VOICE BANDWIDTH PRIVATE LINE DATA CIRCUITS
CIRCUIT CONDITIONING REQUIREMENTS
USING THE COLLINS CLA-TYPE SYSTEM

1. GENERAL

1.01 This section provides attenuation and envelope delay distortion requirements for voice bandwidth private line data channels when tests are performed using the Collins CLA-type system.

1.02 This section is reissued to replace the term "CLA-1C1A" with "CLA-type". This change allows for newer versions of the test set to be included when the term is used. In addition, Table C has been deleted because information contained in that table is no longer supported. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

1.03 The CLA-type system uses test frequencies spaced at 250-Hz intervals ranging from 250 Hz to 3500 Hz. The conditioning test requirements for voice bandwidth data channels are stated differently when using the CLA-type system test equipment. This difference is due to the different test frequencies that are used. Limits have been developed for attenuation and envelope delay distortion at the CLA-type frequencies that will give reasonable assurance that the channel conditioning requirements are met within the specified frequency bands.

1.04 The limits for attenuation and envelope delay distortion are given in Tables A and B of this section. These tables should be substituted for the attenuation and envelope delay distortion requirements given in Section 314-410-500 up through C4 when the Collins CLA-type system is used to perform these tests. Manual measurements must be performed for C5 tests. Use the requirements as given in Section 314-410-500. However, it is recommended to make CLA-type measurements for benchmark readings.

1.05 The amplitude characteristic (attenuation distortion) of a network or interexchange facility is commonly determined by measuring the loss of a single-frequency tone as it is tuned across the bandwidth of interest. This type of measurement is referred to as the static frequency response. A static measurement performed on private line data channels may not provide the same amplitude characteristic results as that given by using a complex test waveform, due to level and frequency sensitive devices and the presence of nonlinearities. Measurement results with differences of up to 2 dB have been obtained on some compandored facilities when using other measuring techniques. These differences result from the relative placement of filters with respect to level sensitive and nonlinear devices, and generally are larger near the limits of the frequency band. In these cases the frequency response is a function of the bandwidth of the signal on the channel. This type of response is referred to as the dynamic frequency response.

1.06 The Collins CLA-type system uses a complex signal and performs a dynamic frequency response measurement. By comparison, the Bell System measurement technique used at this time is a static frequency response measurement.

1.07 A compandored channel will appear to have a wider bandwidth when using a dynamic frequency response measurement than with a static frequency response measurement. In some cases the customer, when using a single frequency transmission measuring set, may report that the frequency response is out of limits. However, subsequent testing using the Collins CLA-type system may indicate the frequency response is within specified limits. In these cases, the circuit must be adjusted to meet requirements using the static frequency response technique.

TABLE A

PRIVATE LINE VOICE BANDWIDTH CIRCUIT ATTENUATION DISTORTION REQUIREMENTS (dB) USING COLLINS CLA-TYPE SYSTEM

FREQUENCY RANGE IN HZ	0	1		2		3		4	
	2-POINT	MID LINK END LINK	MID LINK		MID LINKS		MID LINKS		MID LINKS	
			END LINK	MID LINK	END LINK	MID LINK	END LINK	MID LINK	END LINK	MID LINK
3002 (ALSO 2000)										
BASIC	(VB)	(VBE0)	(VBE1)	(VBM1)	(VBE2)	(VBM2)	(VBE3)	(VBM3)	(VBE4)	(VBM4)
500-2500	-2 to +8	-1.5 to +4	-1 to +4	-1 to +3.5	-1 to +4	- to +3.5	-1 to +3.5	-0.8 to +3.5	-0.8 to +3.5	-0.8 to +3
250-3000	-3 to +12	-1.5 to +6	-1.5 to +6	-1.5 to +6	-1.5 to +6	-1.5 to +5	-1 to +5	-1 to +4.5	-1.5 to +4.5	-1 to +4.5
C1	(C1)	(C1E0)	(C1E1)	(C1M1)	(C1E2)	(C1M2)	(C1E3)	(C1M3)	(C1E4)	(C1M4)
1000-2500	-1 to +3	-0.7 to +1.5	-0.6 to +1.5	-0.5 to +1.5	-0.5 to +1.5	-0.5 to +1.5	-0.5 to +1.5	-0.5 to +1	-0.5 to +1.5	-0.5 to +1
250-2750	-2 to +6	-1.5 to +3	-1 to +3	-1 to +3	-1 to +3	-1 to +2.5	-1 to +3	-0.8 to +2	-0.8 to +3	-0.8 to +2
250-3000	-3 to +12	-1.5 to +6	-1.5 to +6	-1.5 to +6	-1.5 to +6	-1.5 to +5	-1.5 to +5	-1.5 to +4.5	-1.5 to +4.5	-1 to +4.5
C2	(C2)	(C2E0)	(C2E1)	(C2M1)	(C2E2)	C2M2)	(C2E3)	(C2M3)	(C2E4)	(C2M4)
500-2750	-1 to +2.7	-0.6 to +1.4	-0.5 to +1.4	-0.5 to +1.4	-0.5 to +1.4	-0.5 to +1.4	-0.5 to +1.4	-0.5 to +1	-0.5 to +1.4	-0.5 to +1
250-3000	-2 to +6	-1.5 to +3	-1 to +3	-1 to +3	-1 to +3	-1 to +2.5	-1 to +3	-0.8 to +2	-0.8 to +3	-0.8 to +2
C3 ACCESS LINE*†	(C3A)(C3AC)									
500-2750	-0.5 to +1.3									
250-3000	-0.8 to +3									
C3 TRUNK*	(C3T)									
500-2750	-0.5 to +1									
250-3000	-0.8 to +2									
C4	(C4)									
500-3000	-2 to +3									
250-3250	-2 to +7									
C5‡										

( ) Figures in parentheses are classification codes which may be found on some CLRs to indicate the conditioning requirement for each link of the circuit.

* C3 conditioning requirements apply to AUTOVON and CCSA circuits only. Refer to Sections 309-200-300 and 309-200-301 for more information.

† Classification code C3AC assumes measurement taken with compromise equalizer temporarily out of service.

‡ Manual measurements are required and the CLA-type system is recommended for benchmark measurement only.

TABLE B

PRIVATE LINE VOICE BANDWIDTH CIRCUIT ENVELOPE DELAY REQUIREMENTS (MICROSECONDS) USING COLLINS CLA-TYPE SYSTEM

FREQUENCY RANGE IN HZ	2-POINT	0	1		2		3		4	
		MID LINK END LINK	MID LINK		MID LINKS		MID LINKS		MID LINKS	
			END LINK	MID LINK	END LINK	MID LINK	END LINK	MID LINK	END LINK	MID LINK
3002 (ALSO 2000)										
BASIC	(VB)	(VBE0)	(VBE1)	(VBM1)	(VBE2)	(VBM2)	(VBE3)	(VBM3)	(VBE4)	(VBM4)
750-2750	1900	1050	750	630	630	450	450	420	420	300
C1	(C1)	(C1E0)	(C1E1)	(C1M1)	(C1E2)	(C1M2)	(C1E3)	(C1M3)	(C1E4)	(C1M4)
1000-2500	1000	550	400	300	300	250	250	200	200	175
750-2750	1900	1050	750	630	630	450	450	420	420	300
C2	(C2)	(C2E0)	(C2E1)	(C2M1)	(C2E2)	(C2M2)	(C2E3)	(C2M3)	(C2E4)	(C2M4)
1000-2500	400	240	200	150	150	125	125	100	100	80
750-2750	1100	700	520	380	380	330	330	250	250	220
500-2750	2500	1500	1100	800	800	690	690	600	600	450
C3 ACCESS LINE*†	(C3A)(C3AC)									
1000-2500	100									
750-2750	240									
500-2750	600									
C3 TRUNK*	(C3T)									
1000-2500	80									
750-2750	200									
500-2750	450									
C4	(C4)									
1000-2500	260									
750-2750	450									
750-3000	1500									
500-3000	3000									
C5‡										

( ) Figures in parentheses are classification codes which may be found on some CLRs to indicate the conditioning requirement for each link of the circuit.

* C3 conditioning requirements apply to AUTOVON and CCSA circuits only. Refer to Sections 309-200-300 and 309-200-301 for more information.

† Classification code C3AC assumes measurement taken with compromise equalizer temporarily out of service.

‡ Manual measurements are required and the CLA-type system is recommended for benchmark measurement only.