0 HOURS
1 MINUTES
2 SECONDS
3 -

1A - Actual offset value (value_offset) ----------RX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

1C - Firmware version----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

1E - Actual internal Rj (rj_int - 2 decimals) ----------RX

0	VALUE (HH)	or	0x7f (denotes error)
1	VALUE (H)	-	
2	VALUE (L)	-	
3	VALUE (LL)	or	Error code

1F - Actual external Rj (rj_ext - 2 decimals) ----------RX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

20 - Remote Rj (rj_rem - 2 decimals)----------RX

0	VALUE (HH)	or	0x7f (denotes error)
1	VALUE (H)	-	
2	VALUE (L)	-	
3	VALUE (LL)	or	Error code

21 - Pure linearization Input value (invalue_puretab/FATT) ----------RX

0	VALUE (HH)	or	0x7f (denotes error)
1	VALUE (H)	-	
2	VALUE (L)	-	
3	VALUE (LL)	or	Error code

22 - Pure linearization Output value (outvalue_puretab/FATT)----------RX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

2F - Actual selection ----------RX

0 Actual I/O channel (0 = OUTPUT - 1 = INPUT - 2=PRESSURE)
1 Actual slot display (0=Lower - 1=Upper)
2 I/O Channel for lower slot
3 I/O Channel for upper slot

30 - Serial number ----------RX

0 VALUE (H)
1 VALUE (L)
2 -
3 -

31 - Actual decimals number ----------RX

0 Displayed decimals
1 Pure signal decimals
2 -
3 -

32 - Calibrator ID (Calys 1000 = 9 - Calys 1200 = 11 - Calys 1500 = 14)-RX

0 Instrument ID
1 Instrument ID
2 Instrument ID
3 Instrument ID

33 - Pulse timebase OUT ----------RX

0 HOURS
1 MINUTES
2 SECONDS
3 -

34 - Pulse mode OUT ----------RX

0 flag_pulse (H)
1 flag_pulse (L)
2 -
3 'X' (ASCII CODE)

35 - Pulse timebase IN ----------RX

0 HOURS
1 MINUTES
2 SECONDS
3 -

36 - Pulse mode IN ----------RX

0 flag_pulse
1 flag_pulse (L)
2 -
3 -

3C - Firmware version----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

3D - Boot loader firmware version----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

40 - Flags X1 scaling OUT ----------RX

0 flag_x (H)
1 flag_x (L)
2 SUBTYPE
3 -

41 - Flags X2 scaling OUT ----------RX

0 flag_x (H)
1 flag_x (L)
2 SUBTYPE
3 -

42 - Flags X3 scaling OUT ----------RX

0 flag_x (H)
1 flag_x (L)
2 SUBTYPE
3 -

43 - Flags X4 scaling OUT ---------- RX

0 flag_x (H)
1 flag_x (L)
2 SUBTYPE
3 -

44 - Flags X5 scaling OUT ---------- RX

0 flag_x (H)
1 flag_x (L)
2 SUBTYPE
3 -

45 - Engineering unit X1 scaling OUT ---------- RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

46 - Engineering unit X2 scaling OUT ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

47 - Engineering unit X3 scaling OUT ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)

3 'X' (ASCII CODE)

48 - Engineering unit X4 scaling OUT ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

49 - Engineering unit X5 scaling OUT ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

4B – Auxiliary channel config ----------RX

0 Ch setting (0=none 1=Humidity)
1 Ambient Temp. Tecnical Unit (0= °C 1= °F 2= K)
2 -
3 -

4C – Humidity measurements----------RX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

4D – Ambient temperature measurements ----------RX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

50 - Flags X1 scaling IN ----------RX

0 flags_x (H)
1 flags_x (L)
2 SUBTYPE
3 -

51 - Flags X2 scaling IN ----------RX

0 flags_x (H)
1 flags_x (L)
2 SUBTYPE
3 -

52 - Flags X3 scaling IN ----------RX

0 flags_x (H)
1 flags_x (L)
2 SUBTYPE
3 -

53 - Flags X4 scaling IN ----------RX

0 flags_x (H)
1 flags_x (L)
2 SUBTYPE
3 -

54 - Flags X5 scaling IN ----------RX

0 flags_x (H)
1 flags_x (L)
2 SUBTYPE
3 -

55 - Engineering unit X1 scaling IN ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

56 - Engineering unit X2 scaling IN ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

57 - Engineering unit X3 scaling IN ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)

3 'X' (ASCII CODE)

58 - Engineering unit X4 scaling IN ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

59 - Engineering unit X5 scaling IN ----------RX

0 'X' (ASCII CODE)
1 'X' (ASCII CODE)
2 'X' (ASCII CODE)
3 'X' (ASCII CODE)

5A - Number of logging groups----------RX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

5B - Internal Rj OUT (rj_int - 2 decimals) ----------RX

0	VALUE (HH)	or	0x7f (denotes error)
1	VALUE (H)	-	
2	VALUE (L)	-	
3	VALUE (LL)	or	Error code

5C - Internal Rj IN (rj_int - 2 decimals) ----------RX

0	VALUE (HH)	or	0x7f (denotes error)
1	VALUE (H)	-	
2	VALUE (L)	-	
3	VALUE (LL)	or	Error code

61 - First recorded value of switch test routine ---------- RX

0	VALUE (HH)	or	0x7f (denotes error)
1	VALUE (H)	-	
2	VALUE (L)	-	
3	VALUE (LL)	or	Error code

62 - Second recorded value of switch test routine---------- RX

0	VALUE (HH)	or	0x7f (denotes error)
1	VALUE (H)	-	
2	VALUE (L)	-	
3	VALUE (LL)	or	Error code

The Computer must combine HH - H - L - LL 8-bit wide each in a 32 bit long word value as it follows:

$V32 = HH * 2^{24} + H * 2^{16} + L * 2^{8} + LL$
IF $V32 >= 2^{31}$ then $V32 = V32 - 2^{32}$

or the H and L 8-bit wide each in a 16-bit word value as it follows:

$V16 = H * 2^{8} + L$
IF $V16 >= 2^{15}$ then $V16 = V16 - 2^{16}$

I/O TYPE or CNV TYPE

0	=	mVL
1	=	mVH
2	=	V
3	=	mA
4	=	Ω
5	=	KΩ
6	=	Hz
7	=	pulse
8	=	Tc
9	=	Rtd
10	=	X scaling

I/O SUBTYPE

(for I/O TYPE = 8)			(for I/O TYPE = 9)			(for I/O TYPE = 10)	
0	=	Tc J	15	=	Pt 100 IEC/DIN	0 =	X1 scaling
1	=	Tc K	16	=	Pt OIML	1 =	X2 scaling
2	=	Tc T	17	=	Pt USLAB	2 =	X3 scaling
3	=	Tc F	13	=	Pt US	3 =	X4 scaling
4	=	Tc R	19	=	Pt SAMA	4 =	X5 scaling
5	=	Tc S	20	=	Pt JIS		
6	=	Tc B	21	=	Pt 200		
7	=	Tc U	22	=	Pt 500		
8	=	Tc L	23	=	Pt 1000		

9	=	Tc N	24	=	Pt 1000 OIML
10	=	Tc E	25	=	Ni 100
11	=	Tc C	26	=	Ni 120
12	=	Tc G	27	=	Cu 10
13	=	Tc D	23	=	Cu 100
14	=	Tc X	29	=	Rtd X

I/O FLAGS_IO

(FLAGS_IO) .AND. 3	0	=	Rj internal
	1	=	Rj external
	2	=	Rj remote
(FLAGS_IO) .AND. 4	0	=	ITS 68
	1	=	ITS 90
(FLAGS_IO) .AND. &18	0	=	°C
	1	=	°F
	2	=	K
(FLAGS_IO) .AND. &20	0	=	4 w (for □□and k □ IN)
	1	=	3 w (for □ and k □ IN)
(FLAGS_IO) .AND. &C0	0	=	0 dec Tc/Rtd
	1	=	1 dec Tc/Rtd
	2	=	2 dec Tc/Rtd
(FLAGS_IO).AND. &300	1	=	1 dec Hz
	2	=	2 dec Hz
	3	=	3 dec Hz

IF Measure (HH) or Inp CNV (HH) or Max (HH) or Min (HH) or Med (HH) or Dev (HH) or Bar (HH) or Rj int (HH) o Rj rem (HH) =7 F (HEX) then the corresponding value LL represent the error code: (Also for errout_global)	0	=	None
	1	=	Overrange
	2	=	Underrange
	3	=	Rj err. (high)
	4	=	Rj err. (low)
	5	=	Calc. err.
	6	=	******
	7	=	Overflow
	8	=	Underflow
	9	=	Measure waiting
	10	=	Overvoltage
	11	=	Overcurrent
	14	=	Zero err.
	15	=	Frq. err.

"X" represents the ASCII code of the corresponding character, for the following characters, you must apply the conversion table, as shown:

Calys 1xxx	**PC**
128<---------->	248
129<---------->	234
130<---------->	230
131<---------->	24
132<---------->	25
133<---------->	224

(FLAGS_PULSE).AND. 1	0	=	Continuous
	1	=	One - shot
(FLAGS_X).AND. 7	(0 - 5)	=	x scaling decimals
(FLAGS_X).AND. 8	0	=	Linear
	1	=	Square
(FLAGS_X).AND. & 30	(1 - 3)	=	Pure signal decimals (for Hz)

V bat must be divided by 100 and represents the battery voltage with 2 decimals.
YEAR represents the year between 00-99.
Rj int, ext and rem represent the reference junction values in °C and must be divided by 100.

J.2.2 Computer data setting from PC to Calys

Computer		Calys	
Tx IDNAME	→	Rx IDNAME	Proceed if name acknowledged
Rx IDNAME	←	Tx IDNAME	If not, do not answer
Tx Instruction	→	Rx Instruction	
Rx Instruction	←	Tx Instruction	
Tx DATA 1	→	Rx DATA 1	
Rx char	←	Tx char	
Tx DATA 2	→	Rx DATA 2	
Rx char	←	Tx char	
Tx DATA 3	→	Rx DATA 3	
Rx char	←	Tx char	
Tx DATA 4	→	Rx DATA 4	
Rx char	←	Tx char	
Tx CHKSUM	→	Rx CHKSUM	
Rx CHKSUM	←	Tx CHKSUM	

IDNAME, Instruction, DATA 1, DATA 2, DATA 3, DATA 4 and CHKSUM are 8-bit decimal values
CHKSUM (checksum) = DATA1 + DATA2 + DATA3 + DATA4 .AND. 7F
The **Calys** receives and verifies the checksum, when not valid, it doesn't accept the data transmitted. The minimum time-out of the **Calys** is 3 seconds.

Writing values

80 - Actual I/O type ----------TX

0 I/O TYPE
1 I/O SUBTYPE
2 I/O FLAGS_IO (H)
3 I/O FLAGS_IO (L)

81 - Output value (outvalue_final) ----------TX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

82 - Actual selection ----------TX

0 Actual I/O slot display (0=Lower - 1=Upper)
1 -
2 -
3 -

83 - Date----------TX

0 DAY
1 MONTH
2 YEAR
3 -

84 - Time ----------TX

0 HOURS
1 MINUTES
2 SECONDS
3 -

85 - Reset Max,Min and Input filter ----------TX

0 -
1 -
2 -
3 -

87 - States control ----------TX

0 Offset state (0=OFF - 1=ON - 2=ON on degrees for Tc /Rtd - 255 = Don't modify)
1 Avg. state (0=OFF - 1=ON - 255 = Don't modify)
2 Hold state (0=OFF - 1=ON - 255 = Don't modify)
3 Set LOIN-HIIN (1=SET LoIN - 1=Set HiIN - 255 = Don't modify)

88 - Filter weight ----------TX

0 Filter weight (1-255)
1 -
2 -
3 -

89 - Function control ----------TX

0 Output function (0=OFF Autoramp,Autoscan,Trx - 1=Start Autoscan - 2=Start Autoramp - 3=Start Trx 255 = Don't modify)
1 Input function (0=OFF Logging - 1=Start Logging - 255 = Don't modify)
2 I/O function (0 = OFF One-shot - 1 = ON One-shot - 255 = Don't modify)

3 -

8A - Store memory ----------TX

0 Channel (0=OUT - 1=IN - 2=INP)
1 Memory number (0-19)
2 -
3 -

8B - Recall memory ----------TX

0 Channel (0=OUT - 1=IN - 2=INP)
1 Memory number (0-19)
2 -
3 -

8E - Actual states control 2 ----------TX

0 Autorange state (0=Off - 1=On - 255=no modify)
1 -
2 -
3 -

8F - Reset display error numbers----------TX

0 -
1 -
2 -
3 -

99 - Reset Output value----------TX

0 -
1 -
2 -
3 -

9A - Actual external Rj (rj_ext - 2 decimals)----------TX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

9B - Pulse timebase OUT ----------TX

0 HOURS
1 MINUTES
2 SECONDS
3 -

9C - Pulse mode OUT ----------TX

0 flag_pulse (H)
1 flag_pulse (L)
2 -
3 -

9D - Pulse timebase IN----------TX

0 HOURS
1 MINUTES
2 SECONDS
3 -

9E - Pulse mode OUT----------TX

0 flag_pulse (H)
1 flag_pulse (L)
2 -
3 -

9F - Reset recorded values of switch test routine ----------TX

0 -
1 -
2 -
3 -

C5 - Scroll / Swap selecting----------TX

0 Mode (0=Swap - 1=Scroll)
1 -
2 -
3 -

F2 - Reset instrument ----------TX

0 -
1 -
2 -

3 -

F3 - Power off instrument ----------TX

0 -
1 -
2 -
3 -

F4 - Set baut rate by instrument table----------TX

0 VALUE(0=OFF,1=300,2=600,3=1200,4=2400,5=4800.6=9600,7=19200,8=38400,9=57600,10=115200)
1 -
2 -
3 -

F5 - Set baut rate directly----------TX

0 VALUE (HH)
1 VALUE (H)
2 VALUE (L)
3 VALUE (LL)

The computer must split a 32 bit long word into 4 bytes of 8 bit as it follows:
Bits 31-24 --> HH
Bits 23-16 --> H
Bits 15-8 --> L
Bits 7-0 --> LL

IN/OUT selection	0	=	Select 0utput channel
	1	=	Select Input channel
OFFS	0	=	Off Offset
	1	=	On Offset
	2	=	On on degrees
	255	=	Don't modify
AVG	0	=	Off
	1	=	On
	255	=	Don't modify
HOLD	0	=	Off
	1	=	On
	255	=	Don't modify
XSCAL	0	=	Set the Low value as the actual value on the display in INPUT mode
	1	=	Set the High value as the actual value on the display in INPUT mode
	255	=	Don't modify
FUN Output	0	=	Off - Autoramp or Autoscan or TRX
	1	=	Start Autoscan
	2	=	Start Autoramp
	3	=	Start TRX
	255	=	Don't modify
FUN Input	0	=	Off Logging
	1	=	Start Logging
	255	=	Don't modify
FUN I/O	0	=	OFF One shot
	1	=	ON One shot
	255	=	Don't modify
MEM	Represents the memory number between 0÷19		
CHN	0	=	Store to OUT memories
	1	=	Store to IN memories

Actual Rj external the value must be multiplied by 100.

K. MAINTENANCE

The Calys portable calibrator has been factory tested and calibrated before shipment.

The calibration should be verified and re-adjusted if the instrument shows an error exceeding the declared specifications or when a critical active or passive component is replaced (either at component level or at board level)

AOIP sas will supply, on request, a technical reference manual, with all instructions and recommendations for service and calibration.

AOIP sas engineers will give prompt support for any request of assistance.

K.1 Faulty operating conditions

During the start up, measuring and simulation modes, faulty conditions of the instrument will be announced, with coded messages.

If the faulty condition is critical for the type of application, it is recommended to re-run the pertinent set up procedure.

All errors which cannot be recovered without the user's knowledge, result in some system action to inform the operator via a message, and where possible the system is restored.

Errors are classified thanks to the method by which they are handled. Recoverable errors report the error and then continue.

System errors which cannot be recovered cause the system to halt with a message displayed.

Restarting the instrument from -Power ON- may clear the error, but generally such messages are caused by hardware or software faults, which require the user's action.

After the start up diagnostic routine the presence of a fault in the system will be announced as it follows:

"Overrange"	In	Indicates an input signal higher than the acceptable level.
		Indicates an output signal setting higher than the acceptable level.
"Underrange"	In	Indicates a negative input signal lower than the acceptable.
		Indicates an output negative signal setting lower than the acceptable limit.
"Rj err. (high)"	In-Out	Indicates Rj int or remote temperature above the stated limit (+55°C or +100°C for remote))
"Rj err. (low)"	In-Out	Indicates Rj int or remote temperature below the stated limit (-10°C)
"Calc.err."	In-Out	Possible error during scale factor computation
"Overvoltage"	Out mA	Indicates a load resistance above the stated limits
"Overcurrent"	Other OUTs	Indicates a load resistance below the stated limits
"Overflw"	------	Indicates a numerical "overflow" conditions
"Underflw"	------	Indicates a numerical "underflow" conditions
"Frq.err."	In	Indicates that a too low or too high frequency is applied to the Input channel
"******"	In	Indicates that the Max, Min or Med values are meaningless
(measure wait)	In	This error number indicates that the measured circuit has been temporary halted
"Zero err"	In	Indicates that the internal autozero is out of range.
"P.S fail"	In	Indicates that the external load is too low in current loop measurement.
"No Avail"	In-Out	Indicates that the selected user's linearization is not available
"No module"	In	Indicates that the Pressure module PM200 is not connected.

K.2 Protection fuses

The instrument is protected by self limiting circuits and resettable fuses as it follows:

IN Mode (mV, V)

The input circuit is intrinsically protected up to 50 V (Tc and mV ranges)..

IN Mode (mA)

The input circuit is protected by the F5 (In) resettable fuse installed on the main board of the instrument.

IN Mode (Rtd)

The input circuit is intrinsically protected up to 5 V and by the two resettable fuses F4 and F6.

OUT Mode (V, mV)

The simulation circuit is protected by a current limiting device set at 2 mA.

In case of overcurrent, due to wrong external connections, the simulation circuit is also protected by the F2(Out) slow blow 100 mA fuse mounted on the main board.

OUT Mode (mA)

The simulation circuit is intrinsically protected by the impedance of the circuit and with the two resettable fuses F2 and F3.

OUT Mode (Rtd)

The simulation circuit is protected by a current limiting device up to 5 V.

In case of overvoltage, due to wrong external connections, the simulation circuit is also protected by F2(Out).

The protection is effective between terminals A and B or A and C or B and D.

Auxiliary power supply (In) (for mA)

The auxiliary power supply output is protected for a reverse voltage of 100 Vdc .

This circuit is also protected with a combination of a current limiting resettable fuse (F4).

Auxiliary power supply (Out) (for mA)

The auxiliary power supply output is protected from a reverse voltage of 100 Vdc .

This circuit is also protected by a combination of a current limiting resettable fuse (F3).

K.3 Safety recommendations

Primary elements (i.e. thermocouples, resistance thermometers, etc.) are normally linked to electrical potentials equal or near to the ground potential. However, in some applications, there may be present a common mode voltage to earth.

Check for voltage between input terminals and the ground, as this voltage can be transmitted to other devices connected to the calibrator.

K.4 Storage

If the instrument has been left unused for a long time, it is recommended to remove its batteries.

Store the instrument in the original package, at a temperature from -30°C to +60°C, with R.H. less than 90%.

If the instrument has been unused for a month check the battery voltage, and charge Ni-Cd batteries for at least 4 hours.

Returning

If the unit is to be returned, it is preferable to use the original packaging and state as clearly as possible, in a note attached to the unit, the reasons for its return.

AOIP SAS
Rue Dupont Gravé
F-14600 Honfleur

From France :
01.69.02.89.30
From your country :
+33(1) 69.02.89.50

Fax : +33(1) 69 02 89 60
Email : sav@aoip.com

Warning
The packaging supplied with the calibrator can withstand a maximum pressure of 20 bar at 21°C (290 psi at 70°F). Subjecting the package to a higher pressure risks damaging the unit.

K.5 EMC Conformity

The Pressure Module case is made in aluminium to fulfil the prevision of the directive 89/336/CEE Electromagnetic Compatibility.

The following page is a copy of the EMC declaration of conformity.

Declaration of Conformity

AOIP SAS
ZAC DE L'ORME POMPONNE
50-52 Avenue PAUL LANGEVIN
F-91130 RIS-ORANGIS

From France :
N°Azur 0 810 10 2647
PRIX D'UN APPEL LOCAL

01 69.02.89.88
From your country :
+33(1) 69.02.89.00

Fax : +33(1) 69 02 89 70