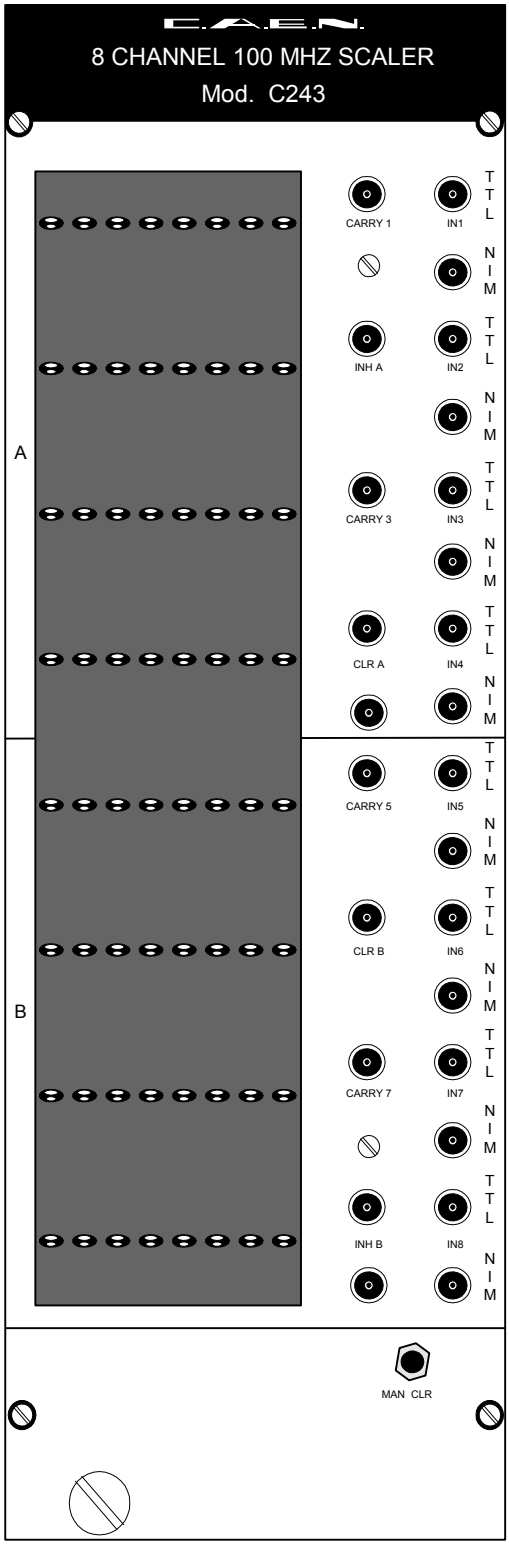
Technical Information Manual

MOD. C 243

8 CHANNEL
100 MHz SCALER

21st February 1991



Mod. C243 Front Panel

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.

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

Table of contents

1. DESCRIPTION

1.1 FUNCTIONAL DESCRIPTION

The CAEN Model C 243 is a 4-unit wide CAMAC module provided with 8 independent 8-digit BCD counters controllable via CAMAC functions.

Each counter can accept either TTL or NIM inputs. Control and output signals (INHIBIT, CLEAR, CARRY) are standard NIM.

The maximum counting frequency is 100 MHz.

Counters can have different operating modes and can be variously interconnected, thereby making the module a flexible and powerful tool for several applications.

A CARRY output connector is available on each odd-numbered counter, and can be connected with a NIM input connector of another counter in order to obtain a 16-digit scale. By connecting the four odd-numbered counters, it is possible to obtain a 40-digit multichannel scale.

An INHIBIT signal sent to the upper or lower INH connector, inhibits respectively the first four counters or the last ones. Both connectors can be connected to each other, in order to inhibit all the counters at the same time.

The above-mentioned is also valid for a CLEAR signal and the relevant CLR connectors. The front-panel push-button MAN CLR allows all the counters to be cleared simultaneously.

The Functional Block Diagram of the module is shown in Figure 1.

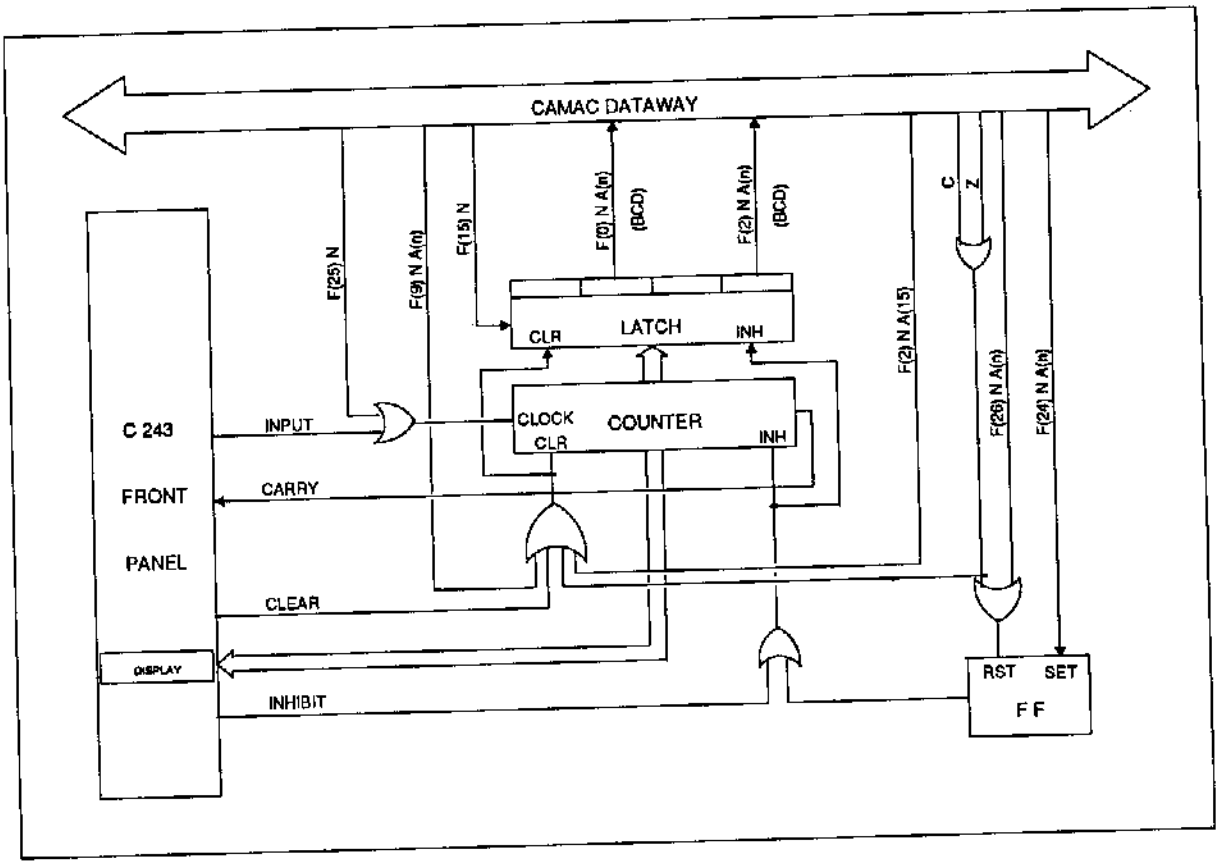

Figure 1 Functional Block Diagram of the Module.

2. SPECIFICATIONS

2.1 PACKAGING

4-unit wide CAMAC module.

2.2 EXTERNAL COMPONENTS

- No. 8 LEMO 00-type connectors "IN1..IN8" (TTL) dedicated to std. TTL inputs. One per counter.
- No. 8 LEMO 00-type connectors "IN1..IN8" (NIM) dedicated to std. NIM inputs. One per counter.
- No. 4 LEMO 00-type connectors "CARRY 1, CARRY 3, CARRY 5, CARRY 7". Std. NIM outputs.
- No. 1 LEMO 00-type connector "INH A" dedicated to the INHIBIT signal for the first four counters. This connector does not require termination.
- No. 2 LEMO 00-type connector "INH B" dedicated to the INHIBIT signal for the remaining four counters. This connector must be terminated in 50 Ω impedance.
- No. 2 LEMO 00-type connector "CLR A" dedicated to the CLEAR signal for the first four counters. This connector must be terminated in 50 Ω impedance.
- No. 1 LEMO 00-type connector "CLR B" dedicated to the CLEAR signal for the remaining four counters. This connector does not require termination.
- No. 8 8-digit segment LEDs for displaying the count on each counter. The count value is read out via CAMAC in BCD format.
- No. 1 pushbutton "MAN CLR" for clearing all counters.

2.3 CHARACTERISTICS OF THE SIGNALS

- COUNTER INPUTS:

NIM
. -600 mV into 50 Ω. Direct coupled.
Reflections <10% with 2.5 ns risetime.
. Min. width 5 ns FWHM. Rise and fall time ≤2 ns.
. Min. interval between 2 pulses measured at half-height 5 ns
Rise and fall time ≤2 ns.
. Max. frequency 100 MHz. Rise and fall time ≤2 ns.

TTL
. TTL level into 50 Ω. Direct coupled.

TTL (contd)	Reflections<10% with 3 ns risetime. . Min. width 5 ns FWHM. Rise and fall time ≤2 ns. . Min. interval between 2 pulses measured at half-height 5 ns. Rise and fall time ≤2 ns.
- CARRY OUTPUTS:	. std. NIM. Rise and fall time ≤6 ns.
- INHIBIT INPUTS:	. -600 mV into 50 Ω. Direct coupled. Reflections <10% with 2.5 ns risetime. . Min. width 60 ns FWHM. Rise and fall time ≤2 ns. It must precede the input signal by 2 ns.
- CLEAR INPUTS:	. -600 mV into 50 Ω. Direct coupled. Reflections <10% with 2.5 ns risetime. . Min. width 60 ns FWHM. Rise and fall time ≤2 ns.

2.4 POWER REQUIREMENTS

+ 6 V at 1.4 A;

- 6 V at 230 mA.

3. CAMAC FUNCTIONS

F(0) N A(n)

After an F(15) N (latch the data) has been performed it reads the scales according to the **n** value:

n	**READ (R1 - R16)**
0	CH1 Least Significant Digits
1	CH1 Most Significant Digits
2	CH2 Least Significant Digits
3	CH2 Most Significant Digits
. . .	
14	CH8 Least Significant Digits
15	CH8 Most Significant Digits

Q response if the datum has been latched after an F(24) N A (n) (set INHIBIT).

F(2) N A(n)

Same as F(0) N A(n), but at the reading end (n=15) all the scales are reset.

F(9) N A(n)

Clears the scales according to the **n** value:

n	**CLEAR SCALE**
0	All
EVEN	1 to 4
ODD	5 to 8

F(15) N

This function is used to latch the data before reading them by an F(0) N A(n) or F(2) N A(n) function.

F(24) N A(n)

Sets the INHIBITS according to the **n** value:

n	**INH SCALE**
0	All
EVEN	1 to 4
ODD	5 to 8

F(25) N

CAEN reserved.

F(26) N A(n)

Resets the INHIBITS according to the **n** value:

n	**RESET INH SCALE**
0	All
EVEN	1 to 4
ODD	5 to 8

C, Z

Reset scales and INHIBITS.

X response for each valid function.
Q response for each valid function, unless otherwise specified.

4. OPERATING MODE

The module is provided with 8 independent 8-digit BCD counters that can be cascaded, via the "CARRY" front panel connectors, in order to obtain various combinations of multichannel scales with equal or different counting capacity.

For example, a 40-digit scale is obtained by connecting "CARRY 1" with "IN 3 (NIM)", "CARRY 3" with "IN 5 (NIM)", "CARRY 5" with "IN 7 (NIM)", "CARRY 7" with "IN 8 (NIM)": in this case the module is configured with one 40-digit scale (IN1-IN3-IN5-IN7-IN8) and three independent 8-digit scales (IN2-IN4-IN6). The 40-digit scale receives the input signal through the IN 1 connector and the most significant digit of the scale is the 8th of IN 8.

The value on the front panel 8-digit segment LED displays is read from CAMAC in BCD mode.
Example:
|1|2|3|5|7|8|9|1| ← *front panel display*
0111|1000|1001|0001 ← *R.L. status referred to the digits 1 to 4 .*

The module's station number corresponds to the slot in which the edge connector of the module itself is inserted (4th CAMAC unit).

The "CLR B" and "INH A" connectors do not require termination. The "CLR A" and "INH B" connectors must be terminated in 50 Ω impedance.

In a cascaded channels scale, the reading must begin at the lower channel.

CAUTION: *turn OFF the CAMAC crate before inserting or removing the module.*

4.1. OPERATIONS TO BE PERFORMED TO OPERATE THE MODULE.

(a) Insert the module into a CAMAC station.
(b) Turn ON the CAMAC crate: on the module's front panel all of the eight 8-figure displays light up and are at zero counting.
(c) Configure the module with the required number and width of scales.
(d) Send the input signals to the selected scales through the relevant front panel connectors.

THE COUNTING BEGINS AND THE MODULE CAN BE CONTROLLED VIA CAMAC.

5. TEST PROCEDURE

5.1 INTRODUCTION

The following Test Procedure is intended to be a guide for the user. We do not claim it to be exhaustive and therefore the module may be tested in various other ways.

Each procedural step contains the operation to be performed and the corresponding effect or the verification to be accomplished.

The module's station number corresponds to the slot in which the edge connector of the module itself is inserted (4th CAMAC unit occupied).

The "CLR B" and "INH A" connectors do not require termination. The "CLR A" and "INH B" connectors must be terminated in 50 Ω impedance.

5.2 SUGGESTED INSTRUMENTS

- No. 1 CAMAC crate.
- No. CAEN MODEL C 249 CAMAC manual crate controller.
- -No. 1 Oscilloscope (bandwidth: min. 200 MHz).
- No. 1 Pulse Generator (with BURST generation capability).

5.3 PROCEDURE

CAUTION: *turn OFF the CAMAC crate before inserting or removing the module.*

1. Insert the module into a CAMAC station.
2. Turn ON the CAMAC crate: on the module's front panel, all of the eight 8-figure displays light up and are at zero counting.

3. For each scale, send a NIM signal (10 Hz ÷ 30 MHz) through the input connector (NIM) and verify that the counting continues correctly.

4. For each scale, send a known BURST (e.g. 1111) through the input connector (NIM) and verify that the remaining scales do not count.

5. For each scale, send a known BURST (TTL) through the input connector (TTL) and verify that the counting continues correctly. Verify that the remaining scales are at zero counting.

6. Connect the oscilloscope (terminated in 50 Ω) with one of the CARRY connectors.

7. Send a NIM signal (20 MHz) through the input connector corresponding to the selected CARRY output and verify (by the oscilloscope) that a NIM level is present and that it goes to zero when a carry condition has been reached.

8. Remove the oscilloscope connector from the selected CARRY output and send this output to one of the other inputs (NIM): the corresponding scale is increased.

9. Repeat the procedural steps 6 to 8 for the remaining CARRY outputs.

10. Send a signal through one of the first two odd-numbered input connectors (IN1/IN3): the counting begins.

11. Connect the CARRY connector corresponding to the selected input with the INH A connector: the counting is inhibited.

12. Remove all connections.

13. Send a signal through one of the other two odd-numbered input connectors (IN5/IN7): the counting begins.

14. Connect the CARRY connector corresponding to the selected input with the INH B connector: the counting is inhibited.

15. Remove all connections.

16. Repeat the procedural step 10.

17. Connect the CARRY connector corresponding to the selected input with the CLR A connector: the counting is zeroed.

18. Remove all connections.

19. Repeat the procedural step 13.

20. Connect the CARRY connector corresponding to the selected input with the CLR B connector: the counting is zeroed.

21. Remove all connections.

22. For each scale:

(a) Send a signal through the input connector until the relevant display shows 55555555.

(b) Perform an F(15) N.

(c) Perform an F(0) N A(n) for each subaddress according to the table below:

n	READ
0	CH1 Least Significant Digits
1	CH1 Most Significant Digits
2	CH2 Least Significant Digits
3	CH2 Most Significant Digits
*	
*	
14	CH8 Least Significant Digits
15	CH8 Most Significant Digits

For each READ operation the R.L. status must be 0101.

(d) Repeat the steps (a) to (c) with 22222222 on the display: For each READ operation the R.L. status must be 0010.

(e) Repeat the steps (a) to (c) with 88888888 on the display: For each READ operation the R.L. status must be 1000.

23. Start the counting on each scale and let it go on for a few seconds, then stop it.

24. Press the front panel pushbutton "MAN CLR": all scales are zeroed.

25. Repeat the procedural step 23.

26. Perform an F(9) N A(15): all scales are zeroed.

27. Repeat the procedural step 23.

28. Perform an F(9) N A(0): the first four scales are zeroed.

29. Perform an F(9) N A(8): the remaining scales are zeroed.

30. Perform the procedural step 22 (a) to (c) with 00000009 on the display: the R.L. assume, in the order, the following status:

1001
0000
1001
0000
*
*
1001
0000.

Q response is FALSE.

31. Perform an F(2) N A(1..14): the above listed result (step 32.) is obtained.

32. Perform an F(2) N A(15): all scales are zeroed.

33. Repeat the procedural steps 26. and 30.

34. Perform an F(24) N A(15): all scales are inhibited.

35. Repeat the procedural steps 31. to 34. : the Q response is now TRUE.

36. Perform an F(26) N A(15): all inhibits are reset.

37. Start the counting on each scale.

38. Perform an F(24) N A(0): the counting is inhibited on CH1, CH2, CH3, CH4.

39. Perform an F(26) N A(0): the INHIBITS are reset and the counting restarts.

40. Perform an F(24) N A(8): the counting is inhibited on CH5, CH6, CH7, CH8.

41. Perform an F(26) N A(8): the INHIBITS are reset and the counting restarts.

42. Repeat the procedural step 36.

43. Perform a C cycle: all scales are zeroed. All INHIBITS are reset.

44. Repeat the procedural step 36.

45. Perform a Z cycle: all scales are zeroed. All INHIBITS are reset.

THE MODULE IS TESTED AND OPERATES CORRECTLY.