Mounts and devices of active materials in laser diodes and description of air communication systems;

-The contents of this documentation are based on references of laser components of medical equipment and characteristics of electronic equipment in light aviation;"

Components

The **power supply**, is the component that generates the current that is supplies the laser. When working continuously, the sources must offer great stability in the supplied current levels. In the case of pulse sources Additionally, it is necessary that it can supply short pulses, with recovery times. fast start-up and offer low duty cycles.

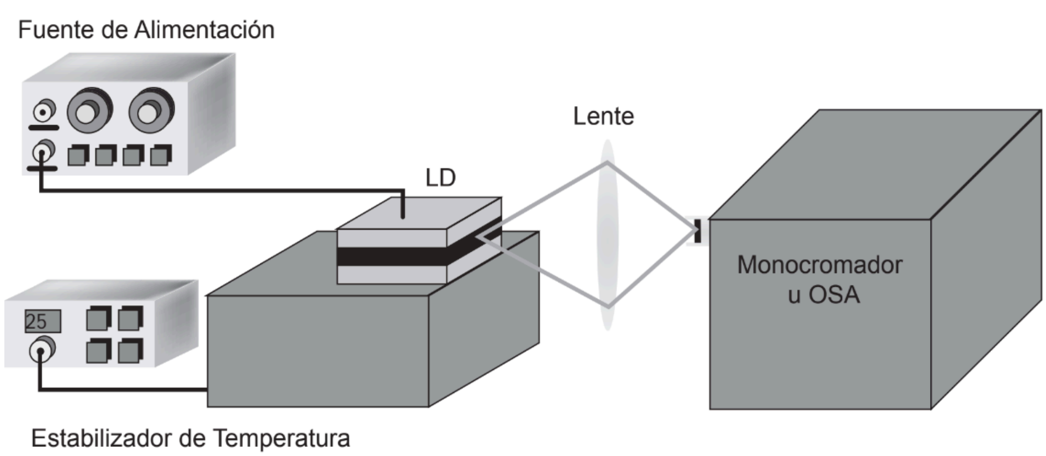
He **temperature stabilizer**, this is a critical part of the experimental setup, since it is what avoids errors introduced by temperature variation environment. They are essential to guarantee the reproducibility of the results.

He **guided** and the selection of the beams, this stage is where the emitted light is collected to be introduced into the measuring device, in this part of the process it is possible to filter the emission spectrum to eliminate emission modes unwanted and improve measures.

The detection of the spectra, in this final stage is where the spectra are obtained ASE, for which an Optical Spectrum Analyzer is usually used.

The main idea would be to take various optical and geometric components along with the measurements or the way to measure the electronic components of the laser diodes to implement them efficiently in air communication systems.

Scheme of the pmain components of laser diodes:



Control circuits in the aircraft (Light aviation)

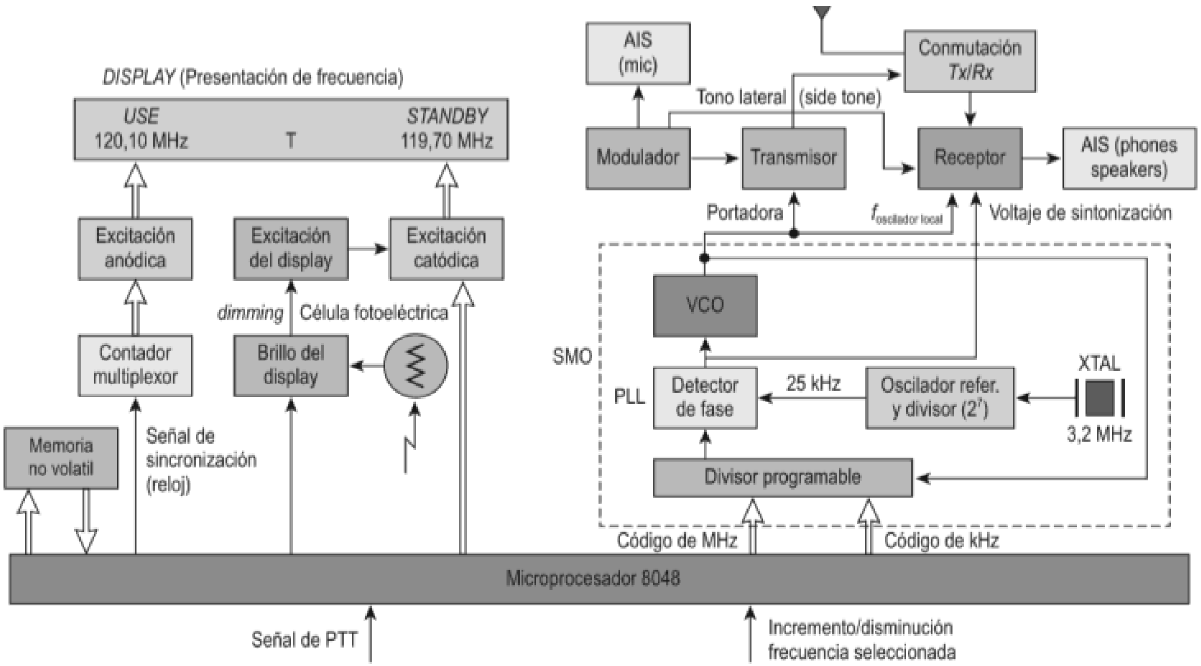


Figura 2.12. Diagrama de bloques del KY196: detalle del circuito de control y del circuito sintetizador (SMO), controlados por microprocesador.

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Laser;
Devices: FW1
Growing technique: MOVPE
Active Layer: 9 nm GaAsP QW
Guıa de onda: AlGaAs
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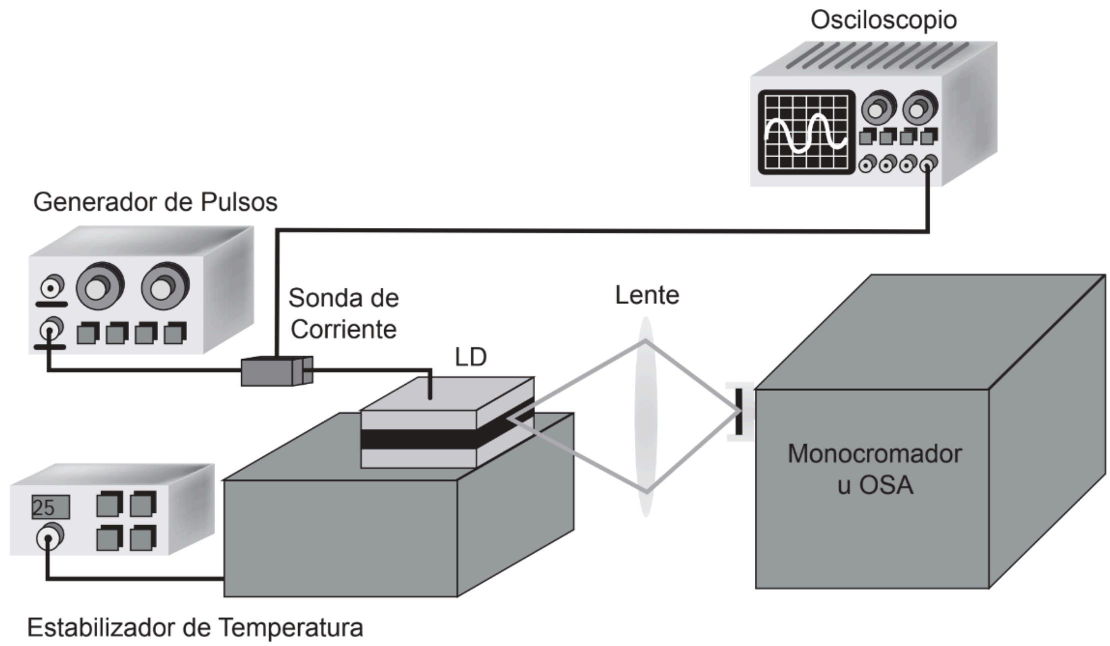
In a signal synthesizer circuit we can describe some properties to implement
Lasers, properties and electronic components:

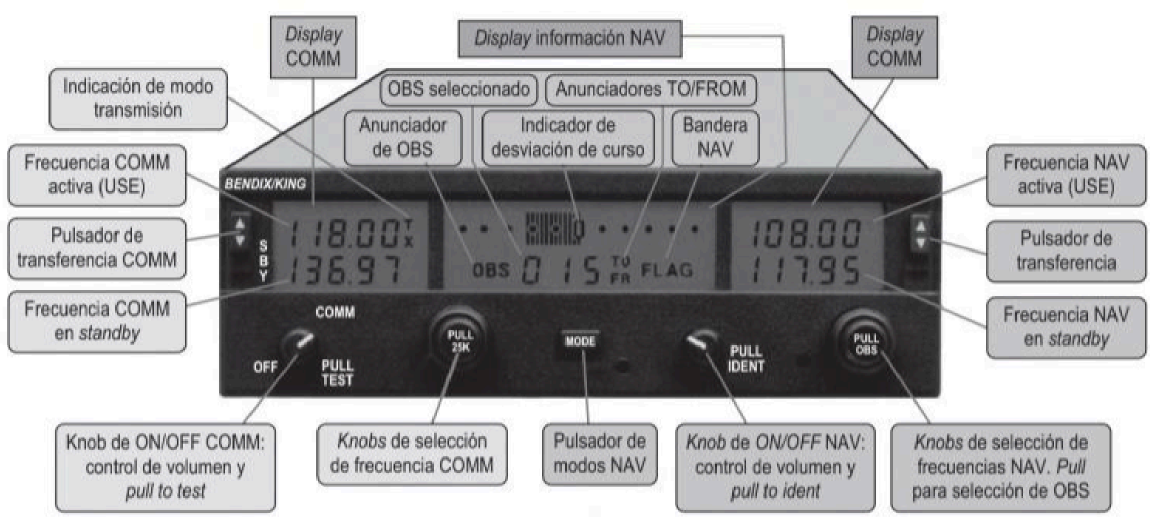
The sources are designed to be coupled to 50 Ω loads. This problem can be solved by using a 47 Ω resistor in series with the laser that allows for correct impedance matching between the source and the resistor-laser assembly. The use of pulsed power supplies also presents the problems of eliminating possible unwanted DC components and measuring the current injected into the laser. The elimination of the DC components is achieved through the use of a set of capacitors and inductances that allows filtering of the DC components. The measurement of the current injected into the laser is obtained by using a current probe (Tektronix CT2) that must be connected to the oscilloscope.

The radiation emitted by the laser diodes has to be selected and, at the same time,
sent to the devices that measure the spectra. The reasons for
The emitted radiation must be selected are mainly the existence of
two main emission modes in the cavities, the TE and TM modes, which must
be characterized independently and, in the case of wide area lasers,

the existence of lateral resonant modes within the cavity. The broadcast also
must be conditioned at the input of the different detection systems, OSA or
monochromator



Electronic system of transmission modes in aircraft together with a pulse generator to improve the efficiency of the aircraft's electronic devices;



Laser characteristics and properties could be combined with radio systems to improve wireless efficiency and signal emission and even incorporate FPGA or quantum FPGA designs described in other documentation associated with these technical ideas.

The TE and TM emission modes can be easily selected by using
of linear polarizing filters. The use of these filters is simple, they simply have to be
place in the beam path and select the appropriate angle for them. The guidance of

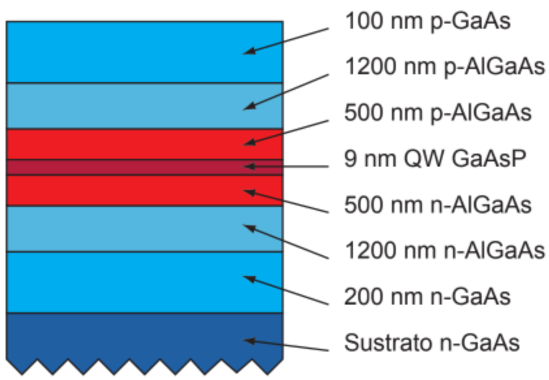
The beams are made by using a minimum of two lenses.
Laser Mounting Features and Properties to Improve Device Efficiencies
In aviation: The following characteristics are defined as a set of optical characteristics of the radiation and wave propagation of a laser that could make up any of the devices on an airplane.

Zone	**Structure**	**L (μm)**	**W (μm)**	**Coating**	**Ith continuous (mA)**	**Ith pulses (mA)**	**η_e continuous (W/A)**	**λ continuous (nm)**	**α_m (cm^{-1})**
FW1	QW Ridge	1000	3	C/C	32.2	29.8	0.690	728	12.0
TW1	QW Broad Area	600	100	C/C	182.0	175.1	—	964	20.1
TW2	QW Ridge	770	3.7	C/AR	41.2	39.1	0.660	960	30.6
WW1	QW Ridge	500	3.7	C/C	9.8	(1)	(1)	972	24.1
WW2	QW Ridge	500	3.7	C/AR	55.2	51.0	0.696	945	47.1
WW3	QW Ridge	500	3.7	AR/AR	113.5	102.5	0.402	883	70.1
WD1	QD Ridge	500	3.7	C/C	25.9	24.2	0.928	950	24.1
WD2	QD Ridge	500	3.7	C/AR	144.1	115.3	0.488	927	47.1
WD3	QD Ridge	500	3.7	C/C	50.8	47.3	1.150	955	24.1
WD4	QD Ridge	500	3.7	C/AR	(2)	127.0	(2)	(2)	47.1

Notes:
(1) The laser was destroyed before being characterized in pulses.
(2) No laser emission has been observed in continuous mode.

The optical output of the laser is focused through the use of an asphalt lens with anti-reflective treatment on an InGaAs detector, whose response time is on the order of nanoseconds. The current generated by the detector is measured on the oscilloscope, using the impedance input (50 Ω) as current/voltage converter.

In wide area lasers the current density can be obtained directly by dividing the injected current by the cavity area of the laser. On the other hand, in the case of easel type lasers this conversion cannot be carried out in this way, since in these devices the existence of of the current spreading phenomenon in the active region. Because Therefore, the results obtained in easel-type lasers are difficult to compare with other lasers in which the dimensions of the cavities are different.



The epitaxial structure of the aluminum-free 980 nm laser devices provides
manufactured by TRT has been designed for high gloss applications

These devices are built using a single 9 nm wide InGaAs QW, an InGaAsP confinement (1.6 eV gap), and an InGaP cladding layer. They have been built with a very wide optical cavity with the intention of reducing the tendency to filamentation, causing a low optical confinement in the vertical direction (which has been estimated at around 1.2%), and then a low perpendicular divergence of the far field, 36.2 ◦ for the width at half height

VHF frequency carriers in light aviation and laser characteristics:

(VHF1, VHF 2, HF2) the crew members give way to the signal, an alert is activated, the switch is switched. The transmitted SELCAL code is defined by two RF pulses of duration (1 +-025) s separated by (0.2 +- 0.1) s. Each pulse contains two tones that modulate a transmission channel carrier by 90%.

F_n = anti log(0,054(n-1) + 2), con n = 12,13, …, 27

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### MATLAB code of laser characteristics:
```matlab
% Define the table data
Zone = {'FW1', 'TW1', 'TW2', 'WW1', 'WW2', 'WW3', 'WD1', 'WD2', 'WD3', 'WD4'};
Structure = {'QW Ridge', 'QW Broad Area', 'QW Ridge', 'QW Ridge', 'QW Ridge',
'QW Ridge', 'QD Ridge', 'QD Ridge', 'QD Ridge', 'QD Ridge'};
L = [1000, 600, 770, 500, 500, 500, 500, 500, 500, 500];
W = [3]
````

The ASE spectra were obtained using two different devices,
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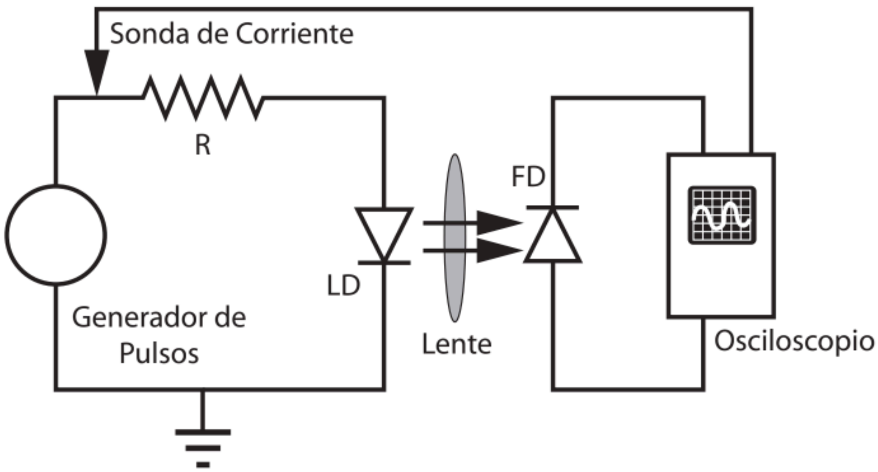
a standard diffraction grating monochromator with a high resolution CCD camera
and an OSA with fiber optic input. Despite having a resolution clearly lower than that of the monochromator with a CCD camera, the OSA has a clear advantage in the
measurements given its greater dynamic range of 80 dB, due to the use of a monochromator
double pass, compared to 40 dB.



The cavity lengths of these samples are 600 µm in one device, 1,000 µm in five, 1,500 µm in four, and 2,000 µm in four others. The gain of this structure as a function of current density, using the fact that the net modal gain for an optical field propagating in a cavity.

Main characteristics of the structure of the supplied QW lasers by TRT.

```
Devices: TW1 and TW2
Technique grown: MOCVD
Active Layer: 9 nm InGaAs QW
Waveguide: InGaAsP index jump
C/dact: 1.3 ×10−3 nm−1
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