communications

DATAFILE

DUPLEX OPERATION CALCULATION FORM 10007-5

Use DATAFILE Bul. 10007-4 as a guide when making duplex operation calculations.

DESCRIPTION OF TRANSMITTER AND RECEIVER

1. Transmitter ...	Output Power ____ watts	Operating Frequency ____ MC
2. Receiver	Effective 12-db SINAD sensitivity ____ µv	Operating Frequency ____ MC
3. Subtract to find separation between transmitter and receiver frequencies		____ MC

DETERMINING THE REQUIRED AMOUNT OF ATTENUATION

For the frequency separation found in step 3, use the appropriate duplex operation curves to find the amount of attenuation required to prevent excessive degradation of desired signals by ....

	RECEIVER DESENSITIZATION	TRANSMITTER NOISE
4. Attenuation required for frequency separation found in step 3	db	db
5. Correction for receiver sensitivity (±)	db	db
6. Correction for transmitter power output (±)	db	db
7. Sum of transmission line losses (if separate antennas are used)	db	db
8. For 2-db effective power loss add 4—6 db; for approx 1-db loss add 6—12 db..	db	db
9. Total attenuation required	db	db

This is the amount of attenuation which must be obtained between the transmitter output and the receiver input (by one of the 3 following methods) to prevent excessive degradation of desired signals.

METHOD 1: OBTAINING ATTENUATION BY ANTENNA SPACING ALONE

10. Type of antenna spacing to be used ..... Vertical ☐ ..... Horizontal ☐

11. Maximum attenuation required to prevent excessive degradation of desired signals (from step 9) .... ____ db

12. Refer to the appropriate antenna-spacing attenuation curve (Figure 10 or 11 in Bulletin 10007-4) and determine how many feet of antenna spacing will be needed to obtain the required amount of attenuation in step 11* .... ____ feet

METHOD 2: OBTAINING ATTENUATION BY CAVITY FILTERS (COMMON ANTENNA)

	TO PREVENT EXCESSIVE RCVR DESENSITIZATION	TO PREVENT EXCESSIVE TRANSMITTER NOISE
13. Total attenuation required (from step 9). Do not use step 7 (transmission line losses) with Method 2.	At least ________ db in the rcvr input	At least ________ db in the xmtr output

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14. Refer to the cavity attenuation curves and select receiver input and transmitter output cavities which will provide the attenuation found in step 13. Use the frequency separation found in step 3.

Remember that 3-db loops produce a 50% power loss, 1-db loops produce a 22% loss, and 1/2-db loops produce an 11% loss.

RCVR INPUT CAVITIES		XMTR OUTPUT CAVITIES	
Cavity with -db loops	db	Cavity with -db loops	db
Cavity with -db loops	db	Cavity with -db loops	db
Cavity with -db loops	db	Cavity with -db loops	db

15. Add to find the total attenuation in each column ....

Total cavity attenuation	db	Total cavity attenuation	db

The total attenuation of the receiver input cavities selected must equal or exceed the total attenuation required to prevent receiver desensitization (step 13). The total attenuation of the transmitter output cavities must equal or exceed the attenuation required to prevent transmitter noise (step 13).

METHOD 3: OBTAINING ATTENUATION BY BOTH ANTENNA SPACING & CAVITY FILTERS

16. Available antenna spacing: [ ] feet of { vertical spacing ..... [ ] / horizontal spacing ... [ ] }

	TO PREVENT EXCESSIVE RCVR DESENSITIZATION		TO PREVENT EXCESSIVE TRANSMITTER NOISE	
17. Total attenuation required (from step 9)	At least ______ db in the rcvr input		At least ______ db in the xmtr output	
18. Attenuation provided by available antenna spacing (step 16)* ...		db	same value →	db
19. Subtract step 18 from step 17	Additional atten req'd	db	Additional atten req'd	db

20. Refer to the cavity attenuation curves and select receiver input and transmitter output cavities which will provide the additional attenuation found in step 19. Use the frequency separation found in step 3.

Remember that 3-db loops produce a 50% power loss, 1-db loops produce a 22% loss, and 1/2-db loops produce an 11% loss.

RCVR INPUT CAVITIES		XMTR OUTPUT CAVITIES	
Cavity with -db loops	db	Cavity with -db loops	db
Cavity with -db loops	db	Cavity with -db loops	db
Cavity with -db loops	db	Cavity with -db loops	db

21. Add to find the total attenuation in each column ....

Total cavity attenuation	db	Total cavity attenuation	db

Both of these totals must equal or exceed the "Additional atten req'd" figures in the same columns above (step 19).

* The antenna-spacing attenuation curves provided in Bulletin 10007-4 are based on the use of unity-gain antennas or vertically-spaced gain antennas. For gain antennas spaced horizontally over 50 feet, add both antenna gains to the attenuation required in step 11 (Method 1), or subtract both gains from the attenuation provided by antenna spacing in step 18 (Method 3). For horizontal spacing of gain antennas less than 50 feet, each installation should be measured or the antenna manufacturer contacted for specific data.

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