	32000	T	18360	L	C
GR05	32000	T	18400	L	C
GR06	32000	T	18440	L	C
GR07	32000	T	18480	L	C

(a) Transponder ID	(b) Transponder Gain (dB)	Receive Band		Transmit Band	
		(c) Channel No.	(d) Beam ID	(e) Channel No.	(f) Beam ID
ECF01	113.9	GFEC1	KGUR	UFEC	KGDL
ECF02	113.9	GFEC2	KGUL	UFEC	KGDL
1F01	117.8	GF01	KFUR	UF01	S11DL
1F02	117.8	GF02	KFUR	UF02	S72DL
1F03	117.8	GF03	KFUR	UF03	S85DL
1F04	117.8	GF04	KFUR	UF04	S13DL
1F05	117.8	GF05	KFUR	UF05	S78DL
1F06	117.8	GF06	KFUR	UF06	S51DL
1F07	117.8	GF07	KFUR	UF07	S14DL
1F08	117.8	GF08	KFUR	UF08	S24DL
1F09	117.8	GF09	KFUR	UF09	S61DL
1F10	117.8	GF10	KFUR	UF10	S28DL
1F11	117.8	GF11	KFUR	UF11	S80DL
1F12	117.8	GF12	KFUR	UF12	S64DL
1F13	117.8	GF13	KFUL	UF13	S12DL
1F14	117.8	GF14	KFUL	UF14	S17DL
1F15	117.8	GF15	KFUL	UF15	S27DL
1F16	117.8	GF16	KFUL	UF16	S82DL
1F17	117.8	GF17	KFUL	UF17	S32DL
1F18	117.8	GF18	KFUL	UF18	S21DL
1F19	117.8	GF19	KFUL	UF19	S63DL
1F20	117.8	GF20	KFUL	UF20	S18DL
1F21	117.8	GF21	KFUL	UF21	S4DL
1F22	117.8	GF22	KFUL	UF22	S55DL
1F23	117.8	GF23	KFUL	UF23	S20DL
1F24	117.8	GF24	KFUL	UF24	S47DL
1F25	117.8	GF25	KFUR	UF25	S43DL
1F26	117.8	GF26	KFUR	UF26	S66DL
1F27	117.8	GF27	KFUR	UF27	S9DL
1F28	117.8	GF28	KFUR	UF28	S2DL

GR08	32000	T	18520	L	C
GR09	32000	T	18560	L	C
GR10	32000	T	18600	L	C
GR11	32000	T	18640	L	C
GR12	32000	T	18680	L	C
GREC2	5000	T	18207	R	C
GR13	32000	T	18240	R	C
GR14	32000	T	18280	R	C
GR15	32000	T	18320	R	C
GR16	32000	T	18360	R	C
GR17	32000	T	18400	R	C
GR18	32000	T	18440	R	C
GR19	32000	T	18480	R	C
GR20	32000	T	18520	R	C
GR21	32000	T	18560	R	C
GR22	32000	T	18600	R	C
GR23	32000	T	18640	R	C
GR24	32000	T	18680	R	C
GR25	32000	T	18720	L	C
GR26	32000	T	18760	L	C
GR27	32000	T	18800	L	C
GR28	32000	T	18840	L	C
GR29	32000	T	18880	L	C
GR30	32000	T	18920	L	C
GR31	32000	T	18960	L	C
GR32	32000	T	19000	L	C
GR33	32000	T	19040	L	C
GR34	32000	T	19080	L	C
GR35	32000	T	19120	L	C
GR36	32000	T	19160	L	C
GR37	32000	T	18720	R	C
GR38	32000	T	18760	R	C
GR39	32000	T	18800	R	C
GR40	32000	T	18840	R	C
GR41	32000	T	18880	R	C
GR42	32000	T	18920	R	C
GR43	32000	T	18960	R	C
GR44	32000	T	19000	R	C
GR45	32000	T	19040	R	C

1F29	117.8	GF29	KFUR	UF29	S74DL
1F30	117.8	GF30	KFUR	UF30	S15DL
1F31	117.8	GF31	KF2UR	UF31	S56DL
1F32	117.8	GF32	KF2UR	UF32	S62DL
1F33	117.8	GF33	KF2UR	UF33	S26DL
1F34	117.8	GF34	KF2UR	UF34	S87DL
1F35	117.8	GF35	KF2UR	UF35	S77DL
1F36	117.8	GF36	KF2UR	UF36	S19DL
1F37	117.8	GF37	KFUL	UF37	S57DL
1F38	117.8	GF38	KFUL	UF38	S45DL
1F39	117.8	GF39	KFUL	UF39	S22DL
1F40	117.8	GF40	KFUL	UF40	S53DL
1F41	117.8	GF41	KFUL	UF41	S10DL
1F42	117.8	GF42	KFUL	UF42	S44DL
1F43	117.8	GF43	KF2UL	UF43	S81DL
1F44	117.8	GF44	KF2UL	UF44	S84DL
1F45	117.8	GF45	KF2UL	UF45	S67DL
1F46	117.8	GF46	KF2UL	UF46	S71DL
1F47	117.8	GF47	KF2UL	UF47	S52DL
1F48	117.8	GF48	KF2UL	UF48	S86DL
1F49	117.8	GF49	KF2UR	UF49	S8DL
1F50	117.8	GF50	KF2UR	UF50	S31DL
1F51	117.8	GF51	KF2UR	UF51	S1DL
1F52	117.8	GF52	KF2UR	UF52	S48DL
1F53	117.8	GF53	KF2UR	UF53	S7DL
1F54	117.8	GF54	KF2UR	UF54	S65DL
1F55	117.8	GF55	KF2UR	UF55	S30DL
1F56	117.8	GF56	KF2UR	UF56	S3DL
1F57	117.8	GF57	KF2UR	UF57	S73DL
1F58	117.8	GF58	KF2UR	UF58	S6DL
1F59	117.8	GF59	KF2UR	UF59	S38DL
1F60	117.8	GF60	KF2UR	UF60	S70DL
1F61	117.8	GF61	KF2UL	UF61	S35DL
1F62	117.8	GF62	KF2UL	UF62	S37DL
1F63	117.8	GF63	KF2UL	UF63	S58DL
1F64	117.8	GF64	KF2UL	UF64	S79DL
1F65	117.8	GF65	KF2UL	UF65	S36DL
1F66	117.8	GF66	KF2UL	UF66	S88DL
1F67	117.8	GF67	KF2UL	UF67	S25DL

GR46	32000	T	19080	R	C
GR47	32000	T	19120	R	C
GR48	32000	T	19160	R	C
GR49	32000	T	19200	L	C
GR50	32000	T	19240	L	C
GR51	32000	T	19280	L	C
GR52	32000	T	19320	L	C
GR53	32000	T	19360	L	C
GR54	32000	T	19400	L	C
GR55	32000	T	19440	L	C
GR56	32000	T	19480	L	C
GR57	32000	T	19520	L	C
GR58	32000	T	19560	L	C
GR59	32000	T	19600	L	C
GR60	32000	T	19640	L	C
GR61	32000	T	19200	R	C
GR62	32000	T	19240	R	C
GR63	32000	T	19280	R	C
GR64	32000	T	19320	R	C
GR65	32000	T	19360	R	C
GR66	32000	T	19400	R	C
GR67	32000	T	19440	R	C
GR68	32000	T	19480	R	C
GR69	32000	T	19520	R	C
GR70	32000	T	19560	R	C
GR71	32000	T	19600	R	C
GR72	32000	T	19640	R	C
UFEC	32000	T	19707	L	C
UF01	32000	T	19740	L	C
UF02	32000	T	19780	L	C
UF03	32000	T	19820	L	C
UF04	32000	T	19860	L	C
UF05	32000	T	19900	L	C
UF06	32000	T	19940	L	C
UF07	32000	T	19980	L	C
UF08	32000	T	20020	L	C
UF09	32000	T	20060	L	C
UF10	32000	T	20100	L	C
UF11	32000	T	20140	L	C

1F68	117.8	GF68	KF2UL	UF68	S75DL
1F69	117.8	GF69	KF2UL	UF69	S33DL
1F70	117.8	GF70	KF2UL	UF70	S42DL
1F71	117.8	GF71	KF2UL	UF71	S46DL
1F72	117.8	GF72	KF2UL	UF72	S5DL
1F73	117.8	GF01	KFUR	UF01	S35DL
1F74	117.8	GF01	KFUR	UF01	S82DL
1F75	117.8	GF03	KFUR	UF03	S27DL
1F76	117.8	GF03	KFUR	UF03	S65DL
1F77	117.8	GF04	KFUR	UF04	S41DL
1F78	117.8	GF04	KFUR	UF04	S12DL
1F79	117.8	GF04	KFUR	UF04	S50DL
1F80	117.8	GF04	KFUR	UF04	S79DL
1F81	117.8	GF06	KFUR	UF06	S27DL
1F82	117.8	GF06	KFUR	UF06	S65DL
1F83	117.8	GF06	KFUR	UF06	S21DL
1F84	117.8	GF08	KFUR	UF08	S29DL
1F85	117.8	GF11	KFUR	UF11	S18DL
1F86	117.8	GF11	KFUR	UF11	S46DL
1F87	117.8	GF11	KFUR	UF11	S23DL
1F88	117.8	GF13	KFUL	UF13	S50DL
1F89	117.8	GF15	KFUL	UF15	S51DL
1F90	117.8	GF15	KFUL	UF15	S65DL
1F91	117.8	GF15	KFUL	UF15	S21DL
1F92	117.8	GF16	KFUL	UF16	S11DL
1F93	117.8	GF16	KFUL	UF16	S79DL
1F94	117.8	GF16	KFUL	UF16	S13DL
1F95	117.8	GF18	KFUL	UF18	S39DL
1F96	117.8	GF18	KFUL	UF18	S1DL
1F97	117.8	GF18	KFUL	UF18	S34DL
1F98	117.8	GF18	KFUL	UF18	S51DL
1F99	117.8	GF20	KFUL	UF20	S75DL
1F100	117.8	GF20	KFUL	UF20	S80DL
1F101	117.8	GF23	KFUL	UF23	S23DL
1F102	117.8	GF23	KFUL	UF23	S24DL
1F103	117.8	GF23	KFUL	UF23	S29DL
1F104	117.8	GF23	KFUL	UF23	S46DL
1F105	117.8	GF50	KF2UR	UF50	S68DL
1F106	117.8	GF50	KF2UR	UF50	S69DL

UF12	32000	T	20180	L	C
UF13	32000	T	19740	L	C
UF14	32000	T	19780	L	C
UF15	32000	T	19820	L	C
UF16	32000	T	19860	L	C
UF17	32000	T	19900	L	C
UF18	32000	T	19940	L	C
UF19	32000	T	19980	L	C
UF20	32000	T	20020	L	C
UF21	32000	T	20060	L	C
UF22	32000	T	20100	L	C
UF23	32000	T	20140	L	C
UF24	32000	T	20180	L	C
UF25	32000	T	19740	L	C
UF26	32000	T	19780	L	C
UF27	32000	T	19820	L	C
UF28	32000	T	19860	L	C
UF29	32000	T	19900	L	C
UF30	32000	T	19940	L	C
UF31	32000	T	19980	L	C
UF32	32000	T	20020	L	C
UF33	32000	T	20060	L	C
UF34	32000	T	20100	L	C
UF35	32000	T	20140	L	C
UF36	32000	T	20180	L	C
UF37	32000	T	19740	L	C
UF38	32000	T	19780	L	C
UF39	32000	T	19820	L	C
UF40	32000	T	19860	L	C
UF41	32000	T	19900	L	C
UF42	32000	T	19940	L	C
UF43	32000	T	19980	L	C
UF44	32000	T	20020	L	C
UF45	32000	T	20060	L	C
UF46	32000	T	20100	L	C
UF47	32000	T	20140	L	C
UF48	32000	T	20180	L	C
UF49	32000	T	19740	L	C
UF50	32000	T	19780	L	C

1F107	117.8	GF51	KF2UR	UF51	S34DL
1F108	117.8	GF53	KF2UR	UF53	S54DL
1F109	117.8	GF53	KF2UR	UF53	S60DL
1F110	117.8	GF54	KF2UR	UF54	S27DL
1F111	117.8	GF54	KF2UR	UF54	S85DL
1F112	117.8	GF55	KF2UR	UF55	S76DL
1F113	117.8	GF55	KF2UR	UF55	S89DL
1F114	117.8	GF58	KF2UR	UF58	S59DL
1F115	117.8	GF58	KF2UR	UF58	S83DL
1F116	117.8	GF61	KF2UL	UF61	S11DL
1F117	117.8	GF61	KF2UL	UF61	S82DL
1F118	117.8	GF64	KF2UL	UF64	S11DL
1F119	117.8	GF64	KF2UL	UF64	S82DL
1F120	117.8	GF64	KF2UL	UF64	S13DL
1F121	117.8	GF68	KF2UL	UF68	S18DL
1F122	117.8	GF68	KF2UL	UF68	S80DL
1F123	117.8	GF69	KF2UL	UF69	S40DL
1F124	117.8	GF71	KF2UL	UF71	S18DL
1F125	117.8	GF71	KF2UL	UF71	S80DL
1F126	117.8	GF71	KF2UL	UF71	S23DL
1F127	117.8	GF72	KF2UL	UF72	S16DL
1F128	117.8	GF72	KF2UL	UF72	S49DL
1F129	117.8	GF04	KFUR	UF04	S11DL
1F130	117.8	GF08	KFUR	UF08	S80DL
1F131	117.8	GF18	KFUL	UF18	S27DL
1F132	117.8	GF13	KFUL	UF13	S82DL
1F133	117.8	GF23	KFUL	UF23	S18DL
1F134	117.8	GF51	KF2UR	UF51	S65DL
1F135	117.8	GF04	KFUR	UF04	S35DL
1F136	117.8	GF04	KFUR	UF04	S82DL
1F137	117.8	GF08	KFUR	UF08	S18DL
1F138	117.8	GF08	KFUR	UF08	S46DL
1F139	117.8	GF08	KFUR	UF08	S23DL
1F140	117.8	GF13	KFUL	UF13	S11DL
1F141	117.8	GF13	KFUL	UF13	S79DL
1F142	117.8	GF13	KFUL	UF13	S13DL
1F143	117.8	GF23	KFUL	UF23	S75DL
1F144	117.8	GF23	KFUL	UF23	S80DL
1F145	117.8	GF51	KF2UR	UF51	S27DL

UF51	32000	T	19820	L	C
UF52	32000	T	19860	L	C
UF53	32000	T	19900	L	C
UF54	32000	T	19940	L	C
UF55	32000	T	19980	L	C
UF56	32000	T	20020	L	C
UF57	32000	T	20060	L	C
UF58	32000	T	20100	L	C
UF59	32000	T	20140	L	C
UF60	32000	T	20180	L	C
UF61	32000	T	19740	L	C
UF62	32000	T	19780	L	C
UF63	32000	T	19820	L	C
UF64	32000	T	19860	L	C
UF65	32000	T	19900	L	C
UF66	32000	T	19940	L	C
UF67	32000	T	19980	L	C
UF68	32000	T	20020	L	C
UF69	32000	T	20060	L	C
UF70	32000	T	20100	L	C
UF71	32000	T	20140	L	C
UF72	32000	T	20180	L	C
UREC	5000	R	29507	R	C
UR01	32000	R	29540	R	C
UR02	32000	R	29580	R	C
UR03	32000	R	29620	R	C
UR04	32000	R	29660	R	C
UR05	32000	R	29700	R	C
UR06	32000	R	29740	R	C
UR07	32000	R	29780	R	C
UR08	32000	R	29820	R	C
UR09	32000	R	29860	R	C
UR10	32000	R	29900	R	C
UR11	32000	R	29940	R	C
UR12	32000	R	29980	R	C
UR13	32000	R	29540	R	C
UR14	32000	R	29580	R	C
UR15	32000	R	29620	R	C
UR16	32000	R	29660	R	C

1F146	117.8	GF51	KF2UR	UF51	S85DL
1F147	117.8	GF18	KFUL	UF18	S51DL
1F148	117.8	GF18	KFUL	UF18	S65DL
1F149	117.8	GF18	KFUL	UF18	S21DL
ECR01	128.4	UREC	KGUR	GREC1	KGDL
ECR02	128.4	UREC	KGUR	GREC2	KGDR
1R01	112.2	UR01	S11UR	GR01	KFDL
1R02	112.2	UR02	S72UR	GR02	KFDL
1R03	112.2	UR03	S85UR	GR03	KFDL
1R04	112.2	UR04	S13UR	GR04	KFDL
1R05	112.2	UR05	S78UR	GR05	KFDL
1R06	112.2	UR06	S51UR	GR06	KFDL
1R07	112.2	UR07	S14UR	GR07	KFDL
1R08	112.2	UR08	S24UR	GR08	KFDL
1R09	112.2	UR09	S61UR	GR09	KFDL
1R10	112.2	UR10	S28UR	GR10	KFDL
1R11	112.2	UR11	S80UR	GR11	KFDL
1R12	112.2	UR12	S64UR	GR12	KFDL
1R13	112.2	UR13	S12UR	GR13	KFDR
1R14	112.2	UR14	S17UR	GR14	KFDR
1R15	112.2	UR15	S27UR	GR15	KFDR
1R16	112.2	UR16	S82UR	GR16	KFDR
1R17	112.2	UR17	S32UR	GR17	KFDR
1R18	112.2	UR18	S21UR	GR18	KFDR
1R19	112.2	UR19	S63UR	GR19	KFDR
1R20	112.2	UR20	S18UR	GR20	KFDR
1R21	112.2	UR21	S4UR	GR21	KFDR
1R22	112.2	UR22	S55UR	GR22	KFDR
1R23	112.2	UR23	S20UR	GR23	KFDR
1R24	112.2	UR24	S47UR	GR24	KFDR
1R25	112.2	UR25	S43UR	GR25	KFDL
1R26	112.2	UR26	S66UR	GR26	KFDL
1R27	112.2	UR27	S9UR	GR27	KFDL
1R28	112.2	UR28	S2UR	GR28	KFDL
1R29	112.2	UR29	S74UR	GR29	KFDL
1R30	112.2	UR30	S15UR	GR30	KFDL
1R31	112.2	UR31	S56UR	GR31	KF2DL
1R32	112.2	UR32	S62UR	GR32	KF2DL
1R33	112.2	UR33	S26UR	GR33	KF2DL

UR17	32000	R	29700	R	C
UR18	32000	R	29740	R	C
UR19	32000	R	29780	R	C
UR20	32000	R	29820	R	C
UR21	32000	R	29860	R	C
UR22	32000	R	29900	R	C
UR23	32000	R	29940	R	C
UR24	32000	R	29980	R	C
UR25	32000	R	29540	R	C
UR26	32000	R	29580	R	C
UR27	32000	R	29620	R	C
UR28	32000	R	29660	R	C
UR29	32000	R	29700	R	C
UR30	32000	R	29740	R	C
UR31	32000	R	29780	R	C
UR32	32000	R	29820	R	C
UR33	32000	R	29860	R	C
UR34	32000	R	29900	R	C
UR35	32000	R	29940	R	C
UR36	32000	R	29980	R	C
UR37	32000	R	29540	R	C
UR38	32000	R	29580	R	C
UR39	32000	R	29620	R	C
UR40	32000	R	29660	R	C
UR41	32000	R	29700	R	C
UR42	32000	R	29740	R	C
UR43	32000	R	29780	R	C
UR44	32000	R	29820	R	C
UR45	32000	R	29860	R	C
UR46	32000	R	29900	R	C
UR47	32000	R	29940	R	C
UR48	32000	R	29980	R	C
UR49	32000	R	29540	R	C
UR50	32000	R	29580	R	C
UR51	32000	R	29620	R	C
UR52	32000	R	29660	R	C
UR53	32000	R	29700	R	C
UR54	32000	R	29740	R	C
UR55	32000	R	29780	R	C

1R34	112.2	UR34	S87UR	GR34	KF2DL
1R35	112.2	UR35	S77UR	GR35	KF2DL
1R36	112.2	UR36	S19UR	GR36	KF2DL
1R37	112.2	UR37	S57UR	GR37	KFDR
1R38	112.2	UR38	S45UR	GR38	KFDR
1R39	112.2	UR39	S22UR	GR39	KFDR
1R40	112.2	UR40	S53UR	GR40	KFDR
1R41	112.2	UR41	S10UR	GR41	KFDR
1R42	112.2	UR42	S44UR	GR42	KFDR
1R43	112.2	UR43	S81UR	GR43	KF2DR
1R44	112.2	UR44	S84UR	GR44	KF2DR
1R45	112.2	UR45	S67UR	GR45	KF2DR
1R46	112.2	UR46	S71UR	GR46	KF2DR
1R47	112.2	UR47	S52UR	GR47	KF2DR
1R48	112.2	UR48	S86UR	GR48	KF2DR
1R49	112.2	UR49	S8UR	GR49	KFDL
1R50	112.2	UR50	S31UR	GR50	KFDL
1R51	112.2	UR51	S1UR	GR51	KFDL
1R52	112.2	UR52	S48UR	GR52	KFDL
1R53	112.2	UR53	S7UR	GR53	KFDL
1R54	112.2	UR54	S65UR	GR54	KFDL
1R55	112.2	UR55	S30UR	GR55	KFDL
1R56	112.2	UR56	S3UR	GR56	KFDL
1R57	112.2	UR57	S73UR	GR57	KFDL
1R58	112.2	UR58	S6UR	GR58	KFDL
1R59	112.2	UR59	S38UR	GR59	KFDL
1R60	112.2	UR60	S70UR	GR60	KFDL
1R61	112.2	UR61	S35UR	GR61	KF2DR
1R62	112.2	UR62	S37UR	GR62	KF2DR
1R63	112.2	UR63	S58UR	GR63	KF2DR
1R64	112.2	UR64	S79UR	GR64	KF2DR
1R65	112.2	UR65	S36UR	GR65	KF2DR
1R66	112.2	UR66	S88UR	GR66	KF2DR
1R67	112.2	UR67	S25UR	GR67	KF2DR
1R68	112.2	UR68	S75UR	GR68	KF2DR
1R69	112.2	UR69	S33UR	GR69	KF2DR
1R70	112.2	UR70	S42UR	GR70	KF2DR
1R71	112.2	UR71	S46UR	GR71	KF2DR
1R72	112.2	UR72	S5UR	GR72	KF2DR

UR56	32000	R	29820	R	C
UR57	32000	R	29860	R	C
UR58	32000	R	29900	R	C
UR59	32000	R	29940	R	C
UR60	32000	R	29980	R	C
UR61	32000	R	29540	R	C
UR62	32000	R	29580	R	C
UR63	32000	R	29620	R	C
UR64	32000	R	29660	R	C
UR65	32000	R	29700	R	C
UR66	32000	R	29740	R	C
UR67	32000	R	29780	R	C
UR68	32000	R	29820	R	C
UR69	32000	R	29860	R	C
UR70	32000	R	29900	R	C
UR71	32000	R	29940	R	C
UR72	32000	R	29980	R	C
HGF1	100000	R	27575	L	C
HGF2	100000	R	27700	L	C
HGF3	100000	R	27825	L	C
HGF4	100000	R	27950	L	C
HGF5	100000	R	27575	R	C
HGF6	100000	R	27700	R	C
HGF7	100000	R	27825	R	C
HGF8	100000	R	27950	R	C
HGR1	100000	T	17775	L	C
HGR2	100000	T	17900	L	C
HGR3	100000	T	18025	L	C
HGR4	100000	T	18150	L	C
HGR5	100000	T	17775	R	C
HGR6	100000	T	17900	R	C
HGR7	100000	T	18025	R	C
HGR8	100000	T	18150	R	C
HUR1R	100000	R	29075	R	C
HUR2R	100000	R	29200	R	C
GFEC1	5000	R	28007	R	C
GF01	32000	R	28040	R	C
GF02	32000	R	28080	R	C
GF03	32000	R	28120	R	C

1R73	112.2	UR01	S35UR	GR01	KFDL
1R74	112.2	UR01	S82UR	GR01	KFDL
1R75	112.2	UR03	S27UR	GR03	KFDL
1R76	112.2	UR03	S65UR	GR03	KFDL
1R77	112.2	UR04	S41UR	GR04	KFDL
1R78	112.2	UR04	S12UR	GR04	KFDL
1R79	112.2	UR04	S50UR	GR04	KFDL
1R80	112.2	UR04	S79UR	GR04	KFDL
1R81	112.2	UR06	S27UR	GR06	KFDL
1R82	112.2	UR06	S65UR	GR06	KFDL
1R83	112.2	UR06	S21UR	GR06	KFDL
1R84	112.2	UR08	S29UR	GR08	KFDL
1R85	112.2	UR11	S18UR	GR11	KFDL
1R86	112.2	UR11	S46UR	GR11	KFDL
1R87	112.2	UR11	S23UR	GR11	KFDL
1R88	112.2	UR13	S50UR	GR13	KFDR
1R89	112.2	UR15	S51UR	GR15	KFDR
1R90	112.2	UR15	S65UR	GR15	KFDR
1R91	112.2	UR15	S21UR	GR15	KFDR
1R92	112.2	UR16	S11UR	GR16	KFDR
1R93	112.2	UR16	S79UR	GR16	KFDR
1R94	112.2	UR16	S13UR	GR16	KFDR
1R95	112.2	UR18	S39UR	GR18	KFDR
1R96	112.2	UR18	S1UR	GR18	KFDR
1R97	112.2	UR18	S34UR	GR18	KFDR
1R98	112.2	UR18	S51UR	GR18	KFDR
1R99	112.2	UR20	S75UR	GR20	KFDR
1R100	112.2	UR20	S80UR	GR20	KFDR
1R101	112.2	UR23	S23UR	GR23	KFDR
1R102	112.2	UR23	S24UR	GR23	KFDR
1R103	112.2	UR23	S29UR	GR23	KFDR
1R104	112.2	UR23	S46UR	GR23	KFDR
1R105	112.2	UR50	S68UR	GR50	KF2DL
1R106	112.2	UR50	S69UR	GR50	KF2DL
1R107	112.2	UR51	S34UR	GR51	KF2DL
1R108	112.2	UR53	S54UR	GR53	KF2DL
1R109	112.2	UR53	S60UR	GR53	KF2DL
1R110	112.2	UR54	S27UR	GR54	KF2DL
1R111	112.2	UR54	S85UR	GR54	KF2DL

GF04	32000	R	28160	R	C
GF05	32000	R	28200	R	C
GF06	32000	R	28240	R	C
GF07	32000	R	28280	R	C
GF08	32000	R	28320	R	C
GF09	32000	R	28360	R	C
GF10	32000	R	28400	R	C
GF11	32000	R	28440	R	C
GF12	32000	R	28480	R	C
GFEC2	5000	R	28007	L	C
GF13	32000	R	28040	L	C
GF14	32000	R	28080	L	C
GF15	32000	R	28120	L	C
GF16	32000	R	28160	L	C
GF17	32000	R	28200	L	C
GF18	32000	R	28240	L	C
GF19	32000	R	28280	L	C
GF20	32000	R	28320	L	C
GF21	32000	R	28360	L	C
GF22	32000	R	28400	L	C
GF23	32000	R	28440	L	C
GF24	32000	R	28480	L	C
GF25	32000	R	28520	R	C
GF26	32000	R	28560	R	C
GF27	32000	R	28600	R	C
GF28	32000	R	28640	R	C
GF29	32000	R	28680	R	C
GF30	32000	R	28720	R	C
GF31	32000	R	28760	R	C
GF32	32000	R	28800	R	C
GF33	32000	R	28840	R	C
GF34	32000	R	28880	R	C
GF35	32000	R	28920	R	C
GF36	32000	R	28960	R	C
GF37	32000	R	28520	L	C
GF38	32000	R	28560	L	C
GF39	32000	R	28600	L	C
GF40	32000	R	28640	L	C
GF41	32000	R	28680	L	C

1R112	112.2	UR55	S76UR	GR55	KF2DL
1R113	112.2	UR55	S89UR	GR55	KF2DL
1R114	112.2	UR58	S59UR	GR58	KF2DL
1R115	112.2	UR58	S83UR	GR58	KF2DL
1R116	112.2	UR61	S11UR	GR61	KF2DR
1R117	112.2	UR61	S82UR	GR61	KF2DR
1R118	112.2	UR64	S11UR	GR64	KF2DR
1R119	112.2	UR64	S82UR	GR64	KF2DR
1R120	112.2	UR64	S13UR	GR64	KF2DR
1R121	112.2	UR68	S18UR	GR68	KF2DR
1R122	112.2	UR68	S80UR	GR68	KF2DR
1R123	112.2	UR69	S40UR	GR69	KF2DR
1R124	112.2	UR71	S18UR	GR71	KF2DR
1R125	112.2	UR71	S80UR	GR71	KF2DR
1R126	112.2	UR71	S23UR	GR71	KF2DR
1R127	112.2	UR72	S16UR	GR72	KF2DR
1R128	112.2	UR72	S49UR	GR72	KF2DR
1R129	112.2	UR04	S11UR	GR04	KFDL
1R130	112.2	UR08	S80UR	GR08	KFDL
1R131	112.2	UR18	S27UR	GR18	KFDR
1R132	112.2	UR13	S82UR	GR13	KFDR
1R133	112.2	UR23	S18UR	GR23	KFDR
1R134	112.2	UR51	S65UR	GR51	KFDL
1R135	112.2	UR04	S35UR	GR04	KFDL
1R136	112.2	UR04	S82UR	GR04	KFDL
1R137	112.2	UR08	S18UR	GR08	KFDL
1R138	112.2	UR08	S46UR	GR08	KFDL
1R139	112.2	UR08	S23UR	GR08	KFDL
1R140	112.2	UR13	S11UR	GR13	KFDR
1R141	112.2	UR13	S79UR	GR13	KFDR
1R142	112.2	UR13	S13UR	GR13	KFDR
1R143	112.2	UR23	S75UR	GR23	KFDR
1R144	112.2	UR23	S80UR	GR23	KFDR
1R145	112.2	UR51	S27UR	GR51	KF2DL
1R146	112.2	UR51	S85UR	GR51	KF2DL
1R147	112.2	UR18	S51UR	GR18	KFDR
1R148	112.2	UR18	S65UR	GR18	KFDR
1R149	112.2	UR18	S21UR	GR18	KFDR
HCF1	116.7	HGF1	KFUL	HUF1L	KHDL

GF42	32000	R	28720	L	C
GF43	32000	R	28760	L	C
GF44	32000	R	28800	L	C
GF45	32000	R	28840	L	C
GF46	32000	R	28880	L	C
GF47	32000	R	28920	L	C
GF48	32000	R	28960	L	C
GF49	32000	R	29000	R	C
GF50	32000	R	29040	R	C
HUR3R	100000	R	29325	R	C
HUR4R	100000	R	29450	R	C
HUR3L	100000	R	29325	L	C
HUR4L	100000	R	29450	L	C
HUR5R	100000	R	29075	R	C
HUR6R	100000	R	29200	R	C
HUR7R	100000	R	29325	R	C
HUR8R	100000	R	29450	R	C
HUF1L	100000	T	19275	L	C
HUF2L	100000	T	19400	L	C
HUF3L	100000	T	19525	L	C
HUF4L	100000	T	19650	L	C
HUF3R	100000	T	19525	R	C
HUF4R	100000	T	19650	R	C
HUF5L	100000	T	19275	L	C
HUF6L	100000	T	19400	L	C
HUF7L	100000	T	19525	L	C
HUF8L	100000	T	19650	L	C
CMD1	2000	R	5926.5	H	T
CMD2	2000	R	6422.5	R	T
CMD3	2000	R	29494	L	T
CMD4	2000	R	29468	R	T
TM1V	2000	T	4199	V	T
TM1L	2000	T	4199	L	T
TM2V	2000	T	4199.5	V	T
TM2L	2000	T	4199.5	L	T
TM3R	2000	T	19700.5	R	T
TM3L	2000	T	19700.5	L	T
TM4R	2000	T	19702.5	R	T
TM4L	2000	T	19702.5	L	T

HCF2	116.7	HGF2	KFUL	HUF2L	KHDL
HCF3	116.7	HGF3	KFUL	HUF3L	KHDL
HCF4	116.7	HGF4	KFUL	HUF4L	KHDL
HCF3A	116.7	HGF3	KFUL	HUF3R	KHDR
HCF4A	116.7	HGF4	KFUL	HUF4R	KHDR
HCF5	116.7	HGF5	KFUR	HUF5L	KHDL
HCF6	116.7	HGF6	KFUR	HUF6L	KHDL
HCF7	116.7	HGF7	KFUR	HUF7L	KHDL
HCF8	116.7	HGF8	KFUR	HUF8L	KHDL
HCR1	113	HUR1R	KHUR	HGR1	KFDL
HCR2	113	HUR2R	KHUR	HGR2	KFDL
HCR3	113	HUR3R	KHUR	HGR3	KFDL
HCR4	113	HUR4R	KHUR	HGR4	KFDL
HCR3A	113	HUR3L	KHUL	HGR3	KFDL
HCR4A	113	HUR4L	KHUL	HGR4	KFDL
HCR5	113	HUR5R	KHUR	HGR5	KFDR
HCR6	113	HUR6R	KHUR	HGR6	KFDR
HCR7	113	HUR7R	KHUR	HGR7	KFDR
HCR8	113	HUR8R	KHUR	HGR8	KFDR
TLC1				CMD1	COUH
TLC2				CMD2	COUR
TLC3				CMD3	KFUL
TLC4				CMD4	KFUR
TLM1V		TM1V	CODV		
TLM1L		TM1L	CODL		
TLM2V		TM2V	CODV		
TLM2L		TM2L	CODL		
TLM3R		TM3R	KFDR		
TLM3L		TM3L	KFDL		
TLM4R		TM4R	KFDR		
TLM4L		TM4L	KFDL		
TLM5R		TM3R	KHDR		
TLM5L		TM3L	KHDL		
TLM6R		TM4R	KHDR		
TLM6L		TM4L	KHDL		
TLC5				CMD3	KHUL
TLC6				CMD4	KHUR

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Page 7: Digital Modulation

S11. DIGITAL MODULATION PARAMETERS For each digital emission provide:

(a) Digital Mod. ID	(b) Emission Designator	(c) Assigned Bandwidth (kHz)	(d) No. of Phases	(e) Uncoded Data Rate (kbps)	(f) FEC Error Correction Coding Rate	(g) CDMA Processing Gain (dB)	(h) Total C/N Performance Objective (dB)	(i) Single Entry C/I Objective (dB)
1	32M0G7W	32000	4	35680	0.6		2.5	14.7
2	32M0G7W	32000	4	49248	0.83		5.5	17.7
3	32M0G7W	32000	8	73600	0.83		9.6	21.8
4	50M0G7W	50000	4	40800	0.5		1	13.2
5	50M0G7W	50000	4	72700	0.8		4.9	17.1
6	50M0G7W	50000	8	102450	0.75		8.5	20.7
7	5M00G1W	5000	2	48	0.5		-2	10.2
8	3M16G7W	3156.32	2	1023.17	0.5		-1	11.2
9	2M45G7W	2450.086	4	1674.23	0.5		2	14.2
10	4M78G7W	4777.29	4	5139.56	0.75		5.6	17.8
11	3M16G7W	3156.32	2	1509.77	0.67		1	13.2
12	2M45G7W	2450.09	4	2635.88	0.75		5.6	17.8
13	4M78G7W	4777.29	8	6365.73	0.67		8.2	20.4
14	5M00G1W	5000	2	9.6	0.5		-22	-9.8
15	32M0G7W	32000	16	106176	0.89		13.8	26
16	50M0G7W	50000	16	165900	0.89		13.8	26
TLM	150KG3X	150	2				11	23.2

Page 8: Analog Modulation

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Page 9: Typical Emissions

S13. TYPICAL EMISSIONS For each planned type of emission provide:

Associated Transponder ID Range		Modulation ID		(e) Carriers per Transponder	(f) Carrier Spacing (kHz)	(g) Noise Budget Reference (Table No.)	(h) Energy Dispersal Bandwidth (kHz)	Receive Band (Assoc. Transmit Stn)			Transmit Band (This Space Station)			
		(c) Digital (Table S11)	(d) Analog (Table S12)					(i) Assoc. Stn. Max. Antenna Gain (dBi)	Assoc. Station Transmit Power (dBW)		EIRP (dBW)		(n) Max. Power Flux Density (dBW/m ² /Hz)	(o) Assoc. Stn Rec. G/T (dB/K)
(a) Start	(b) End								(j) Min.	(k) Max.	(l) Min.	(m) Max.		
ECF01	ECF02	7		1		EC_60cm_fwd_		68.7	-5	-1	30	33	-129.1	15.1
ECF01	ECF02	7		1		EC_100cm_fwd		68.7	-5	-1	30	33	-129.1	18.4
ECF01	ECF02	7		1		EC_150cm_fwd		68.7	-5	-1	30	33	-129.1	23.6
ECF01	ECF02	7		1		EC_test_fwd3_		68.7	-5	-1	30	33	-129.1	42
1F01	1F149	1		1		GP_60cm_fwd_		68.9	1.1	8.1	53.1	56.1	-121.1	15.2
1F01	1F149	2		1		GP_100cm_fwd		68.9	1.1	8.1	53.1	56.1	-121.1	18.5
1F01	1F149	3		1		GP_150cm_fwd		68.9	1.1	8.1	53.1	56.1	-121.1	23.7
1F01	1F149	15		1		GP_test_fwd1_f		68.9	1.1	8.1	53.1	56.1	-121.1	42
ECR01	ECR02	14		1		EC_60cm_rtn_f		43.5	1.7	5.7	23.9	30.9	-138.2	42
ECR01	ECR02	14		1		EC_100cm_rtn		47.9	0.6	4.6	27.2	34.2	-134.9	42
ECR01	ECR02	14		1		EC_150cm_rtn		51.5	4	8	35.2	42.2	-126.9	42
ECR01	ECR02	14		1		EC_test_rtn7_f		69.2	-24	-20	23.9	30.9	-138.2	42
ECR01	ECR02	14		1		EC_test_rtn8_f		69.2	-20.7	-16.7	27.2	34.2	-134.9	42
ECR01	ECR02	14		1		EC_test_rtn9_f		69.2	-13.7	-9.7	35.2	42.2	-126.9	42
1R01	1R149	8		10	3156.3	GP_60cm_rtn_f		43.6	2.6	5.6	19.3	29.3	-137	42
1R01	1R149	9		13	2450.1	GP_100cm_rtn		48	1.5	4.5	22.6	32.6	-132.6	42
1R01	1R149	10		6	4777.3	GP_150cm_rtn		51.5	5	8	26.6	36.6	-131.5	42
1R01	1R149	8		10	3156.3	GP_test_rtn1_f		69.3	-23.1	-20.1	19.3	29.3	-137	42
1R01	1R149	9		13	2450.1	GP_test_rtn2_f		69.3	-19.8	-16.8	22.6	32.6	-132.6	42
1R01	1R149	10		6	4777.3	GP_test_rtn3_f		69.3	-12.8	-9.8	26.6	36.6	-131.5	42
HCF1	HCF8	4		1		HCP_60cm_fwd		68.7	1.3	8.3	54	57	-122.1	15
HCF1	HCF8	5		1		HCP_100cm_fw		68.7	1.3	8.3	54	57	-122.1	18.3
HCF1	HCF8	6		1		HCP_150cm_fw		68.7	1.3	8.3	54	57	-122.1	23.5
HCF1	HCF8	16		1		HCP_test_fwd2		68.7	1.3	8.3	54	57	-122.1	42
HCR1	HCR8	11		31	3156.3	HCP_60cm_rtn		43.4	2.8	5.8	24.4	34.4	-131.8	42
HCR1	HCR8	12		40	2450.1	HCP_100cm_rt		47.9	1.6	4.6	27.7	37.7	-127.4	42
HCR1	HCR8	13		20	4777.3	HCP_150cm_rt		51.4	5.1	8.1	29.1	39.1	-128.9	42
HCR1	HCR8	11		31	3156.3	HCP_test_rtn4_		69.1	-22.9	-19.9	24.4	34.4	-131.8	42
HCR1	HCR8	12		40	2450.1	HCP_test_rtn5_		69.1	-19.6	-16.6	27.7	37.7	-127.4	42

HCR1	HCR8	13		20	4777.3	HCP_test_rtn6_		69.1	-12.6	-9.6	29.1	39.1	-128.9	42
TLC1	TLC2		TLC	1		TLC1-6_LB_SS		54	22	34				
TLM1V	TLM2L	TLM		1		TLM1-6_LB_SS					3.5	10.9	-151.2	39
TLC3	TLC6		TLC	1		TLC1-6_LB_SS		69.5	-1.5	4.5				
TLM3R	TLM6L	TLM		1		TLM1-6_LB_SS					23.8	28.8	-133.3	39

**FEDERAL COMMUNICATIONS COMMISSION
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Page 10: TT and C

S14. Is the space station(s) controlled and monitored remotely? If Yes, provide the location and telephone number of the TT and C control point(s): Yes

Remote Control (TT C) Location(s):

S14a: Street Address: 6221			
S14b. City: Lino Lakes	S14c. County:	S14d. State/Country MN	S14e. Zip Code: 55083
S14f. Telephone Number:		S14g. Call Sign of Control Station (if appropriate):	

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**Page 11:
Characteristics and
Certifications**

S15. SPACECRAFT PHYSICAL CHARACTERISTICS:

S15a. Mass of spacecraft without fuel (kg): 3663	Spacecraft Dimensions (meters)	Probability of Survival to End of Life (0.0 - 1.0)
S15b. Mass of fuel and disposables at launch (kg): 2441		
S15c. Mass of spacecraft and fuel at launch (kg): 6104	S15f. Length (m): 8.5	S15i. Payload: 0.863
S15d. Mass of fuel, in orbit, at beginning of life (kg): 266	S15g. Width (m): 7.3	S15j. Bus: 0.849
S15e. Deployed Area of Solar Array (square meters): 65.4	S15h. Height (m): 40.9	S15k. Total: 0.727

S16. SPACECRAFT ELECTRICAL CHARACTERISTICS:

Spacecraft Subsystem	Electrical Power (Watts) At Beginning of Life		Electrical Power (Watts) At End of Life	
	At Equinox	At Solstice	At Equinox	At Solstice
Payload (Watts):	(a): 11592	(f): 11592	(k): 11040	(p): 11040
Bus (Watts):	(b): 3281	(g): 3281	(l): 3125	(q): 1905
Total (Watts):	(c): 14873	(h): 14873	(m): 14165	(r): 12945
Solar Array (Watts):	(d): 15429	(i): 13829	(n): 15161	(s): 13649
Depth of Battery Discharge (%):	(e) 63.2 %	(j) %	(o) 63.2 %	(t) %

S17. CERTIFICATIONS:

a. Are the power flux density limits of § 25.208 met?:	☒ YES	☐ NO	☐ N/A
b. Are the appropriate service area coverage requirements of § 25.143(b)(ii) and (iii), or § 25.145(c)(1) and (2) met?	☐ YES	☐ NO	☒ N/A
c. Are the frequency tolerances of § 25.202(e) and the out-of-band emission limits of § 25.202(f)(1), (2) and (3) met?	☒ YES	☐ NO	☐ N/A

In addition to the information required in this Form, the space station applicant is required to provide all the information specified in Section 25.114 of the Commission's rules, 47 C.F.R. § 25.114.

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