OreSat1 / Amateur CW Beacon - 436.5 MHz CW in 100Hz Bandwidth — 2019 December 15

BEACON

DOWNLINK SYSTEM: — Frequency: 436.50 MHz

~~R = 0,100 bps~~

Modulation Method: 20WPM OOK

F.E.C. Encoder Type: None

Transmitter Exciter/Modulator/ FEC Encoder

η_{Tx} Goal = 9.1%

HPA

T_X DC Pwr = 1.10 W

T_X Dissipation = 1.00 W

P_{Tx} = 0.10 W

S/C

L_{TLine} = 0.008 dB

Cable losses, Connectors, & In-Line Devices

$L_{Tconn.}$ = 0.40 dB

L_{Tother} = 0.38 dB

L_{VSWR} = 0.04 dB

L_{Total} = 0.82 dB

$P_{Antenna}$ = 19.18 dBm

Transmit Antenna

G_T = 1.4 dBi

Polarization: RHCP

Point Error: 90 °

Canted Turnstyle (back)

EIRP$_{S/C}$ = **20.6 dBm**

RADIO LINK

Link Losses: **151.5 dB** | Elevation: **10 °**

$P_{Isotropic\ GS}$ = -130.9 dBm

7-element Yagi

G_R = 7.0 dBi

Polarization: Linear

Point Error: 5 °

Receive Antenna

$T_{Antenna}$ = 400 K

L_{TLine} = 0.300 dB

Cable losses, Connectors, & In-Line Devices

$L_{Tconn.}$ = 0.20 dB

L_{Tother} = 1.00 dB

$L_{Total\ to\ LNA}$ = 1.50 dB

LNA

T_{LNA} = 60 K

G_{LNA} = 18.0 dB

Ground Station

Additional Front End Losses & Devices

$T_{ComRcvr}$ = 865 K

Receiver's IF Downconvert & Amp.

T_S = 442 K

G/T = **-21.0 dB/K**

Data Bandpass Filter

B_{Rbpf} = 100 Hz

(Used only in S/N Calc.)

Data Demodulator

Spec. B.E.R.: NA

Demodulator Type: 20WPM OOK

C/No Threshold: 22.4 dB

Data FEC Decoder

F.E.C. Decoder Type: None

C/No = C/N + Bn
Bn = 20 dB-Hz (100Hz)
C/N = -0.6 dB
- Median value based on AMSAT ZRO Test
- 10 WPM C.W. in 100 Hz

R = 0,100 Hz

~~Eb/No Method:~~ ~~Eb/No = 26.7 dB~~ ~~Link Margin: 4.3 dB~~ ~~MARGINAL LINK~~

S/N Method: S/N = 26.7 dB — Link Margin: **4.3 dB** MARGINAL LINK

OreSat1 / Amateur Packet Beacon - 436.5 MHz G3RUH FSK via AX.25 — 2019 December 15

BEACON

DOWNLINK SYSTEM: — Frequency: 436.50 MHz

R = 9,600 bps

Transmitter Exciter/Modulator/ FEC Encoder

Modulation Method: FSK, h=0.625, R.C.

F.E.C. Encoder Type: None

HPA

h_{Tx} Goal = 51.3%

T_X DC Pwr = 1.95 W

T_x Dissipation = 0.95 W

P_{Tx} = 1.00 W

S/C

Cable losses, Connectors, & In-Line Devices

L_{TLine} = 0.008 dB

$L_{Tconn.}$ = 0.40 dB

L_{Tother} = 0.38 dB

L_{VSWR} = 0.04 dB

L_{Total} = 0.82 dB

$P_{Antenna}$ = 29.18 dBm

Transmit Antenna

G_T = 1.4 dBi

Polarization: RHCP

Point Error: 90 °

Canted Turnstyle (back)

$EIRP_{S/C}$ = **30.6 dBm**

RADIO LINK

Link Losses: **152.4 dB** | Elevation: **10 °**

$P_{Isotropic\ GS}$ = -120.9 dBm

7-element Yagi

G_R = 7.0 dBi

Polarization: Linear

Point Error: 20 °

Receive Antenna

$T_{Antenna}$ = 400 K

Cable losses, Connectors, & In-Line Devices

L_{TLine} = 0.300 dB

$L_{Tconn.}$ = 0.20 dB

L_{Tother} = 1.00 dB

$L_{Total\ to\ LNA}$ = 1.50 dB

LNA

T_{LNA} = 60 K

G_{LNA} = 18.0 dB

Ground Station

Additional Front End Losses & Devices

$T_{ComRcvr}$ = 865 K

Receiver's IF Downconvert & Amp.

T_S = 442 K

G/T = **-21.0 dB/K**

Data Bandpass Filter

B_{Rbpf} = 14400 Hz

(Used only in S/N Calc.)

Data Demodulator

Spec. B.E.R.: 1.00E-04

Demodulator Type: FSK, h=0.625, R.C.

E_b/N_0 Threshold: 10.7 dB

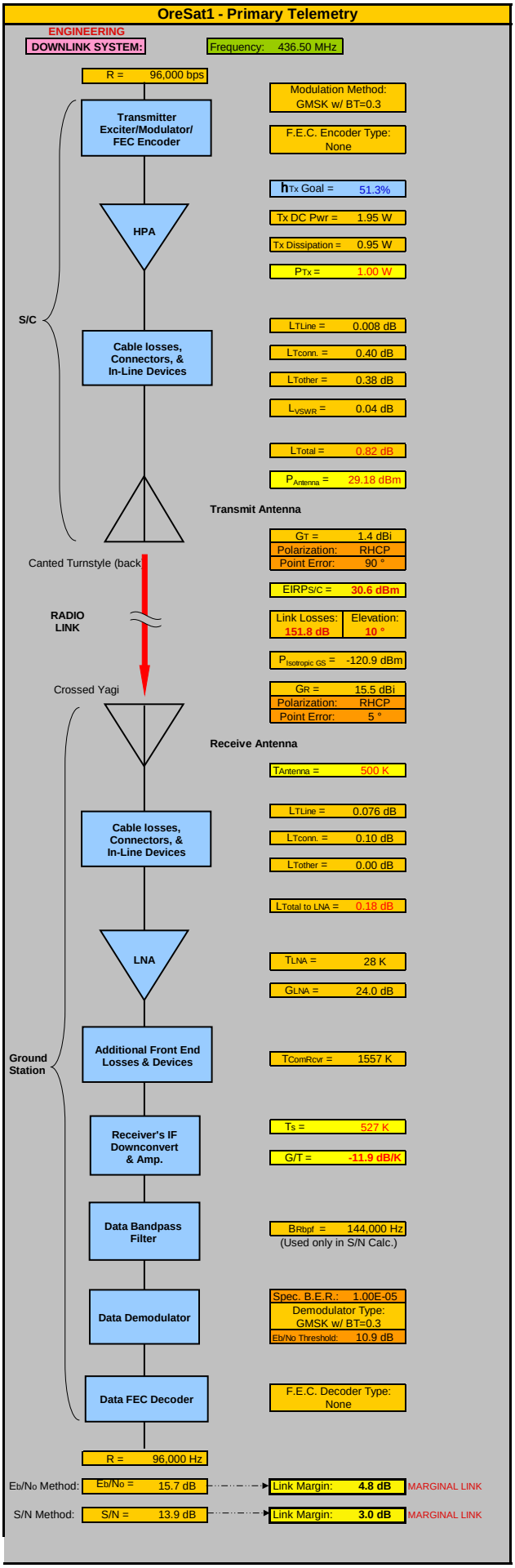
Data FEC Decoder

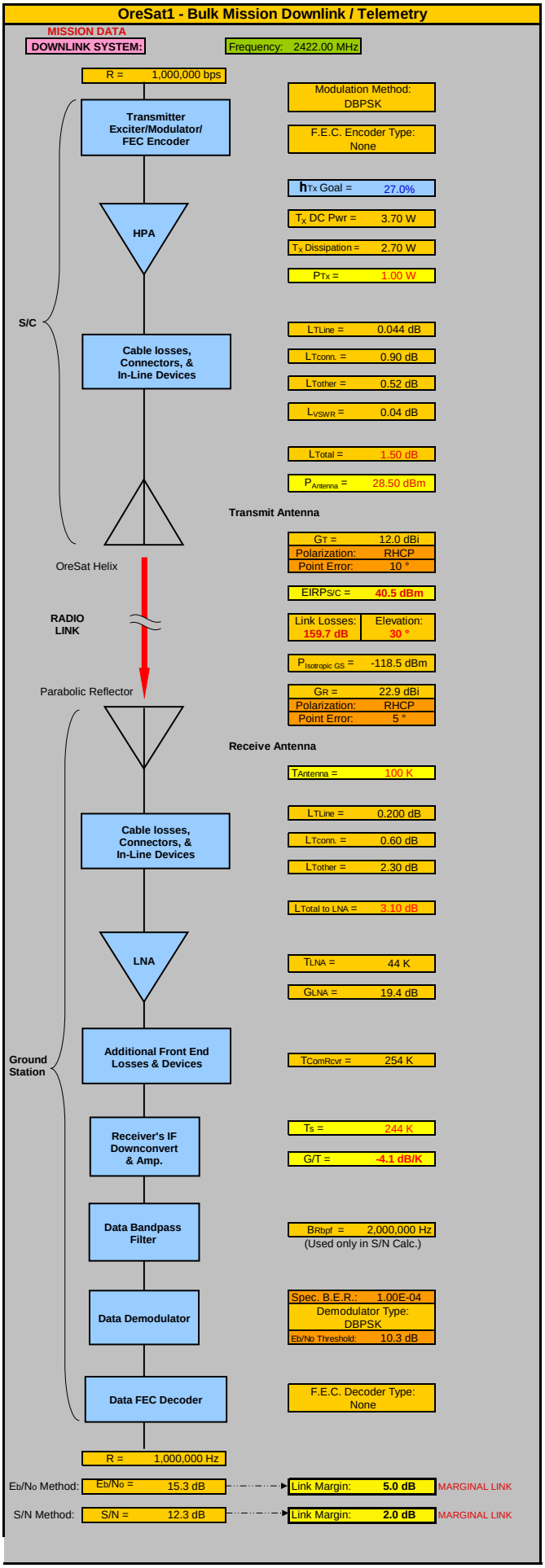
F.E.C. Decoder Type: None

R = 9,600 Hz

E_b/N_0 Method: E_b/N_0 = 16.0 dB → Link Margin: **5.3 dB** MARGINAL LINK

S/N Method: S/N = 14.2 dB → Link Margin: **3.5 dB** MARGINAL LINK


OreSat1 - Primary Telemetry
ENGINEERING
DOWNLINK SYSTEM:
Frequency: 436.50 MHz
R = 96,000 bps
Modulation Method: GMSK w/ BT=0.3
Transmitter Exciter/Modulator/ FEC Encoder
F.E.C. Encoder Type: None
hTx Goal = 51.3%
HPA
Tx DC Pwr = 1.95 W
Tx Dissipation = 0.95 W
PTx = 1.00 W
S/C
LTLine = 0.008 dB
Cable losses, Connectors, & In-Line Devices
LTconn. = 0.40 dB
LTother = 0.38 dB
LVSWR = 0.04 dB
LTotal = 0.82 dB
PAntenna = 29.18 dBm
Transmit Antenna
GT = 1.4 dBi
Polarization: RHCP
Point Error: 90 °
Canted Turnstyle (back
EIRPS/C = 30.6 dBm
RADIO LINK
Link Losses: 151.8 dB
Elevation: 10 °
PIsotropic GS = -120.9 dBm
Crossed Yagi
GR = 15.5 dBi
Polarization: RHCP
Point Error: 5 °
Receive Antenna
TAntenna = 500 K
LTLine = 0.076 dB
Cable losses, Connectors, & In-Line Devices
LTconn. = 0.10 dB
LTother = 0.00 dB
LTotal to LNA = 0.18 dB
LNA
TLNA = 28 K
GLNA = 24.0 dB
Ground Station
Additional Front End Losses & Devices
TComRcvr = 1557 K
Receiver's IF Downconvert & Amp.
Ts = 527 K
G/T = -11.9 dB/K
Data Bandpass Filter
BRbpf = 144,000 Hz
(Used only in S/N Calc.)
Data Demodulator
Spec. B.E.R.: 1.00E-05
Demodulator Type: GMSK w/ BT=0.3
Eb/No Threshold: 10.9 dB
Data FEC Decoder
F.E.C. Decoder Type: None
R = 96,000 Hz
Eb/No Method:
Eb/No = 15.7 dB
Link Margin: 4.8 dB
MARGINAL LINK
S/N Method:
S/N = 13.9 dB
Link Margin: 3.0 dB
MARGINAL LINK


OreSat1 - Bulk Mission Downlink / Telemetry
MISSION DATA
DOWNLINK SYSTEM:
Frequency: 2422.00 MHz
R = 1,000,000 bps
Modulation Method: DBPSK
Transmitter Exciter/Modulator/ FEC Encoder
F.E.C. Encoder Type: None
hTx Goal = 27.0%
HPA
Tx DC Pwr = 3.70 W
Tx Dissipation = 2.70 W
PTx = 1.00 W
S/C
LTLine = 0.044 dB
Cable losses, Connectors, & In-Line Devices
LTconn. = 0.90 dB
LTother = 0.52 dB
LVSWR = 0.04 dB
LTotal = 1.50 dB
PAntenna = 28.50 dBm
Transmit Antenna
GT = 12.0 dBi
Polarization: RHCP
Point Error: 10 °
OreSat Helix
EIRPS/C = 40.5 dBm
RADIO LINK
Link Losses: 159.7 dB
Elevation: 30 °
PIsotropic GS = -118.5 dBm
Parabolic Reflector
GR = 22.9 dBi
Polarization: RHCP
Point Error: 5 °
Receive Antenna
TAntenna = 100 K
LTLine = 0.200 dB
Cable losses, Connectors, & In-Line Devices
LTconn. = 0.60 dB
LTother = 2.30 dB
LTotal to LNA = 3.10 dB
LNA
TLNA = 44 K
GLNA = 19.4 dB
Ground Station
Additional Front End Losses & Devices
TComRcvr = 254 K
Receiver's IF Downconvert & Amp.
Ts = 244 K
G/T = -4.1 dB/K
Data Bandpass Filter
BRbpf = 2,000,000 Hz
(Used only in S/N Calc.)
Data Demodulator
Spec. B.E.R.: 1.00E-04
Demodulator Type: DBPSK
Eb/No Threshold: 10.3 dB
Data FEC Decoder
F.E.C. Decoder Type: None
R = 1,000,000 Hz
Eb/No Method:
Eb/No = 15.3 dB
Link Margin: 5.0 dB
MARGINAL LINK
S/N Method:
S/N = 12.3 dB
Link Margin: 2.0 dB
MARGINAL LINK