

L3 CARRIER - OVER-ALL TESTS AND ADJUSTMENTS
OF AN L3 SYSTEM - TERMINAL TO TERMINAL

CHECK OF SYNCHRONIZATION OF 4-KC FREQUENCY SUPPLY CIRCUITS

A measure of the accuracy at controlled offices of synchronization of the 4-kc frequency supply circuit may be obtained on an IN-SERVICE basis at the high-frequency patch bay by beating the 92-kc group pilot from a regular receiving group with a 92-kc pilot from a spare transmitting group and a spare receiving group. The group transmission measuring circuit is employed for observing the beat. An alternate arrangement may be employed by beating the 92-kc group pilot from a regular receiving group with the 92-kc group pilot available at the 92-kc test jack which is usually provided at the high-frequency patch bay where the group transmission measuring circuit is located.

In selecting the regular receiving group for the test, the following considerations should be applied:

- (a) The number of beats per interval of time for a given amount of deviation between carrier supplies increases in proportion to the line frequency of the 92-kc group pilot. Therefore, the incoming group should be associated with the highest-numbered supergroup available to shorten the testing time. It is necessary to test only one incoming group.
- (b) The regular receiving group, if possible, should originate at the nearest terminal repeater station supplying the 308-kc pilot frequency for synchronization in order to eliminate, or keep to a minimum, deviations caused by the carrier supplies at an intervening station or stations. Refer to Fig. 1.
- (c) Group 3 should be used in all tests, since test requirements are based on this group number.

Apparatus: See Fig. 2 associated with this point section for testing apparatus and testing arrangements.

STEP	PROCEDURE
	METHOD USING SPARE GROUP EQUIPMENT
	The spare transmitting and receiving group 3 selected for the test should be on the same carrier supply as the regular receiving group 3 to be used in the test.
1	Terminate SP HYB as indicated by ① in Fig. 2.
2	Patch spare transmitting and receiving group 3 to group transmission measuring circuit as indicated by ②, ③, ④, and ⑤
3	Patch regular receiving group 3 to group transmission measuring circuit as indicated by ⑥
4	Observe beat on IND meter of group transmission measuring circuit. The beat should meet requirements indicated by Table A.
	ALTERNATE METHOD USING 92-KC TEST JACK
	The 92-kc group pilot at the 92-kc test jack to be used in the test should be supplied from the same carrier supply as the regular receiving group 3 selected for the test.
1A	Measure 92-kc group pilot on regular receiving group 3 by making patches indicated by ⑤ and ⑥. Remove patch ⑥
2A	Patch 92-kc test jacks to attenuator as indicated by ⑦. Set attenuator to 10 db.

STEP	PROCEDURE
3A	Patch attenuator to group transmission measuring circuit through MULT JACKS as indicated by ⑧. Reduce attenuator loss until deflection on IND meter is approximately the same as in Step 1A.
4A	Replace patch ⑥ and observe beat on IND meter. The beat should meet requirements given in Table A.
THE FOLLOWING STEPS APPLY TO BOTH METHODS	
5	If the requirements of Table A, Column 1 are not met, check the frequency comparison circuit of the carrier supply circuit associated with the group under test in accordance with the E34 series covering the L carrier and pilot supply. If the requirements of Table A, Column 2 are not met, check the frequency comparison circuit, as above, then advise the group control office that an irregularity exists and request that the offices involved check the synchronization of their respective carrier supply circuits.
6	Transfer to the other 4-kc harmonic generator of the carrier supply circuit associated with the group under test, following the procedure given in the E34 series covering the L carrier and pilot supply, and repeat Steps 1 to 4 (or 1A to 4A) and Step 5.
	<u>Caution: The transfer of the carrier supply causes hits on superimposed telegraph so that the number of transfers should be kept to a minimum.</u>
7	Repeat Steps 1 to 4 (or 1A to 4A) and Steps 5 and 6, using spare group banks being supplied from each of the other carrier supply circuits in the office.

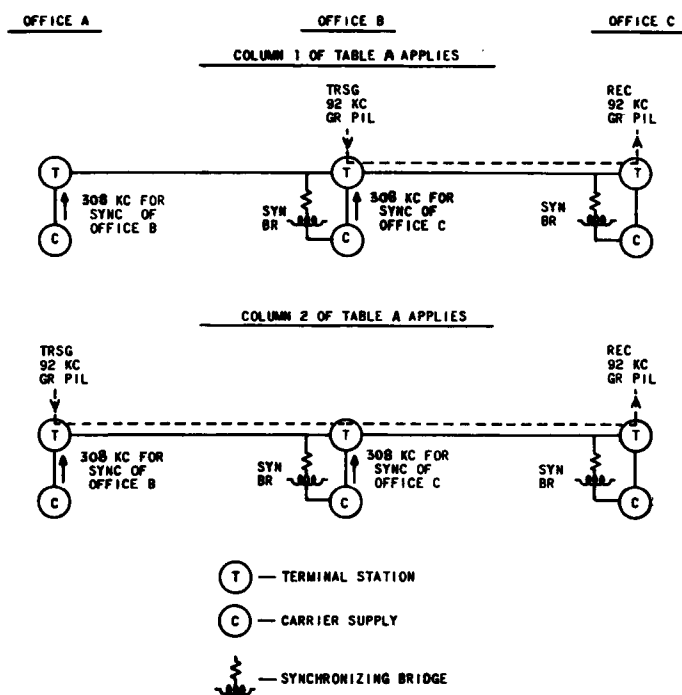


Fig. 1 - Illustration of Application of Requirements in Columns 1 and 2 of Table A.

TABLE A

Requirements: The time of one beat should not be less than that shown in Columns 1 or 2, as applicable. A beat is a complete cycle of the swing of the meter needle (see Note 1).

Column 1 should apply when the 92-kc group pilot originates at the adjacent terminal which supplies 308-kc pilot for synchronization at the testing office (see illustration in Fig. 1).

Column 2 should apply when the 92-kc group pilot does not originate at the adjacent terminal which supplies 308-kc pilot for synchronization at the testing office (see illustration in Fig. 1).

Supergroup	Group	Time Interval Between Beats			
		Column 1		Column 2	
		Minutes	Seconds	Minutes	Seconds
112	3	3	56	1	19
113	3	2	24		48
114	3	1	47		36
115	3	1	24		28
116	3	1	10		23
117	3	1	0		20
118	3		51		17
125	3		44		15
126	3		40		13
127	3		36		12
128	3		33		11
213	3		30		10
214	3		28		9
215	3		26		9
216	3		24		8
217	3		23		8
218	3		22		7
225	3		20		7
226	3		19		6
227	3		18		6
228	3		18		6
313	3		17		5
314	3		16		5
315	3		15		5
316	3		15		5
317	3		14		4
318	3		14		4
325	3		13		4
326	3		13		4
327	3		12		4
328	3		12		4

Notes

1. In timing beats, better accuracy is usually obtained if the selected reference point in the beat cycle is taken near the middle of the deflection swing rather than at the point of maximum deflection. When beats occur at a slow rate, the movement of the meter needle at maximum deflection is sometimes so slow that the exact point of greatest deflection is difficult to determine. The meter needle movement is much faster at the middle of the swing, which aids in determining the exact point where a beat cycle begins and ends.
2. Oscillators in good order under stable conditions should have a beat exceeding the time shown in the table. Under transient conditions such as the sun shining on the crystal network, they may have a beat of less time for several minutes until the new condition stabilizes. The motor on the 4-kc frequency panel will operate to reduce the frequency difference by one-half every five minutes, that is, the time of one beat is doubled every five minutes.

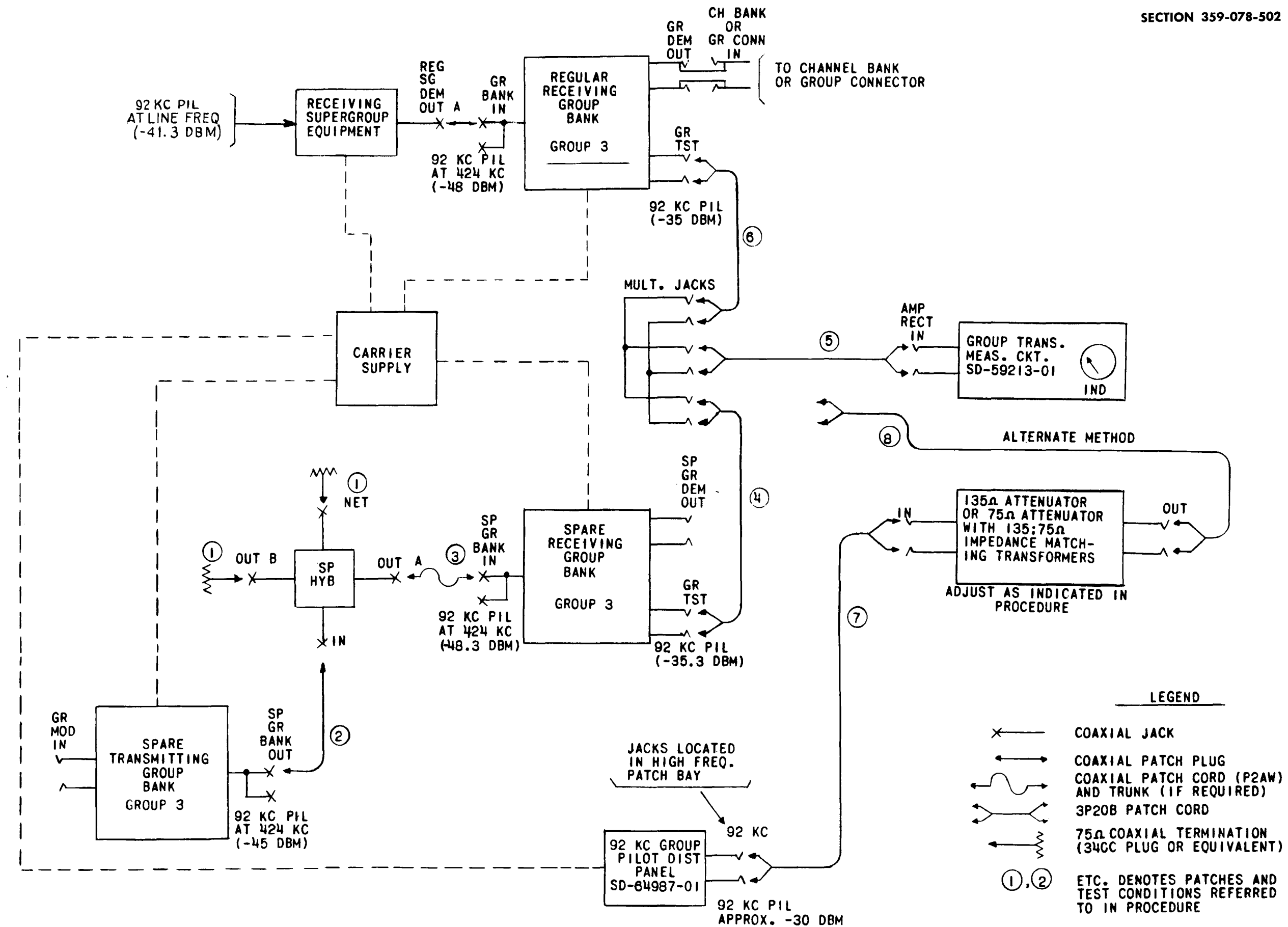


FIG. 2 CHECK OF SYNCHRONIZATION USING 92-KC GROUP PILOT