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LedPro

The LedPro is the lightsource of the projective alignment in the RasNik alignment system. It has sixteen high efficiency 875nm IR Emitters. These emitters are RadTol AlGaAs types.

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http://www.nikhef.nl/pub/departments/et/experiments/atlas/rasnik/atlas_rasnik/atlas_rasnik.html

Introduction

The basic idea is to create an image of a coded mask on an optical sensor by means of a lens. The mask is lit by an infrared LED. In this set up the relative position in X and Y direction is measured along the line mask, optical center of the lens and the sensor. In addition, the (relative) rotation of the mask or the sensor can be measured. By calculating the actual image spotsize and comparing this with the mask spot size, the position of the lens along the Z-axis is calculated. Also the relative rotation around the X and Y-axis of the mask in respect to the CCD sensor can be calculated.

The system can be split into three major components

1. The optical system:
 - a coded mask
 - a lens
 - an optical sensor
2. The sensor and framegrabber combination (video):

The optical sensor is a commercially available B&W observation camera, without a lens. This can be a CCD type or CMOS.

The framegrabber is a commercially available 8-bit grayvalue type E.G.Data Translation DT3152. The RasMux connects a number of sensors to the framegrabber.
3. The reconstruction software ICARAS.

This paper describes the IR light source (LedPro), which illuminates the diffusor and coded mask of the projective alignment system.

Specifications:

The LedPro circuit has sixteen high efficiency IR emitters arranged in a square to illuminate the diffuser in front of the coded RasNik mask. This square is appr. 16 * 16 mm. The IR emitters are 875nm LED's HP type HSDL-4420 #011 with high intensity. These IR emitters are MDT environment Radiation Tolerant. Typical light intensity (Ie) of these emitters is 17mW/sr at 50mA. The viewing angle is 24 deg.

The LedPro circuit places two times eight IR emitters in series with –in each string- a current limiting resistor of 165 Ohm (8 x 330 Ohm/1206). The LedPro is voltage driven. Nominal input voltage is +24V. The circuit is reverse voltage protected with two anti-parallel diodes. The input connector is a standard unshielded RJ11 type. Shield / 0V static resistance is 10kOhm. On the RasMux each output driver has two RJ11 outputs. If a LedPro is connected, only one output should be used.

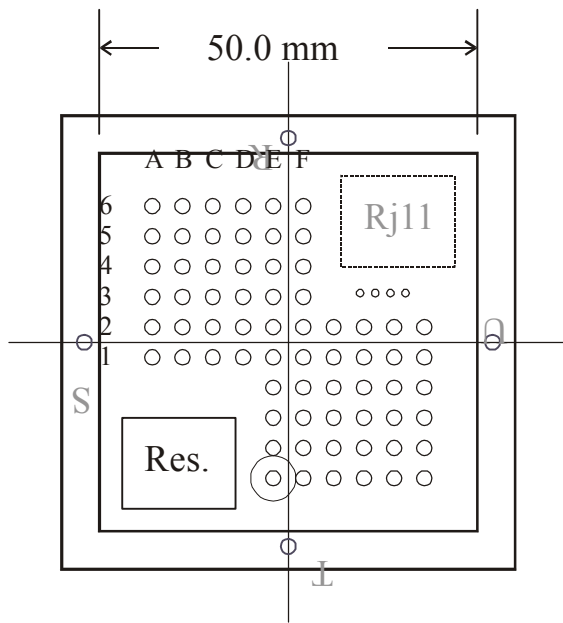
The emitter consists out of two boards: LedPro, containing the LEDES only, and LedBase, containing the rest of the components. Appr. 50% of the RasLeD power dissipation is in the IR emitters. Care has been taken to conduct the heat of the LEDs to the LedBase board as much as possible. LedPro can be moved and fixed in steps of 4 mm across LedBase. In this way, slightly more than one quadrant of the 50 * 50 mm space can be covered. The other quadrants are covered by rotating the whole assembly.

LedPro connections (RJ11 connector)		
PIN	Function	Standard Cable Color
1	0 V	Yellow
2	+24 V	Green
3	0 V	Red
4	0 V	Black

Warning: The RJ11 connector is a commonly used type for telephone extension lines. Do NOT plug the RasLed into a telephone extension socket. These outlets can have line voltages of up to 48V !

LedPro current and power dissipation		
Input voltage	Input current	Power
+24 V	151.8 mA	3.65 W
+23	139.6	3.21
+22	127.5	2.81
+21	115.5	2.43
+20	103.3	2.07

Mechanical drawing

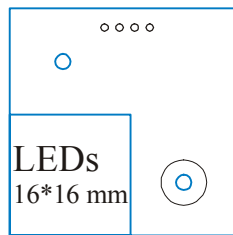


38110.10.01 (BasePro)
60*60 mm

mounting holes M3 special,
2.8 mm pitch 55*55 mm.

Position holes 3.2 mm,
pitch 4*4 mm.

RJ11: 90 °.
RJ11, LED on back.



38110.10.02 (LedPro)
30*30 mm (-0.2 mm)

position holes 3.0 mm

Led (2*8) pitch 4*4 mm

LedPro assembly, as seen from the diffuser:

