

LO AND LO CONTROL PLUG IN490-005 LER. Barthélémy
R. Garoby1. DESCRIPTION1.1. Summary

This circuit generates the Local Oscillator (LO) frequency (RF frequency + 10,7 MHz intermediate frequency) and furnishes the necessary inputs for the correction signals of the beam phase loop. It contains all the functions necessary for a Phase Lock Loop.

1.2. Electronic description

The phase discriminator MC 12040 (3) is driven by:

1.2.1 the DCO (Digital Controle Oscillator); input signal converted to TTL pulse through transistors T11 - T12 and monostable 74121 (2)

1.2.2 The RF input signal (converted to TTL by the same way) divided by 2 or 8 (depending of jumper position) through transistors T14 - T13 - divider 74LS163 (13) and monostable 74121 (4). The phase error is integrated by the amplifier HA 2625 (6) and loop filter RA - CA - RB - CB. The amplifier HA 2625 (5) amplifies and limits an optional phase perturbation which can be added with the input of (6). D7 D8 D9 D10 limit the input to assure loop stability in all conditions. Closed loop or open loop operation is selected by the analog switch AH 0014 (9) driven by timing pulses through T2, T3 and bistable 7400 (8). In open loop operation the front panel 10 turns potentiometer P3 permits manual adjustment of the output frequency.

The voltage follower HA 2625 (10) gives a good isolation and a high input impedance. R15, C11, R101 integrate the signal and D1, D2 are working as limiters. The offset summing is used to translate the center of the dynamic range of the phase integration to the center of the linear range of the varicap MV 1401 (D3). The voltage controlled oscillator is a MC 1648 (1) with its frequency adjust components D3, C88, C89, L4 and C86. The T10 transistor amplifies the ECL oscillator output up to 10 dBm. Harmonics are filtered by the 5 poles band pass filter (Low - 3 dB cut off frequency: 11,1 MHz, High - 3 dB cut off frequency: 14,5 MHz ripple 0,1 dB). Emitter followers T5, T6, T7 give 3 independent 50 Ω impedance sine wave outputs and T8 is used for the front panel test output. Loop On status and LED indicator are driven by (8) + T1, (8) + T4 and Optocoupler (14)

2. ADJUSTMENTS

- 2.1. Trace curve frequency (output T10)/voltage control (LO control), then adjust P2 to obtain a linear variation in open loop mode.
- 2.2. Adjust L4 for a good frequency range (11,1 MHz to 14,7 MHz).
- 2.3. Adjust gain pot P1 on phase perturbation response - see photos and spectrum.

3. SPECIFICATIONS

Input DCO level	10 dBm
% 2 mode	200 kHz to 2 MHz
% 8 mode	1,383 MHz to 1,837 MHz
Input RF level	10 dBm
	400 kHz to 4 MHz
Input phase perturbation	± 10 V degrees/Volt.
Input LO perturbation	± 10 V
ON/OFF loop pulses	Standard PS blocking pulses
Output frequency range	11,1 MHz to 14,7 MHz
Output level	5 dBm \pm 1 dB.