APPENDIX C

LOS SYSTEM DATA SHEET

The data sheets of Figure C-1 may be used in the calculation of the LOS System parameters.

FROM: TO:

I.   SYSTEM REQUIREMENTS

        Type of Transmission (Voice, TTY, etc.)
        Number of Voice Channels
        Desired Reliability
        Maximum Allowable Channel Noise 6000 mi. cct.
        Maximum Modulating Frequency , FM
        RF Carrier Frequency, F
        Modulation Index
        Site Coordinates:

            LA ____° ____' ____''   N Lat _____° ____' ____'' W Long
            LB ____° ____' ____''   N Lat _____° ____' ____'' W Long

II   PRELIMINARY CALCULATIONS

        Great Circle Distance , D
        Revr. Bandwidth, $BW = 2(\Delta F_p + F_m)$

III.   LOSSES - dB

Trial	Change	Change	Change

        Free-Space Loss, $L_{FS} = 37 + 20 \log D$
                                    (miles) +
                                    20 log f (MHz)
        Misc. Transmission Loss
        TOTAL LOSSES

IV.   MINIMUM USABLE SIGNAL, MUS

        = 204 dBW+ 10 log BW + 12 dB + 10 dB

V.   ADDITIONAL GAIN REQUIRED FOR 99.99%
        RELIABILITY (FADE MARGIN)

VI.   ACTUAL MINIMUM USABLE SIGNAL, AMUS
        = MUS + FADE MARGIN

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Figure C-1.   Line-of-Sight System Data Sheet (Sheet 1 of 3)

	Trial	Change	Change	Change
VII. TOTAL REQUIRED GAIN in dBW = TOTAL LOSSES + AMUS				

VII.   TOTAL REQUIRED GAIN in dBW
= TOTAL LOSSES + AMUS

VIII.   GAINS - dBW

	Trial	Change	Change	Change
Xmtr Gain, $G_{TR} = 10 \log \frac{P_T}{1}$				
Antenna Gain , $G_A = 20 \log f + 20 \log D_A - 52.6$				
Diversity Gain, G_{DIV}				
TOTAL GAIN				

IX.   SYSTEM FEASIBILITY

(Compare Step VIII and Step VII)   Adjustment Required
                                          OK

X.   MEDIAN CARRIER-TO-NOISE RATIO, C/N
= FADE MARGIN + 10 dB

XI.   SIGNAL-TO-NOISE RATIO , S/N
$= C/N + 10 \log \left(\frac{BW}{bw} \right) + 20 \log \text{ (Modulation Index)}$
+ PF - L - MUX

XII.   CHANNEL NOISE FACTOR
= 82 - S/N

XIII.   ALLOWABLE MEDIAN NOISE

        L > 151 NMI
   27 < L < 151 NMI
        L < 27 NMI
        MAX ALLOWABLE NOISE

XIV.   SUMMARY

Desired Reliability: 99.99%   Actual Reliability: _____
Max. Allowable Channel Noise: 15.6 dBa0   Actual Channel Nose: _____

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Figure C-1. Line-of-Sight System Data Sheet (Sheet 2 of 3)

Recommended Design Parameters:

Transmitter Power: ____ watts
Antenna Size: ____ feet
Diversity, order
    of: _____

GENERAL NOTES

o   The maximum modulating frequency is the sum of the minimum modulating fre-
quency (60 kHz); the voice channel bandwidth (a product of the number of voice channels
and the nominal 4 kHz spacing); and the spacing between basic supergroups (12 kHz).

o   See Appendix D if Great Circle distance must be determined exactly (to five
place accuracy). Otherwise, measurements from a map with $\pm$ 10-mile accuracy will
suffice.

o   To allow for losses associated with transmission lines, coupling, transition,
duplexers, etc., a figure of 4 dB is given for systems using 1 kMHz and a figure of 6 dB
is used for 2 kMHz systems.

o   In this equation 12 dB = receiver-noise figure and 10 dB = C/N figure. These
are approximate values and may be changed to fit the specific case. For instance, if
parametric amplifiers are used, the 12 dB receiver-noise figure is changed to 2 dB.

o   In this equation C/N is that computed in Step X, BW is that computed in Step II,
bw = voice channel bandwidth, PF = pre-emphasis gain, L = channel loading factor, and
MUX = multiplex equipment noise insertion (about 2 dB.).

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Figure C-1. Line-of-Sight System Data Sheet (Sheet 3 of 3)