FUNCTION	EMISSION	APPROVAL	EDITION	CONTROL
ORGAN	SETEL	SETEL	January 06, 2006	SEATE
CHECKED	Vagner Lúcio	Flávio Spressola	No. 15150/201 - 2° Edition	Rodrigo Marcos
INSTRUCTION MANUAL FOR ADJUSTABLE WIDE-BAND TUNING DEVICE IN THE RANGE OF 90 - 300 kHz				Total of pages 11 Page 1

1.0 - ADJUSTABLE WIDE-BAND TUNING DEVICE

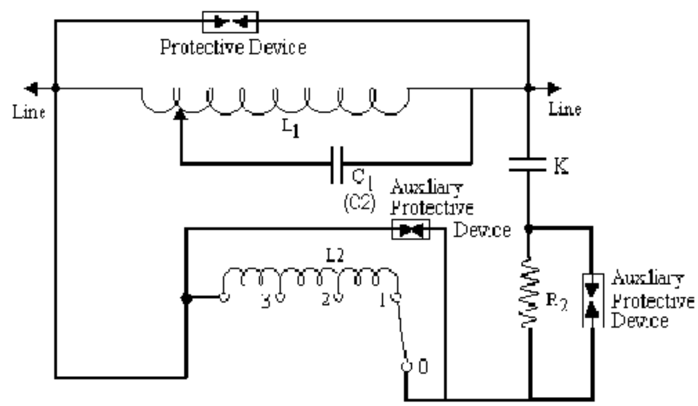
The simplied elementary diagram is shown in figure 1. The complete circuit, shown in figure 2, forms a half section constant “K” band pass filter. The two line terminals of the line trap form the input terminals of the filter. The line trap coil L_1 with the capacitor C_1 (C_2) form the shunt arm and the coils L_2 with the capacitor K form the series arm. The resistor R_2 terminates the filter in its characteristic impedance (R_0) over the filter passband. L_1C_1 (C_2) and L_2K are resonant at f_0, the GMF of the filter passband.

The characteristic input impedance of the filter is:

$$R_0 = \sqrt{\frac{L_1}{K}} = R_2$$

Where: L_1 = Inductance of the main coil. L_1 = 0.265 mH.
K = Capacitance of capacitor K.
R_2 = Resistance of resistor R_2

FIGURE 1



2.0 - TOOLS NEEDED (FOR ADJUSTMENT)

A) 2 - 10 mm wrenches for the tap on the L_1 winding.

B) 2 - 13 mm wrenches for changing the connections on the tuning device.

C) 1 - 8 mm wrench for changing the L_2 strips.

3.0 - INSTRUMENTS NEEDED

See figure 5.

4.0 - TUNING PACKS

The tuning packs consist of the necessary elements for the adjustment of GMF from 90 kHz to 300 kHz and a terminal resistor of 400 Ω.

The possible band width is shown on figure 3 and 4.

5.0 - ADJUSTMENT

The line traps are usually adjusted at the factory for a bandwidth and impedance or resistive component specified by the customer. In this case the adjusted values were:

Impedance Z = 400 Ω	Blocked bandwith = ____________kHz

If it is desired to change the blocked bandwidth, the necessary steps are:

5.1 - Disconnect the series arm R_2, L_2, K and tune the shunt arm C1(C_2)L1 to the GMF f_0 of the selected bandwidth. The necessary connections are shown on the tuning chart (figure 3). Due to component variations, it is possible that the best tap arrangement for the desired GMF may be one or two positions away from those shown.

5.2 - Inject the carrier frequency GMF signal into the line trap coil through a resistor (usually about 10 Ω). See figure 5.

5.3 - Measure the voltage drop across the resistor by means of a selective voltmeter V_2.

5.4 - Change the tapped connection on L_1 and search the position, where the maximum impedance over the line trap terminals is reached (voltage dip). Always tune the desired frequency with as much inductance L_1 as possible.

5.5 - Reconnect the series arm R_2, L_2, K and disconnect the shunt arm C_1L_1. Install a jumper to short-circuit the resistor R_2 and make the proper connection for the selected frequency according to the tuning chart (figure 3). Adjust the ferrite core position in the inductance L_2 to achieve the minimum impedance in the circuit (voltage peak).

5.6 - Reconnect the shunt arm and remove the short circuit across the resistor R_2. The adjustment should now complete.

5.7 - Check the impedance peak above and below the GMF. L_2 may be adjusted to balance these points, if they are not similar.

6.0 - TRAP IMPEDANCE MEASUREMENT

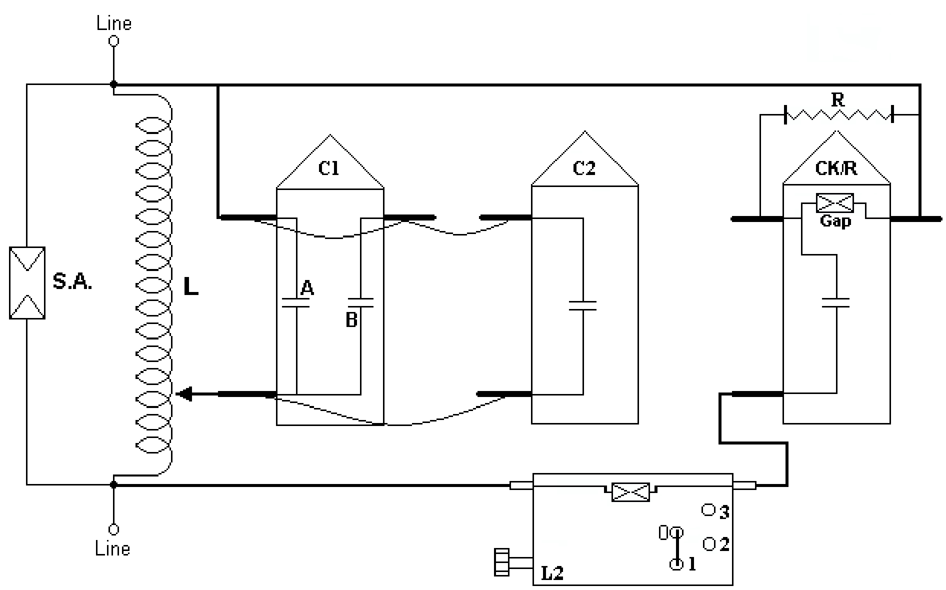
6.1 - The measuring circuit is shown in figure 5. A 10 Ω resistor R_1 must be inserted in the measuring circuit.

6.2 - Adjust the signal generator to the desired frequency for which the impedance is to be found.

6.3 - Record the voltage readings of both voltmeters V_1 and V_2. Knowing the value of R_1, the impedance can be calculated from the following equation.

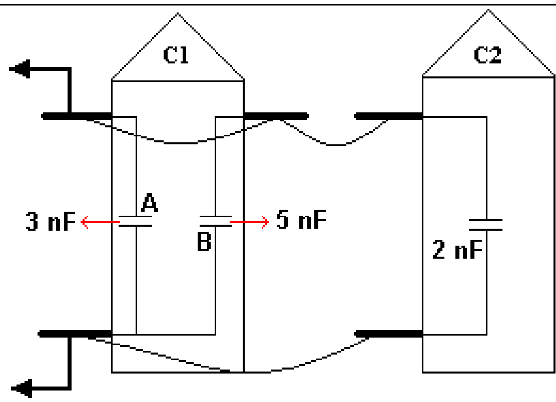
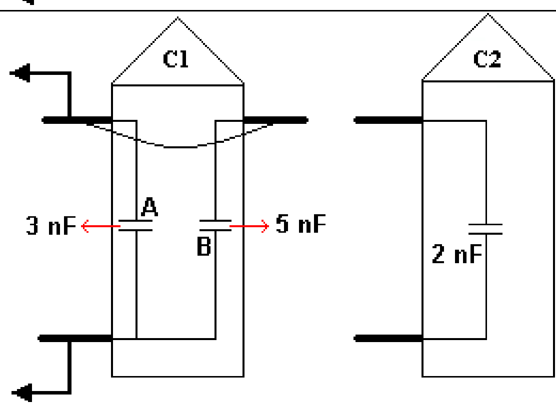
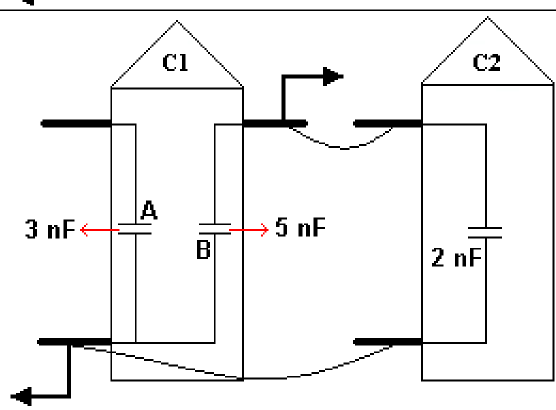
$$IMPEDANCE = \frac{V_1(voltage) \times R_1(\Omega)}{V_2(voltage)}$$

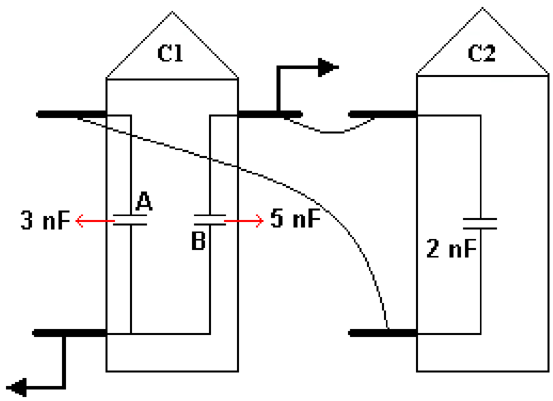
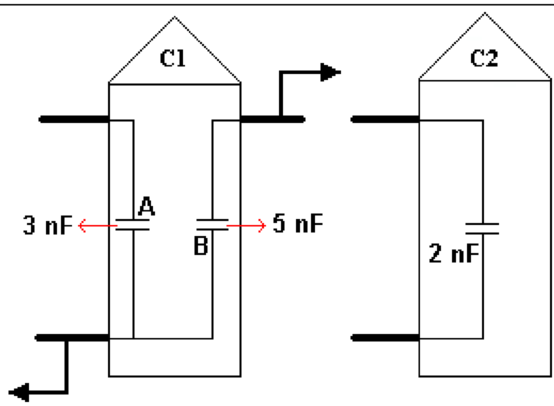
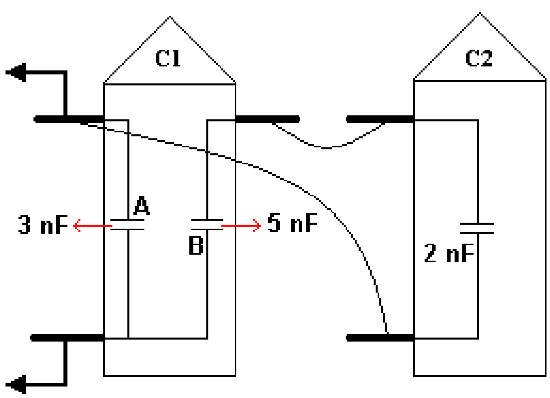
FIGURE 2 - CONNECTION DIAGRAM

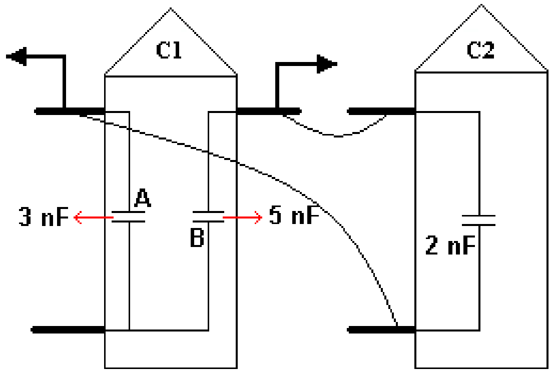
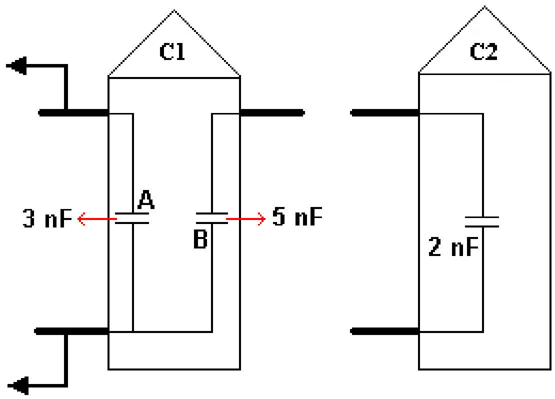
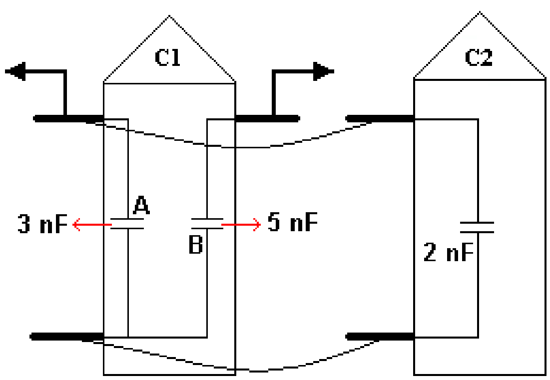
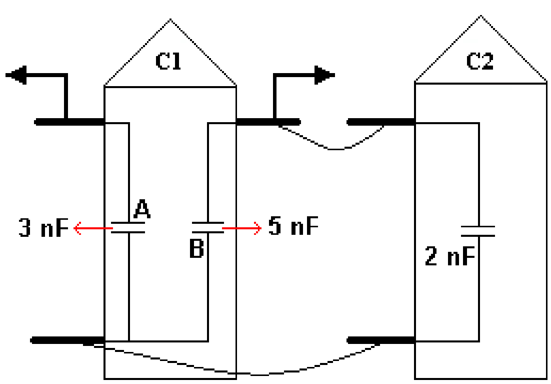


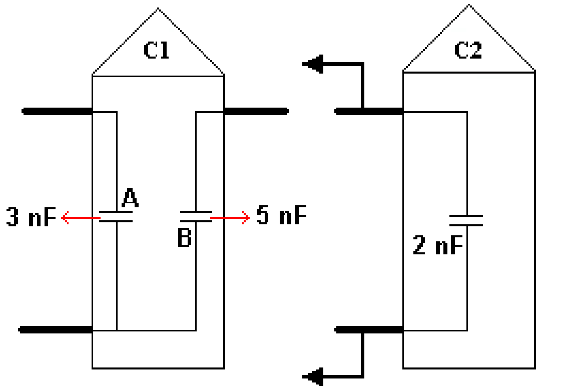
(i.e. connected for 86 – 110 kHz).

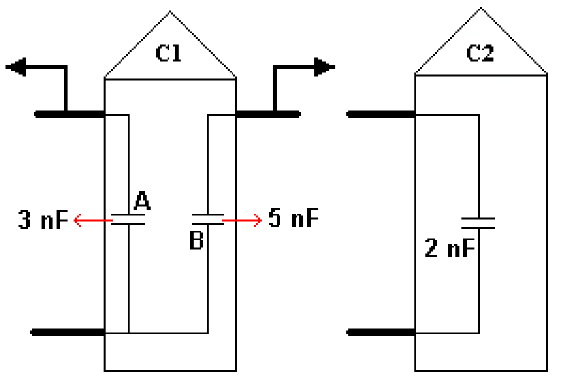
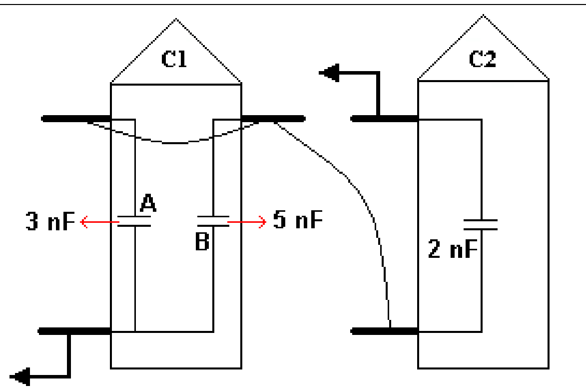
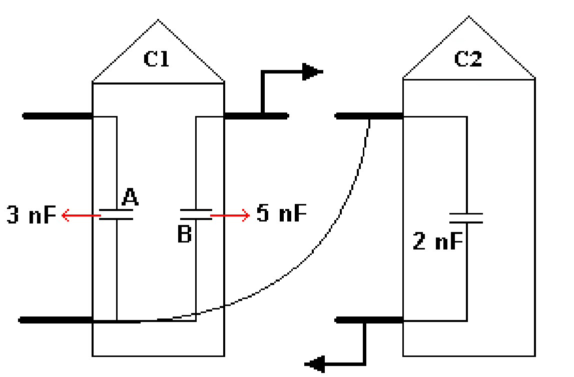
FIGURE 3: TUNING CHARTS FOR THE SHUNT ARM OF ADJUSTABLE WIDE BAND TRAPS 90 – 300 kHz

C1/C2 CAPACITORS	GEOMETRIC MEAN FREQUENCY NOMINAL TUNING RANGE (kHz)	NOMINAL CAPACITORS AND DERIVATIONS (nF)
	86-110	5+3+2=10
	110-117	5+3=8
	117-124	5+2=7

C1/C2 CAPACITORS	GEOMETRIC MEAN FREQUENCY NOMINAL TUNING RANGE (kHz)	NOMINAL CAPACITORS AND DERIVATIONS (nF)
	124-138	2x3/5+5=6.2
	138-147	5
	147-157	5x2/7+3=4.43

	**157-179**	**5x3/8+2=3.875**
C1/C2 CAPACITORS	**GEOMETRIC MEAN FREQUENCY NOMINAL TUNING RANGE (kHz)**	**NOMINAL CAPACITORS AND DERIVATIONS (nF)**
	**179-196**	**3**
	**196-214**	**(3+2)x5/10=2.5**
	**214-219**	**(5+2)x3/10=2.1**

	219-226	2

C1/C2 CAPACITORS	GEOMETRIC MEAN FREQUENCY NOMINAL TUNING RANGE (kHz)	NOMINAL CAPACITORS AND DERIVATIONS (nF)
	226-245	3x5/8=1.875
	245-259	(5+3)x2/10=1.6
	259-283	5x2/7=1.43

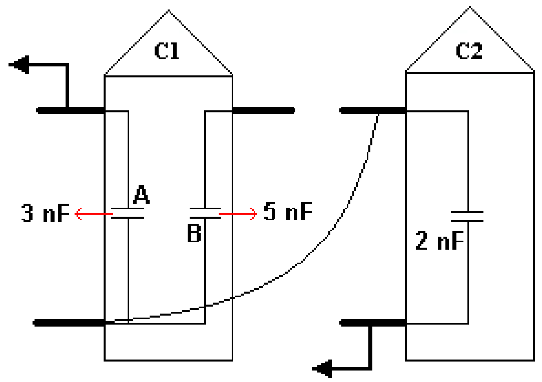
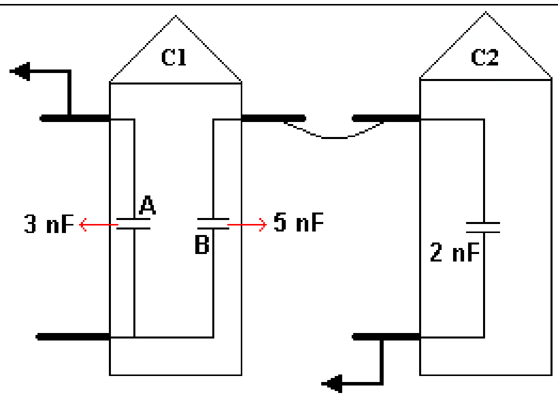
	283-300	3x2/5=1.2
C1/C2 CAPACITORS	**GEOMETRIC MEAN FREQUENCY NOMINAL TUNING RANGE (kHz)**	**NOMINAL CAPACITORS AND DERIVATIONS (nF)**
	300-	1.2x5/6.2=0.97

FIGURE 4 - FOR THE SERIES ARM OF TUNING CHART, ADJUSTABLE WIDE BAND LINE TRAPS AND CONNECTION DIAGRAM

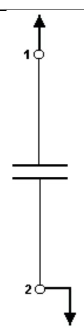
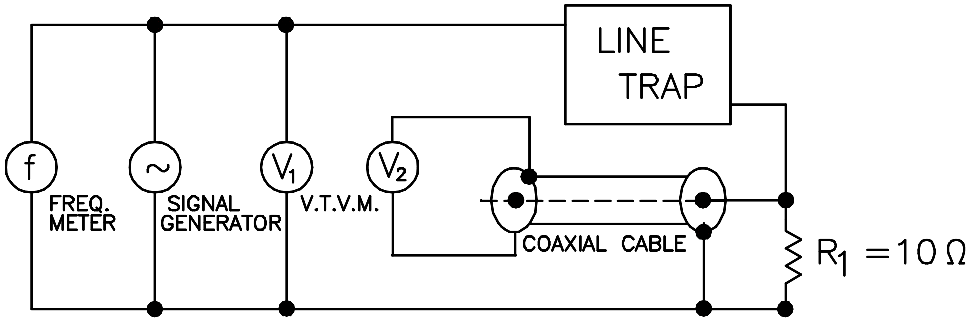
K 1.56 (nF)	GEOMETRIC MEAN FREQUENCY NOMINAL TUNING RANGE (kHz)	L2 TAP	R2 (Ω)
	86-168	0-1	400
	168-242	0-2	
	242-330	0-3	

FIGURE 5 - METHOD TESTING THE LINE TRAP IMPEDANCE



V_1 = Must be a selective voltmeter.
R_1 = Should be attached directly to the line terminal.

FIGURE 6 - ADJUSTABLE WIDE BAND TUNING DEVICE
LAYOUT OF THE TUNING ELEMENTS AND THEIR INTERCONNECTION