

PMA CONTROLLER

PHOTONIC MULTICHANNEL

SPECTRAL ANALYZER

C5967

INSTRUCTION MANUAL

HAMAMATSU

1799401

Features

Compact controller can drive the multi-channel photodetector head.

- **Compact design**

High performance is packed in a small case.

- **Simultaneous Measurement of Different Wavelength**

Employment of self-scanned image sensor enables simultaneous measurement of different wavelengths without scanning the spectrograph. This allows high-speed measurement of the spectrum of light.

- **Selectable Multichannel Photodetector**

Various types of image sensors can be used as the photodetector. A photodetector combining a linear image sensor and I.I. (Image intensifier) is also available. Selecting a photodetector according to the wavelength and intensity of the light to be measured allows the system to be used in a wide range of applications.

- **Easy to Operate**

The photodetector and spectrograph can be controlled easily by a data analysis system based on a personal computer.

- **Measurements can be synchronized to an External Trigger**

Spectrum measurements can be synchronized to an external trigger signal so that even pulse phenomena can be measured.

- **Standard SCSI* interface allows connection to any computer.**

The PMA-50 connects to any NEC PC98 Series, Macintosh, IBM PC, or compatible personal computer.

**SCSI (Small Computer System Interface)*

SCSI is an 8-bit wide data bus interface standardized by ANSI.

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General

The C5967 can drive a MOS linear image sensor head , CCD multichannel photodetector head and InGaAs multichannel photodetector head individually. It converts the signal from the sensor to a digital output , which is then sent to a personal computer via the SCSI interface.

When used with a MOS liner image sensor with built-in image intensifier (C4560-C4565), the C5967 can control the gain of the intensifier. Various measuring parameters can be controlled by data analysis software available for the C5967.

Standard configuration

Component

C5967	.....	1piece
MOS adapter	.....	1pieces
Fuse (2.5A)	.....	2pieces
Power cable	.....	1piece
Manual	.....	1piece

Installation

1. Power requirement

The power supply voltage of the C5967 is AC100V to AC240V (50/60Hz).

2. Fuses

Inspect the fuse before plugging the power cord of the instrument into an outlet. The fuse is located in the fuse box (in the LINE) on controller rear panel. The fuse is rated at 1A. When replacing the fuse, use only fuse of the same ratings as those provided.

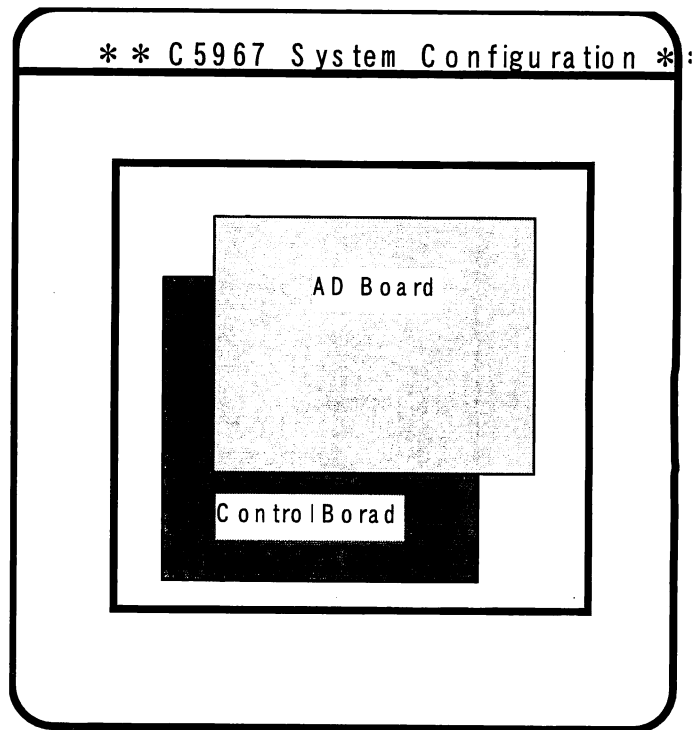
[Caution]

Using a fuse of a different rating or bypassing the fuse is dangerous and not recommended.

3. Ground

Connect the power cord plug to a 3-prong power outlet. When using a 2-prong power outlet, use the 3P-2P adaptor.

System configuration

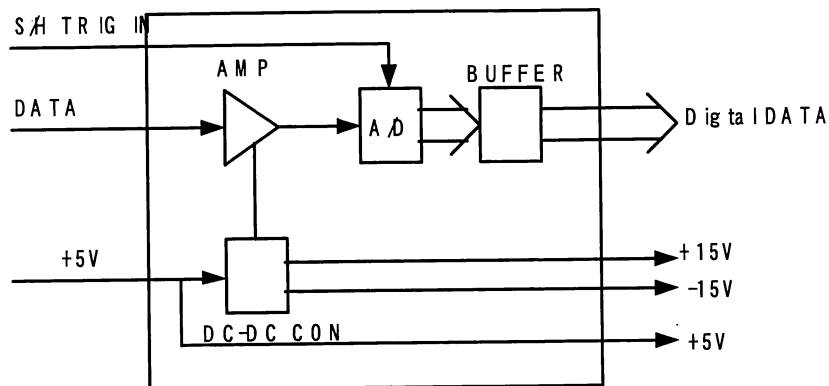


- 1) **A/D board**
Differential input A/D board. 16-bit board are available.
- 2) **Control board**
Drives the various line sensors.
This board also has an SCSI interface for communicating with a personal computer.

System configuration

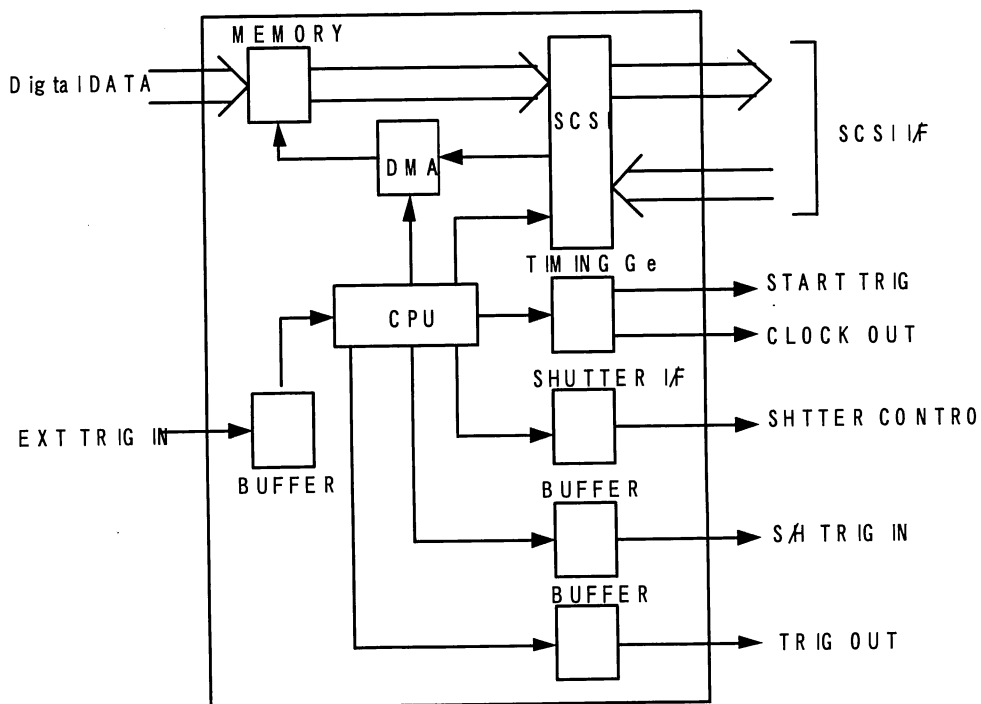
A/D board

A/D board block diagram

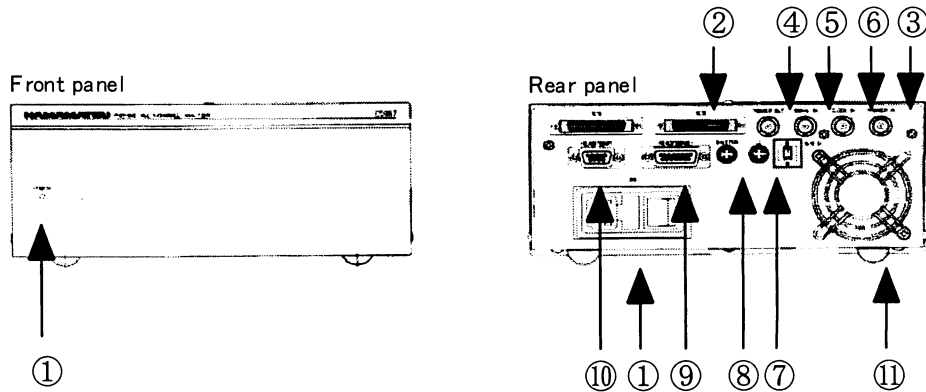


Control board

Control board functional block diagram



Nomenclature



Front panel

① POWER LED Indicates the PMA-50 power.

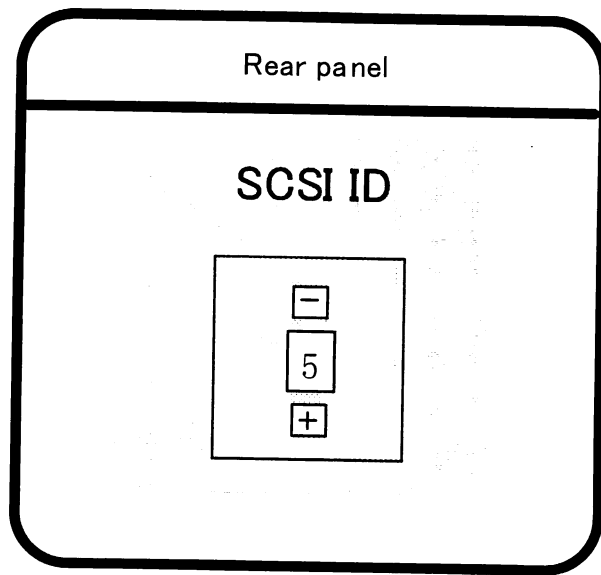
Rear panel

- ① LINE Power input connector.
- ② SCSI SCSI interface for communicating with an external personal computer.
- ③ TRIG.IN Inputs the external trigger signal during external synchronization measurement. (TTL/High impedance).
- ④ TRIG.OUT Outputs the signal (END of SCAN) at the end of sensor reading. (TTL/High impedance)
- ⑤ SIGNAL IN Inputs the Analog data signal. (High impedance) : "option"
- ⑥ CLOCK IN Inputs the external clock signal during external synchronization A/D converter. (TTL/High impedance). "option"
- ⑦ I.I. Image Intensifier control signal connector.
- ⑧ SHUTTER Exclusive shutter control signal connector.
- ⑨ HEAD (SIGNAL) Linear Image Sensor control signal connector.
- ⑩ HEAD (TEMP) Temperature control signal connector for Linear Image Sensor.
- ⑪ FAN Forced air cooling fan.

Nomenclature

Side panel

- ① SCSI ID No. setting DIP SW
Set to ID5 at the factory.
When changing the setting, push the switch " + " or " - ", viewed from the rear panel.

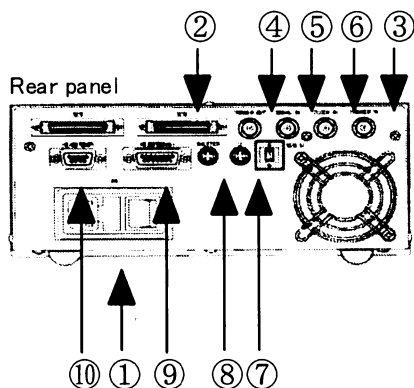


A note on termination should be included.

Connection

The following describes the system connections.

1. Cable Connection



- ① LINE Connect power cable provided.
- ② SCSI SCSI interface for communicating with an external personal computer.
- ③ TRIG.IN When triggering an external device from the PMA-50 , connect the PMA-50 "TRIG.IN" connector to the external trigger pulse output terminal.
- ④ TRIG.OUT When triggering an external device from PMA-50 , connect the PMA-50 "TRIG.OUT" connector to the external trigger pulse input terminal.
- ⑤ SIGNAL IN Inputs the Analog signal connector.
(High impedance) : "option"
- ⑥ CLOCK IN Inputs the external clock signal during external synchronization A/D converter. (TTL/High impedance). "option"
- ⑦ I.I. In case that the Image Intensifier head used, with PMA - 50 " I.I. " and II HEAD connect .
- ⑧ SHUTTER Connect the PMA-50 "SHUTTER" connector to the Fiber converging optics (A5761) "SHUTTER" connector.
- ⑨ HEAD (SIGNAL) Connect the PMA-50 " HEAD(SIGNAL)" connect to Linear image sensor head.
- ⑩ HEAD (TEMP) Connect the PMA-50 " HEAD(TEMP)" connect to second Linear image sensor head.

Operation

After making all the connections, turn on the system power.

1) Turning on the power

When the front panel "POWER" switch is set to the "I" position, the power is turned on. When the power is turned on, the "POWER" switch LED lights.

Age allow the system to warm up for 20 to 30 minutes after turning on the power before beginning measurements. If you begin measurements as soon as the power is turned on, the signal offset may change and normal measurement may not be possible.

After turning on the system power, turn on the personal computer power and start the special software supplied and begin making measurements.

Refer to the basic software instruction manual for a description of how to set up the personal computer and install the software.

2) Measurement

This system is designed so that the light can be easily input into the spectrograph through an optical fiber probe.

Spectral measurements are easily made by simply pointing the optical fiber probe toward the unknown light and clicking the program data measurement button.

Note: The optical fiber probe must be installed to various optical systems, depending on the measurement application.

The exposure time, number of integrations, etc. must also be set according to the strength of the unknown light. Refer to the basic software instruction manual for a description of the setting method.

Operation

A. Internal synchronization measurement

When measuring the spectral of a steady light with this system, use internal synchronization measurement.

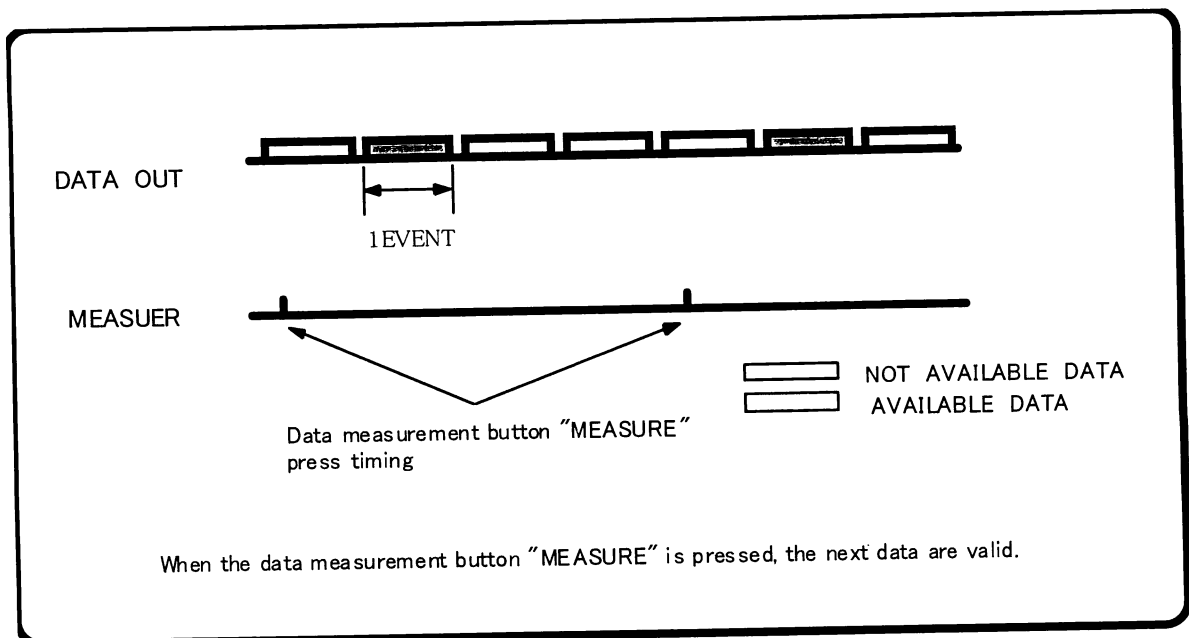
Method:

1) Operation

Set Trigger MODE to Internal and the number of measurements at Number of Cycle from the PMA software.

Next measure the data using the data measurement function.

2) Timing chart



Operation

B. External synchronization measurement

When measuring the spectral range of a flash lamp, laser, and other pulsed light with this system, use the external synchronization measurement mode.

Method:

1) Connections

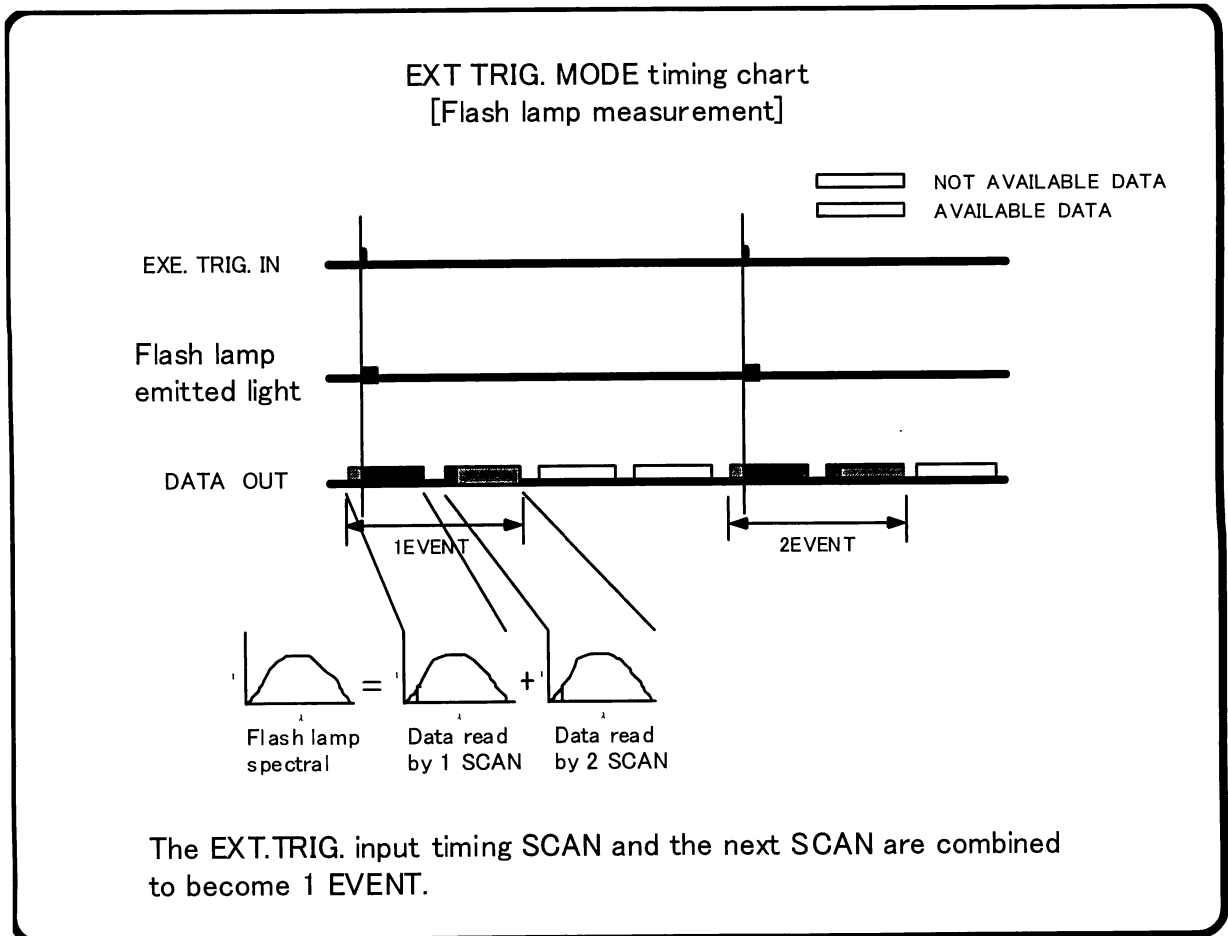
Input the trigger signal to the EXT.TRIG.IN terminal at TTL/High impedance using a BNC-BNC cable.

2) Operation

Set Trigger MODE to External and the number of measurements at Number of Cycle from the PMA software.

Next measure the data using the data measurement function.

3) Timing chart



Operation

C. External synchronization measurement -2-

When measuring the spectral range of a flash lamp, laser, and other pulsed light with this system, use the external synchronization measurement mode. At external trigger signal during blanking time.

Method:

1) Connections

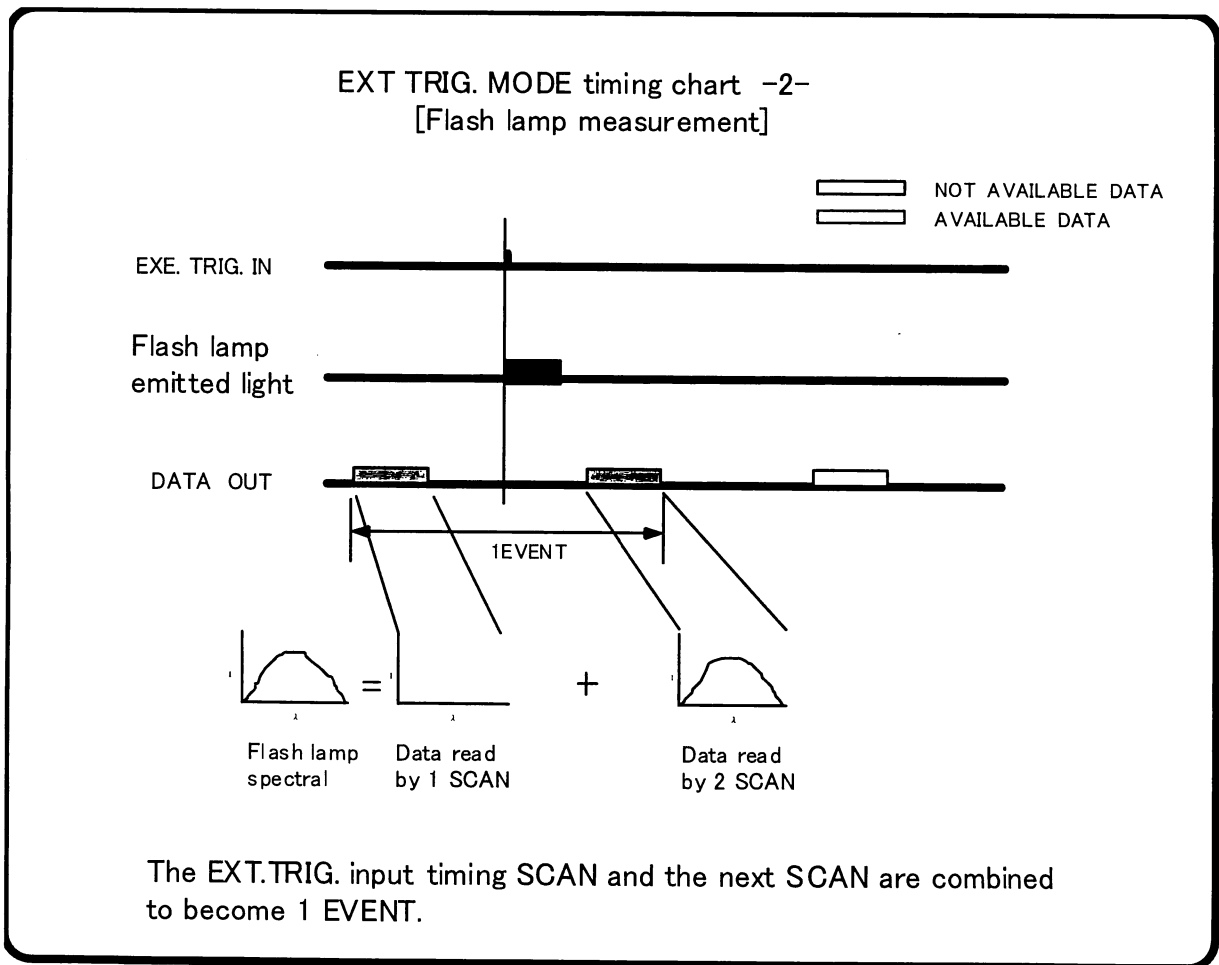
Input the trigger signal to the EXT.TRIG.IN terminal at TTL/High impedance using a BNC-BNC cable.

2) Operation

Set Trigger MODE to External and the number of measurements at Number of Cycle from the PMA software.

Next measure the data using the data measurement function.

3) Timing chart



Operation

D. External start measurement

When the repetition frequency when measuring the spectral of a flash lamp, laser, and other pulsed light with this system is fast (MAX: 50Hz), use the external start measurement mode.

Method:

1) Connections

Input the trigger signal at the EXT.TRIG.IN terminal at TTL/High impedance using a BNC-BNC cable.

2) Convergence

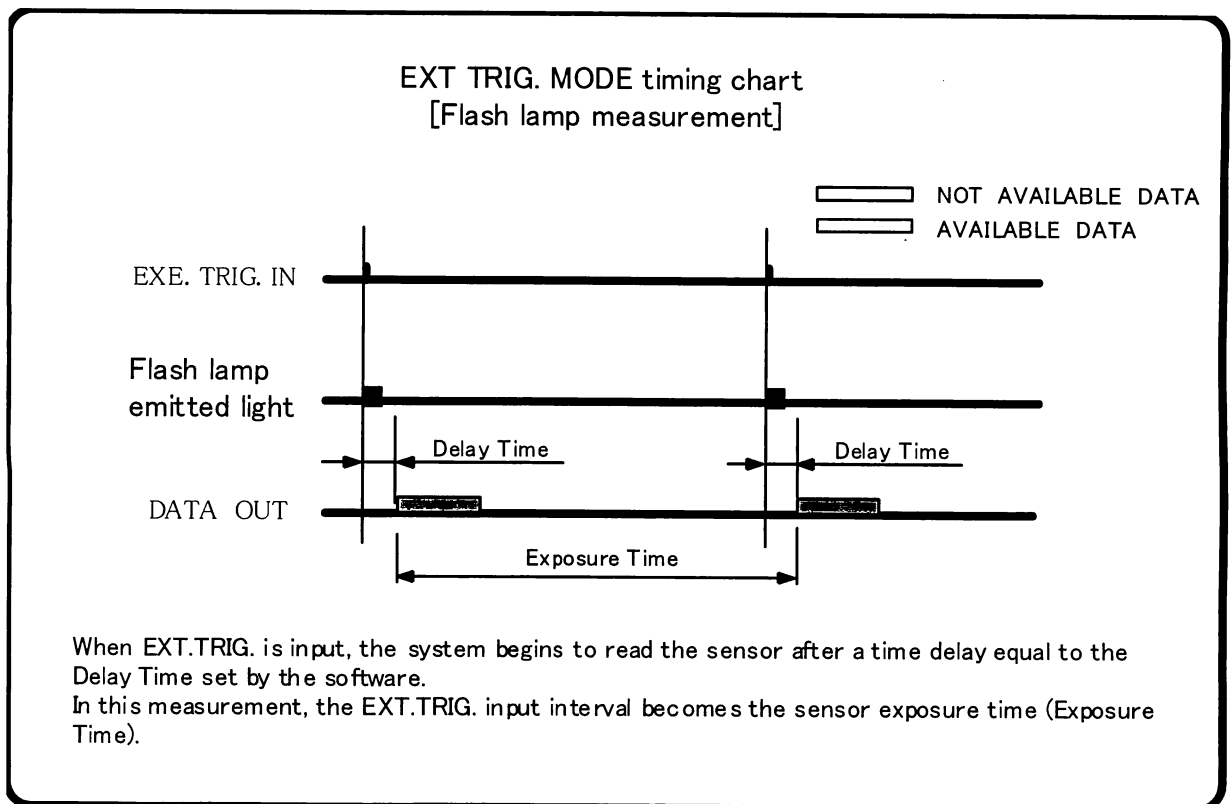
Converge the unknown light at the optical fiber probe.

3) Operation

Set Trigger MODE to Start and the number of measurements at Number of Cycle from the PMA software.

Next measure the data using the data measurement function.

4) Timing chart



Operation

E. Measuring pulsed light by internal synchronization

This system outputs a line sensor read end signal (END OF SCAN) from the "EXT.TRIG.OUT" connector for measuring the spectral of a laser or other pulsed light synchronized to the built-in line sensor read cycle. Consequently, if pulsed light is emitted by inputting the EXT.TRIG.OUT signal into an external device, pulsed light spectral measurements are carried out by the internal trigger of this system.

Method:

1) Connections

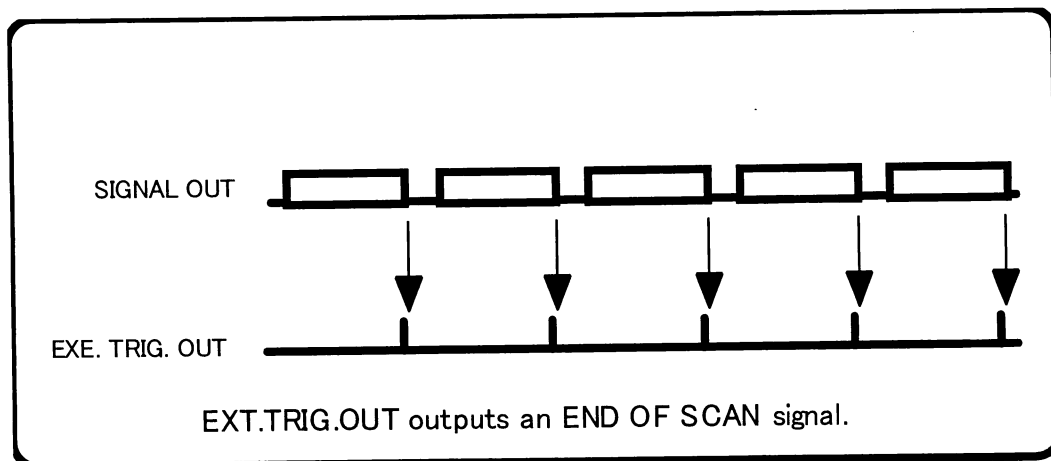
Output the trigger signal from the EXT.TRIG.OUT connector to the external trigger input device at TTL/High impedance using a BNC-BNC cable.

2) Operation

Set Trigger MODE to Internal and the number of measurements at Number of Cycle from the PMA software.

Next measure the data using the data measurement function.

3) Timing chart



Specifications

A/D converter

This is a differential input type high-speed A/D converter. It amplifies and A/D converts the signal input from various line sensors.

A/D conversion	16bit
Conversion speed	10us/ch
Input range	0 - 10V
Input format	Differential input
Nonlinear type linearity	0.1%FS
A/D conversion signal	External input

Controller

The controller is made up of various line sensor drive circuits, data storage memory, and computer interface (SCSI interface).

Line sensor storage time setting, data transfer, etc. can be easily performed by issuing commands from an external computer over the SCSI interface.

Clock	20MHZ
Memory	4MB (1024ch x 2048)
Interface	SCSI interface

Functions

Data transfer	Transfers the data stored in memory to the computer.
Exposure time setting	Set between 19msecs and 32secs
Trigger mode setting	Selects internal trigger or external trigger
Trigger polarity setting	Selects the trigger polarity in the external synchronization mode
Shutter open/close	Opens and closes the shutter built into the spectrograph
AMP GAIN setting	Sets the data amp gain to X1, X2, or X5.
Pixel Clock setting	Sensor drive speed setting

Specifications

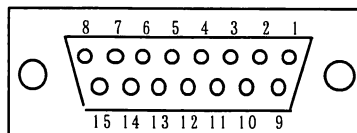
System specifications

Interface	SCSI interface
External trigger input	TTL level/High impedance
External trigger output	TTL level/High impedance
Power requirement	AC/100/117/220/240V \pm 10%, 50 - 60Hz
Operating temperature range	0°C +35°C
Dimensions	232mm (W) x 99mm (H) x 333mm (D)
Weight	Approx 4.5kg

Linear Image Sensor Control Signal Connector

HEAD (SIGNAL)

PIN No.	Signal	Description
1	-	-
2	VIDEO DATA	Video output
3	+15V	Power Supply for Analog circuit
4	-15V	Power Supply for Analog circuit
5	+5V	Power Supply for Digital circuit
6	START	Scan Start signal output
7	CLOCK	Clock signal output
8	/EOS	End of scan signal input
9	A GND	Ground for analog circuit
10	A GND	Ground for analog circuit
11	+24V	Power Supply for Analog circuit
12	D GND	Ground for digital circuit
13	D GND	Ground for digital circuit
14	D GND	Ground for digital circuit
15	TRIGGER	A/D trigger signal input



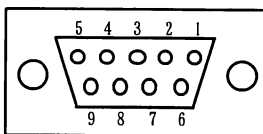
D - sub Connector 15pin

Specifications

Linear Image Sensor Control Signal Connector

HEAD (TEMP)

Pin No.	Signal	Description
1	5V/6V OUT	Power supply for digital circuit
2	TE SIGNAL	Temperature signal input
3	TE ON/OFF	Temperature control signal output
4	5V/6V OUT	Power supply for peltier
5	12V OUT	Power supply for the fan
6	D. GND	Ground for digital circuit
7	D. GND	Ground for digital circuit
8	P. GND	Return for power supply for peltier
9	F. GND	Return for power supply for fan



D - sub Connector 9pin

Image Intensifier Control Signal Connector

I.I.

Pin No.	Signal	Description
1	+15V	Power
2	GND	Ground for Power
3	GND	Ground for II GAIN
4	II GAIN	Input Voltage for Gain Program
5	-	-
6	-	-

SHUTTER Control Signal Connector

SHUTTER

Pin No.	Signal
1	SHUTTER1
2	SHUTTER2
3	SHUTTER3
4	SHUTTER4

Appendix

Outline Dimensions (mm)

Instrument

