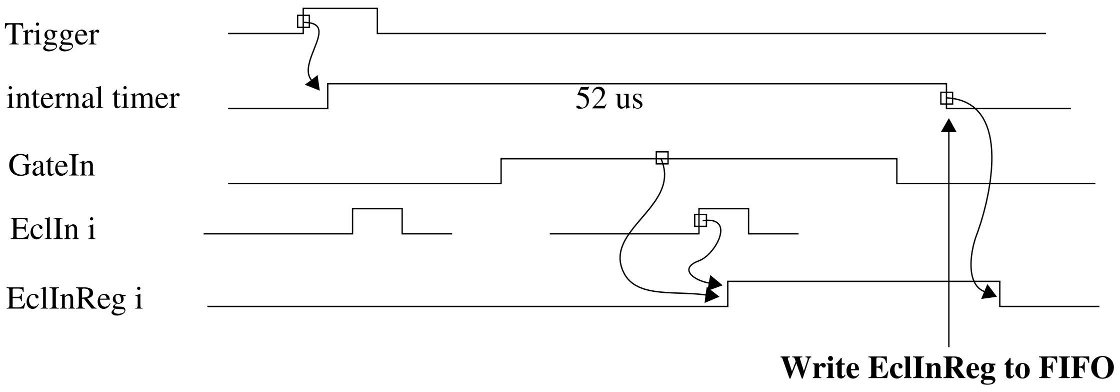
GPS Interface & Timing Board

ECL-Input Logic:

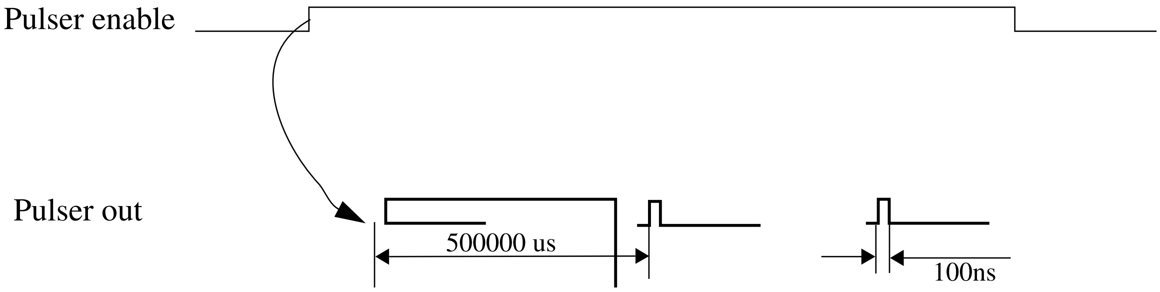


Calibration Output:

Differential ECL signals, activated when writing to address: ***Base + 4***.
Pulse width programmable from 100ns to 22,5 us setting the CalOut Divider bits.

Pulser Output:

Differential ECL signal, 100ns pulse width.
Period: 500000 us (2 Hz)
Jitter better than +- 5 ns if 10 MHz from GPS is used



LED Signals:

R1-LED: on when Calibration Pulse sent
R2-LED: currently not used

ECL Control (X6):

Pin	Signal	Pin	Signal
1	PulsOut+	2	PulsOut-
3	CalOut+	4	CalOut-
5	GateIn+	6	GateIn-
7	nc	8	nc
9	GND	10	GND

CAN-Connector (X4):

Pin	Function	Comment
1	nc	
2	CAN_L	
3	GND	
4	nc	
5	nc	
6	GND	
7	CAN_H	
8	nc	
9	+12V	option

LEMO-Connector (X1):

Pin	Signal	Comment
1	TRIGIN	NIM-Input; >= 10 ns

LEMO-Connector (X2):

Pin	Signal	Comment
1	PPS1	TTL-Input; >= 110ns

LEMO-Connector (X3):

Pin	Signal	Comment
1	Mhz10In	Sin-Input

PROGM-Connector (J7):

Pin	Function	Comment
1	VCC	
2	SDO	
3	SDI	
4	ISPEN/	
5	nc	
6	MODE	
7	GND	
8	SCLK	

ECL-Iinput/Output X7):

Pin	Signal	Pin	Signal
1	EclOut1+	2	EclOut1-
3	EclOut2+	4	EclOut2-
5	EclOut3+	6	EclOut3-
7	EclOut4+	8	EclOut4-
9		10	
11		12	
13		14	
15		16	
17	EclIn1+	18	EclIn1-
19	EclIn2+	20	EclIn2-
21	EclIn3+	22	EclIn3-
23	EclIn4+	24	EclIn4-
25	EclIn5+	26	EclIn5-
27	EclIn6+	28	EclIn6-
29	EclIn7+	30	EclIn7-
31	EclIn8+	32	EclIn8-
33	GND	34	GND

Format of GPS time word #2:

Bit:	23 ... 20	19 ... 16	15 ... 08	07 ... 00
	Status	TQC	Year	Second's Count (high order 8 bit)

where: TQC - TrueTime Quality Character as received via the SIO input from the GPS.
The order of quality is:
0 (best), E, A, 3 and F (worst).

Status - GPS Clock Status:

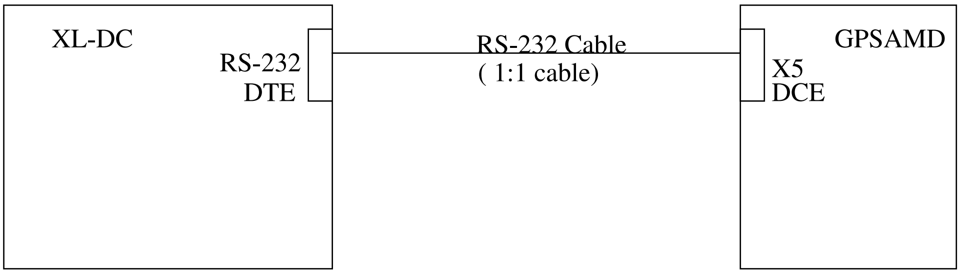
Bit 1 (LSB)	1PPS Bit: is high if 1PPS signal has been present
Bit 2	10MHz: is high if 10 MHz has been stable
Bit 3	COM Bit: is high if SIO input has been valid and incrementing
Bit 4 (MSB)	TIME Bit: is SIO input has matched internal time

Note: GPSOK-led is on if status = 'F'

For details see: **GRS2: GPS Repeater/Scaler**

GPS - Interface

GPS Connection to GPSAMD:



Pin-Assignments

RS-232 Connector (X5):

Pin	Signal	Comment
1	nc	
2	Tx Data	
3	Rx Data	
4	nc	
5	GND	
6	nc	
7	nc	
8	nc	
9	nc	

Base + 0x4: **Output Calibration Pulse**, write only

Bit	Write Function	Read Function	Note
0	Send Calibration Pulse	FIFO not empty flag	1)
1	Send Calibration Pulse	FIFO full flag	1)

Base + 0x8: **ECL output register**, write only

Bit	Write Function	Read Function	Note
7 ... 0	ECL output register	-	-

Base + 0xC: **Load LED Driver Register**, write only

Bit	Write Function	Read Function	Note
7 ... 0	LED Driver Register	-	-

1) Bit 0 = 0 ---> FIFO empty
Bit 0 = 1 ---> FIFO **not** empty
Bit 1 = 0 ---> FIFO **not** full
Bit 1 = 1 ---> FIFO full

Base + 0x10: **FIFO Data out**.

Port is read only! A write to that address will cause a bus error!

Event Data Block Structure in FIFO:

Word #	Bit	Content	Note
1	23 ... 00	10 MHz Frequency Count	
2	23 ... 00	GPS time telegram #1	
3	23 ... 00	GPS time telegram #2	
4	23 ... 16, 15 ... 00	ECL input lines (8 bit), Event Counter (16 Bit)	

Format of GPS time word #1:

Bit: 23 ... 00
Second‘s Count starting at 00:00:00 of the actual year (low order 24 bit)

GPSAMD: User's Guide

VME - Interface:

- All accesses must be performed using 32 bit addresses with address modifier AM=09h (standard access) or AM=0Bh (block transfer)
- VME /D16 and VME /D32 accesses are allowed (FIFO access only with VME / D32)

Board base address:

VME A31 ... A24, selectable by means of 2 hex rotary switches:

Switch 1 corresponds to A31 ... A28;
Switch 2 corresponds to A27 ... A24

Base + 0x0: **Control / Status Register,** read / write

Bit	Write Function	Read Function	Value after Reset	Note
0	Local Reset	Local Reset Bit	0	1)
1	-	-	0	2)
2	Switch to GPS Clock Reference	Actual Clock Reference	0	3)
3	Enable Pulser	Enable Pulser Bit	0	1)
4	CalOut Devider Bit 0	CalOut Devider Bit 0	0	4)
5	CalOut Devider Bit 1	CalOut Devider Bit 1	0	
6	CalOut Devider Bit 2	CalOut Devider Bit 2	0	
7	CalOut Devider Bit 3	CalOut Devider Bit 3	0	

1) For LocalReset and Pulser:
Bit = 0 ---> off
Bit = 1 ---> on

2) Bit not in use

3) *Write function:*
Bit 2 = 0 ---> GPSAMD switches to internal 10 MHz clock as reference
Bit 2 = 1 ---> GPSAMD tries to switch to GPS clock as reference
Read function:
Bit 2 = 0 ---> clock reference from onboard clock
Bit 2 = 1 ---> clock reference from GPS clock

4) Calibration Output Pulse Width:
Bit 7 .. 4 = 0 ---> no pulse
Bit 7 .. 4 = i ---> pulse width = (i-1)*1,6us + 100ns, for i = 1 ... 15