JOHN H. MULLANEY
CONSULTING RADIO ENGINEERS, INC.

INSERT

PROCEDURE FOR TUNING
Sideband Network
And Program Information Entry Procedure

(1) Run SBNET program, using sideband loads for ± 10KHz from carrier frequency.

		Frequency	RA	XA
High	(Carrier + 10KHz)	1010,	Load	
Center	(Carrier)	1000,	50,.	0
Low	(Carrier - 10KHz)	990,	Load	

(2) Enter Power of Carrier (watts). Perfect sideband powers would be = Carrier Power/4.

(3) Observe <u>starting</u> values for sideband loads.

(4) Select one of the two "phase" answers (whichever gives the best input and results; in conjunction with the SB power split and the practicality of the C3 and L1 + L2 component requirements.

(5) To see if the additional Series Network will give a substantial improvement, enter 0 for the "new phase shift" request and then enter the "phase" that was selected in "(4)". (This must be entered twice.)

(6) Observe the new input Z and power split results, and, especially, the component requirements for C4 and L5. The total inductance indication on the printout refers to the coil value that would be required if you chose to use a single coil to act as L1 + L2 + L5.

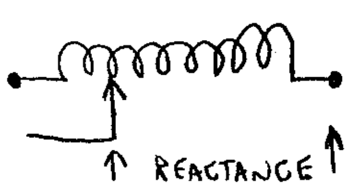
(7) You can choose to vary the value of C4, as follows: A higher C4 value will require a smaller L5 value and often produces very satisfactory sideband results.

(8) The best way to <u>tune</u> the Sideband Network (example for type <u>without</u> series network) is as follows:

→ a. Select a coil, the inductance of which is ≥ THAN the value shown for (L1 + L2) on the printout.

b. Calculate the <u>reactance</u> at Carrier for (L1 + L2).

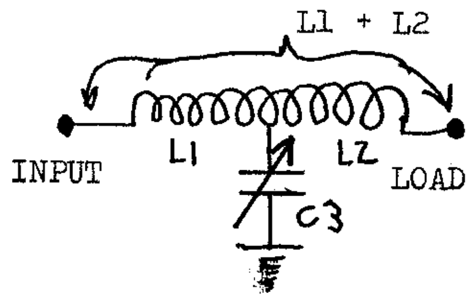
c. Set the coil to that reactance (by bridge measurement), as shown below.



d. Accurately count the number of turns required to obtain that reactance.

e. Next, connect the capacitor shunt leg to the point that is 1/2 the number of turns that were counted, after having made a bridge measurement of the capacitor to set it at its proper reactance value.

Final network:



(C3 @ midpoint between input clip & output end lug)

f. Bridge input impedances at carrier and sidebands. Should get 50 j0 at carrier and SBNET printout values at sidebands.

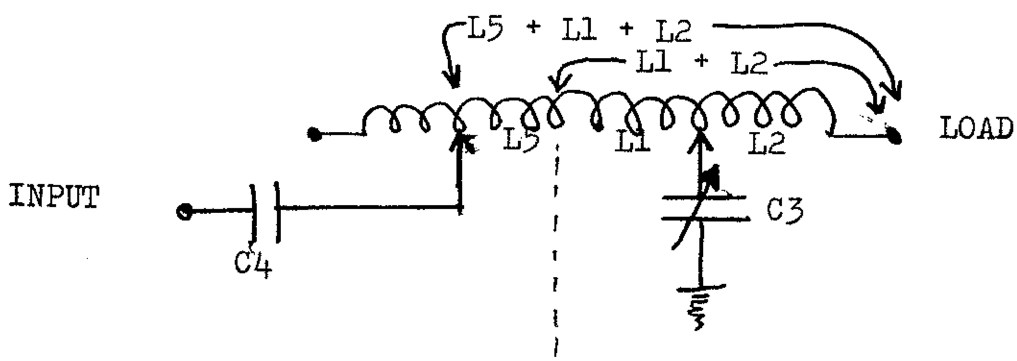
g. For different sideband results, you can move the input clip and the capacitor clip, equal distances (turns) toward either either end of the coil; then turn the capacitor to produce 50 j0 at the input. Once again, check the sideband results.

⑨ If electing to use the additional Series Network with a single coil for L5 + L1 + L2, select a coil ≥ the total inductance printout.

a) First, follow the same procedure as given in Step ⑧.

b. Next, connect the selected capacitor C4 as shown below, and move the input clip toward the input of the coil until you get 50 j0 at carrier.

Then, check sidebands.



1520 KHz System

240 Ft. Line (50 Ω, V.P. = .81)

Frequency			Loads @ B (Same as before.)	
1500	-	162.560	49.632 - j 17.331	112.241 W
1505	-	163.102	49.722 - j 13.032	
1510	-	163.644	49.833 - j 8.712	
1515	-	164.186	49.956 - j 4.368	
* 1520	-	164.727	50 j 0	
1525	-	165.269	50.233 + j 4.394	
1530	-	165.811	50.389 + j 8.813	
1535	-	166.353	50.556 + j 13.261	
1540	-	166.895	50.734 + j 17.738	109.773 W

New, resulting values at input of Line (@ C)

Frequency	R	X	SB Powers
1500	61.179	- j 15.666	95.872
1505	57.828	- j 11.676	103.845
1510	54.899	- j 7.723	111.636
1515	52.331	- j 3.815	118.802
* 1520	50	j 0	
1525	48.101	+ j 3.864	129.102
1530	46.374	+ j 7.647	131.206
1535	44.868	+ j 11.402	130.848
1540	43.561	+ j 15.138	128.018

Next, rerun the SBNET program to determine network needed at input of the line and resulting values presented to XMTR (@ D), which probably will not change much from the original network.

Using: 101.2° Sideband Network (starting with 1525/1515)

	Results using SB Network		Results adding Series Network	
1540	42.41 - j 14.44	264.16	42.41 + j 2.22	293.96
1535	45.45 - j 11.69	257.96	45.45 j .82	274.95
1530	47.86 - j 8.23	253.69	47.86 j .12	261.20
1525	49.39 - j 4.24	251.21	49.39 - j .06	253.06
* 1520	50 j 0	1000	50 j 0	1000
1515	49.38 + j 4.14	251.35	49.38 - j .06	253.11
1510	47.93 + j 7.91	253.90	47.93 - j .50	260.78
1505	45.93 + j 11.02	257.32	45.93 - j 5.0	268.95
1500	43.00 + j 13.51	264.56	43.00 - j 3.36	288.92

1240 KHz System

20 Ft. Line RG17 (50 Ω, V.P. = .666)

Frequency	θ	Loads @ ①, output of Line
1265	- 13.881°	45.5 + j 14.979
1255	- 13.771	46.9 + j 9.544
1245	- 13.661	48.4 + j 3.987
* 1240	- 13.6063	49.5 j 0
1235	- 13.551	50 - j 4.692
1225	- 13.442	52 - j 9.894
1215	- 13.332	53.7 - j 15.519

New, resulting values at input of Line (@②)

	R		X	SB Powers
1265	53.171	+ j	16.607	214.194
1255	51.709	+ j	10.397	232.343
1245	50.404	+ j	4.365	246.150
* 1240	49.555	+ j	0.228	
1235	47.928	- j	4.100	258.914
1225	47.445	- j	9.297	253.720
1215	46.592	- j	14.464	244.704

SBNET Program could be run using the point ② values to see if use of the sideband network at the input of the line would give substantial improvement (probably not worth the cost involved).

Original Values (before network is added)

1540	43.561 + j 15.138	128.015
1535	44.868 + j 11.402	130.850
1530	46.374 + j 7.647	131.205
1525	48.101 + j 3.864	129.100
* 1520	50 j 0	500
1515	52.331 - j 3.815	118.800
1510	54.899 - j 7.723	111.655
1505	57.828 - j 11.676	103.845
1500	61.179 - j 15.666	95.875