Technical Information Manual

Revision n. 3
20 October 2010

CAEN will repair or replace any product within the guarantee period if the Guarantor declares that the product is defective due to workmanship or materials and has not been caused by mishandling, negligence on behalf of the User, accident or any abnormal conditions or operations.

CAEN declines all responsibility for damages or injuries caused by an improper use of the Modules due to negligence on behalf of the User. It is strongly recommended to read thoroughly the CAEN User's Manual before any kind of operation.

CAEN reserves the right to change partially or entirely the contents of this Manual at any time and without giving any notice.

Disposal of the Product

The product must never be dumped in the Municipal Waste. Please check your local regulations for disposal of electronics products.

MADE IN ITALY : We stress the fact that all the boards are made in Italy because in this globalized world, where getting the lowest possible price for products sometimes translates into poor pay and working conditions for the people who make them, at least you know that who made your board was reasonably paid and worked in a safe environment. (this obviously applies only to the boards marked "MADE IN ITALY", we can not attest to the manufacturing process of "third party" boards).

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. General description

1.1 Overview

The Model N914 is a 8 channel charge preamplifier and integrator, implemented in a single-width NIM module.
It is designed to process signals generated by Photomultipliers.

The module is provided with LEMO 00 connectors for both input and output signals, except the T# output which is provided through a 16 pin flat cable connector.

The Photomultiplier signal at the input is buffered and processed in several ways:
- The OL# output provides the signal processed by a gateless charge preamplifier and integrator
- The OH# output provides the signal processed by a gateless charge preamplifier and integrator, followed by a 10x gain stage
- The OLSUM output provides the analog sum of the OL# outputs
- The OHSUM output provides the analog sum of the OH# outputs
- The ASUM output provides the analog sum of the CH# inputs
- The MALU output provides a step function (Majority) with a height proportional to the number of channels simultaneously over a threshold settable individually or globally.
- The T_OUT# output provides a discriminator output converted into a digital signal to be sent to a TDC for arrival times recording
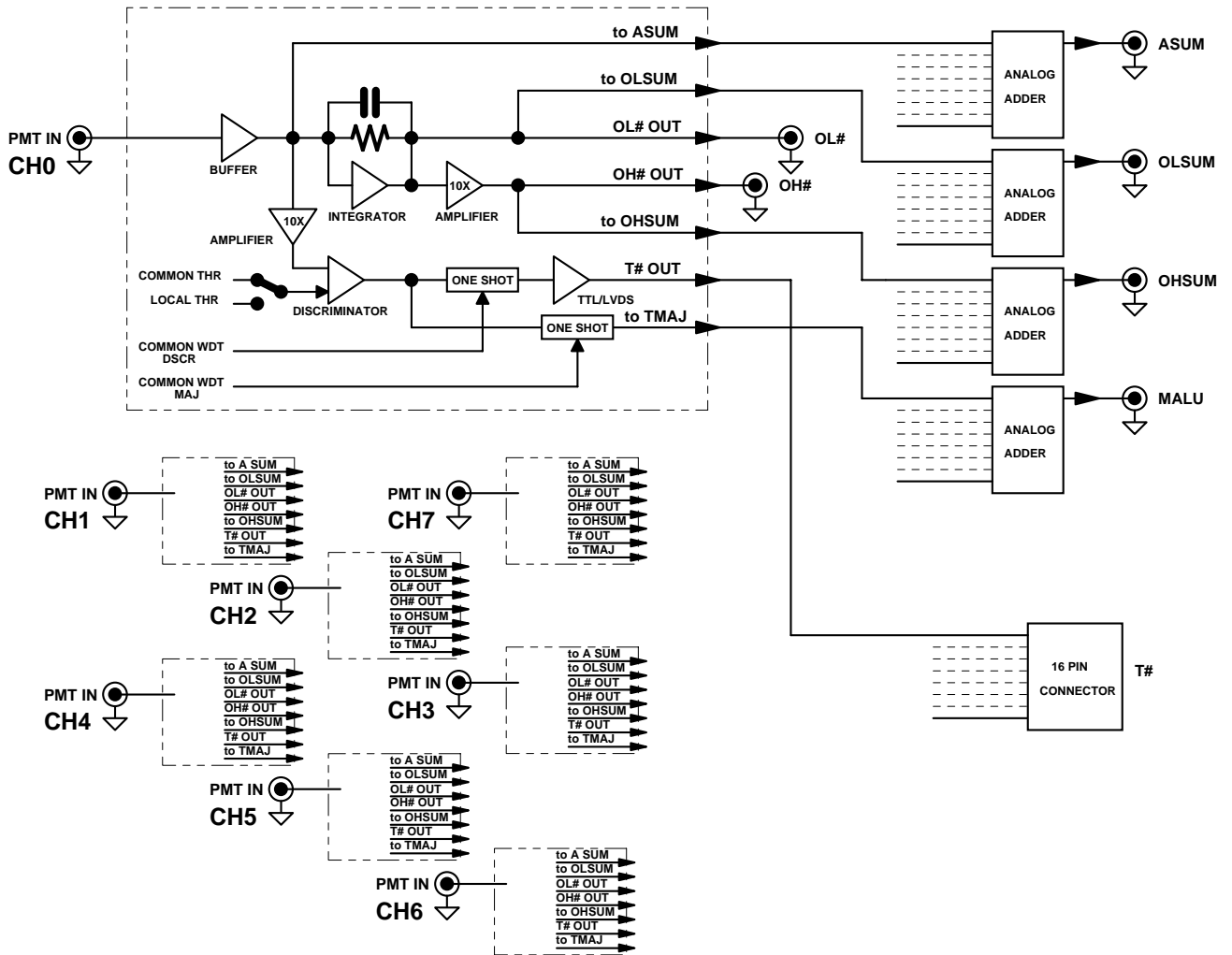
Fig. 1.1 shows a block diagram of the module.

Fig. 1.1: Mod. N914 block diagram

2. Technical specifications

2.1 Packaging

The Model N914 is housed in a single width NIM module.

2.2 Power requirements

Table 2.1: Power requirements

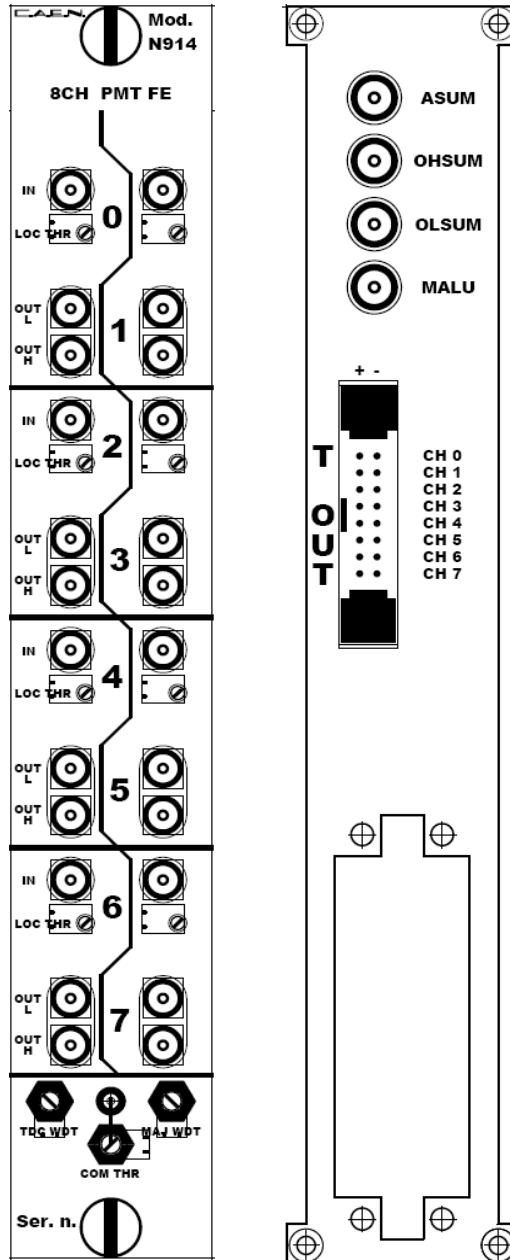| +24 V	110 mA
+12 V	60 mA
+6 V	1.45 A.
-6 V	900 mA

2.3   Front panel

Fig. 2.1: Mod. N914 front and rear panel

2.4 Input/Output connections

IN#:
Mechanical specifications:
LEMO 00 type connectors
Electrical specifications:
Accepts negative charge pulses from PMT detectors. Impedance 25 Ohm.

OUTL#:
Mechanical specifications:
LEMO 00 type connectors
Electrical specifications:
Integrator output with -0.83 mV/pC sensitivity. Impedance: 50 Ohm, dynamics -2.1 V.

OUTH#:
Mechanical specifications:
LEMO 00 type connectors
Electrical specifications:
Integrator output with -8.3 mV/pC sensitivity. Impedance: 50 Ohm, dynamics -1.7 V.

ASUM:
Mechanical specifications:
LEMO 00 type connectors
Electrical specifications:
Provides the analog sum of the CH# inputs; Impedance: 50 Ohm, dynamics -1.7 V.

OLSUM:
Mechanical specifications:
LEMO 00 type connectors
Electrical specifications:
Provides the analog sum of the OL# outputs; Impedance: 50 Ohm, dynamics -1.7 V.

OHSUM:
Mechanical specifications:
LEMO 00 type connectors
Electrical specifications:
Provides the analog sum of the OL# outputs; Impedance: 50 Ohm, dynamics -1.7 V.

MALU:
Mechanical specifications:
LEMO 00 type connectors
Electrical specifications:
PMT signal on each channel input is passed to a 10x gain stage and then a discriminator (with settable threshold), whose output is passed to a one-shot device, which converts it into a digital signal of tunable length. The resulting pulses are summed and then delivered by the MALU output, which therefore provides a step function (Majority) with a height proportional to the number of channels simultaneously over threshold; step amplitude: 40 mV / Ch. Impedance: 50 Ohm, dynamics +4 V.

T_OUT#:
Mechanical specifications:
8+8-pin, 3M 3408-5202 Header-type connector
Electrical specifications:
PMT signal on each channel input is passed to a 10x gain stage and then a discriminator (settable threshold), whose output is passed to a one-shot device, which converts it into a digital signal of tunable length. This signal will be sent to a TDC for arrival times detection. LVDS standard

2.5   Front panel trimmers

LOC THR: Each input channel is provided with a screwdriver trimmer for setting the LOCAL discriminator threshold for the production of MALU and T_OUT# signals; such threshold can be set in a -1.5 mV ÷ -60 mV range.

COM THR: On the lower section of the front panel, a screwdriver trimmer and test point allows setting the COMMON discriminator threshold for the production of MALU and T_OUT# signals; actual threshold is 1% of test point value. Internal jumpers (see § 2.6) allows to select between Local and Common threshold. The relevant test point provides a -150 mV ÷ -3000 mV output, corresponding to a -1.5 mV ÷ -30 mV set threshold.

TDC WDT: This trimmer allows to set the T_OUT# width (250ns÷5µs range)

MAJ WDT: This trimmer allows to set the duration of the majority steps (250ns÷5µs range).

2.6   Internal jumpers

Eight internal jumpers (J8, J16, J24 and J32: they are four on each printed board) allow to select whether to use the Local (INT) or Common (EXT) threshold setting (via front panel trimmers). Each jumper handles one channel (Printed board left: J8: CH0, J16: CH2, J24: CH4, J32: CH6; Printed board right: J8: CH1, J16: CH3, J24: CH5, J32: CH7). Refer to Fig 2.2 for the jumpers' location.
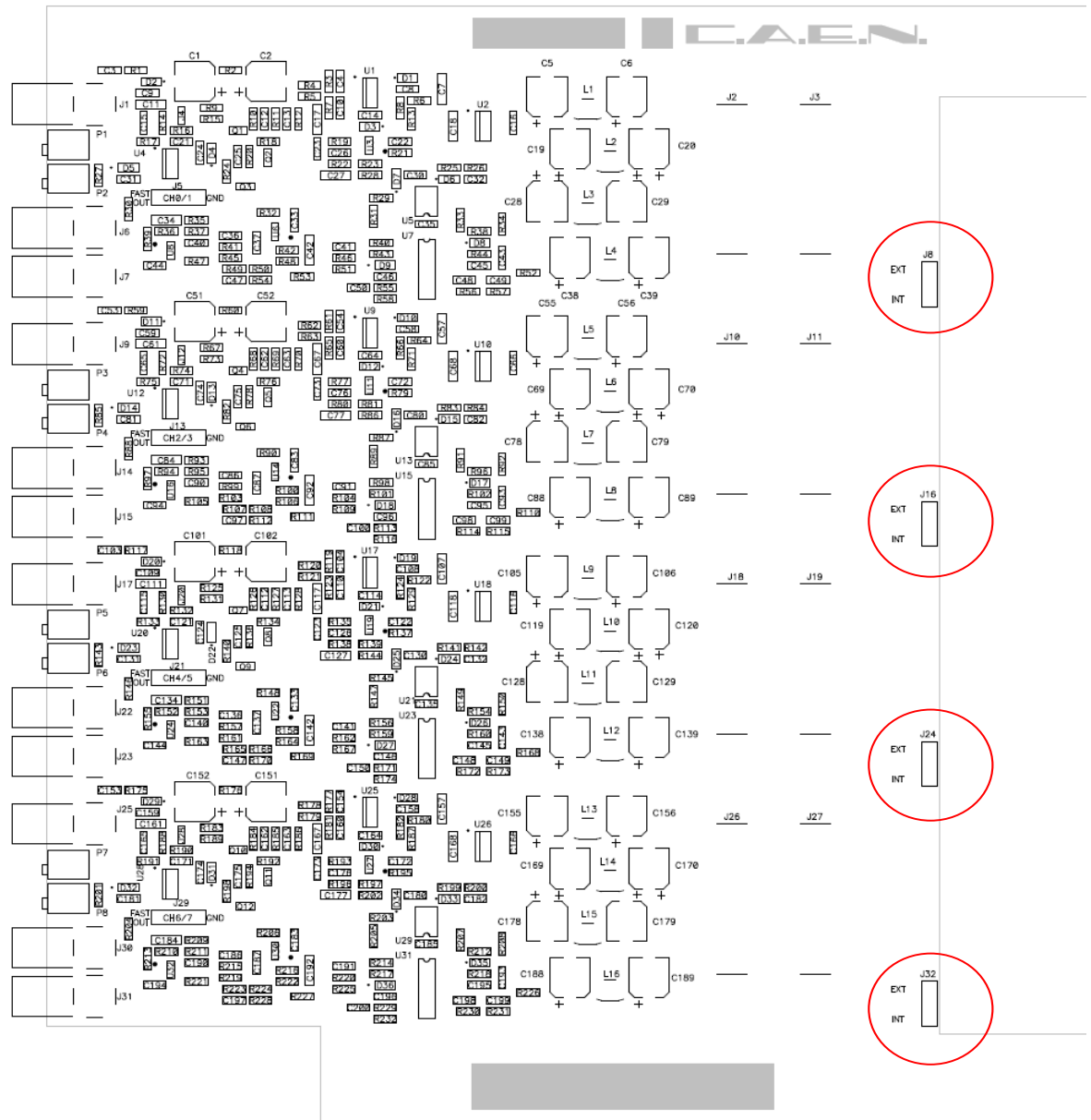
Fig. 2.2: Internal jumpers location[1]

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[1] N914 has two identical printed board inside

2.7   Technical specification table

Table 2.2: Mod. N914 Technical Features

Packaging	One unit wide NIM unit
Input sensitivity	OUTL#: 0.83 mV/pC OUTH#: 8.3 mV/pC
T# width	250ns÷5µs
MALU width	250ns÷5µs
MALU step amplitude	40 mV/channel
Integrator time constant	1.2 nF // 100 kOhm
ASUM out bandwidth	150 MHz
Discriminator Sensitivity	1.5 mV