海洋儀器®

致力于电子测试、维护领域!

C.A 43

Mesureur de champ large bande
Wide band field meter
Breitbandiger feldstärkenmesser

Measure up

Thank you for puchasing an **Wide band electric field meter C.A 43**.

For best results from your instrument:
- **read** these operating instructions carefully,
- **comply** with the precautions for use.

⚠	WARNING, risk of DANGER! The operator must refer to these instructions whenever this danger symbol appears.
	WARNING, risk of electric shock. The voltage applied to parts marked with this symbol may be hazardous.
	Equipment protected by double insulation.
CE	The CE marking indicates conformity with European directives, in particular LVD and EMC.
	The rubbish bin with a line through it indicates that, in the European Union, the product must undergo selective disposal in compliance with Directive WEEE 2002/96/EC.

⚠ SAFETY PRECAUTIONS ⚠

- Medical standards consider that electric fields greater than 60V/m can be dangerous to persons. The user must therefore avoid remaining in close proximity to the instrument when in an environment of this kind.
- Before making a measurement, as soon as the instrument is switched on, check that the low battery symbol (35) is not shown on the display. If it is, change the battery.
- In the case of prolonged storage, it is preferable to remove the battery from the instrument.
- When the probe is fitted to the meter, avoid shaking the assembly, particularly in measurement mode.
- In order to keep the instrument in its accuracy class and to obtain optimum use, we advise against leaving the C.A 43 permanently exposed to fields higher than 300 V/m or 100 A/m.

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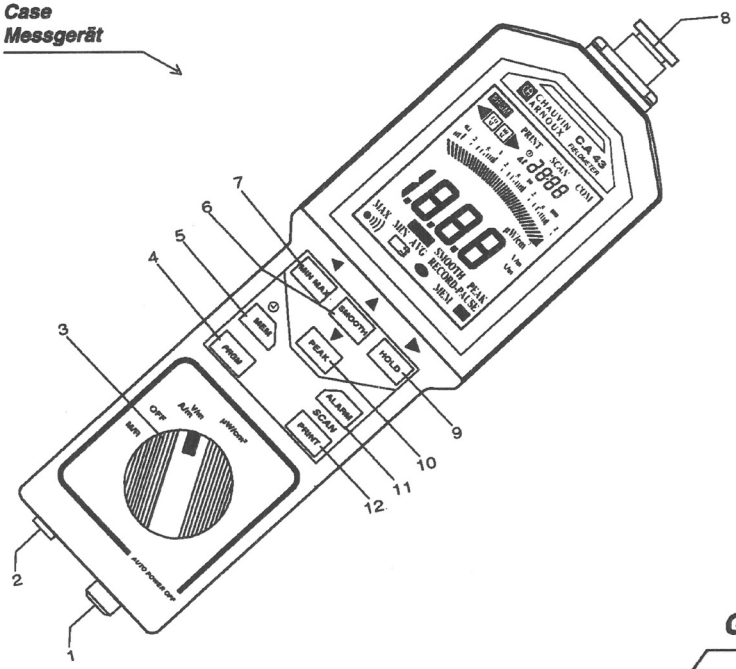

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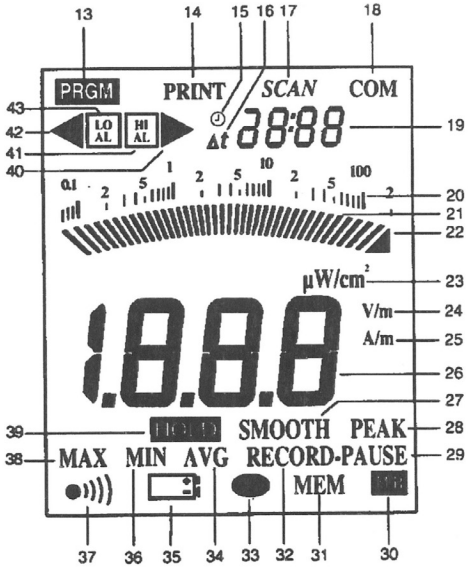

1. DESCRIPTION

1.1. CASE

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2 Optical connector, digital link

3 4 position rotary switch

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- Initialisation of the program memory

5 **MEM** button
- Memorisation of the measurement
- Display of the memory address
- Display of the remaining memory capacity
- Initialisation of the measurement memory

🕘 button
- Programming the sessions of Δt memorisation
- Setting the clock 🕘

6 **SMOOTH** button
- Smoothing measurements
- Switching On/Off the display of the present time

▲ button
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- Display of MIN, MAX and AVG
- Switching On  or Off the sound beep

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2. PRESENTATION

2.1 GENERAL

Pollution of the radio-electric environment is becoming more and more harsh, which leads to problems of malfunctioning in many types of electronic equipment, especially since the use of sequential logic and the development of microprocessors.
These modern techniques are used in practically all types of industrial equipment which makes them particularly sensitive to interference and electromagnetic disturbances. The C.A 43 FIELDMETER allows the user to measure these levels of disturbance.

Measurements are of two types:

Measurement of immunity
This measurement gives the value of the electromagnetic field in which equipment is located, in order to check that this field does not exceed the permitted limits in accordance with applicable standards.

Measurement of emissivity
This measurement gives the value of the electromagnetic field emitted by equipment which is switched ON, and consequently its class of electromagnetic compatibility in accordance with the applicable standard.

The C.A 43 is a small portable instrument that mesures the electric field present in the atmosphere surrounding its measurement probe.

This probe consists of an aerial combined with a high frequency detector. The wide passband of this unit enables the measurement of electrical fields from 0.1 V/m to 200 V/m for frequencies between 100 kHz and 2.5 GHz.

The connection between the measurement probe and the base instrument is made via a socket which allows the measurement probe to be removed during transportation.

The use of microprocessors for measurement, calculations and management of the display makes the instrument simple to use and very accurate.

The large LCD comprises a 2000 count digital display, a logarithmic 35-segment bargraph and a display of the different measurement symbols that provide easy reading for the user.

The bi-directional digital output via optical fibre permits access to all data for printing and processing of measurements on an external processing unit. To allow you to do this, the EMIGRAPH software program is supplied as standard with the C.A 43 Fieldmeter.

2.2 USER MANUAL LABELS

five adhesive labels are supplied with your Fieldmeter. They are simplified reminders about how to use your instrument. This information is available in five languages. Chosse your label and carefully stick it to the back of your instrument. Now you will always have the information necessary to use your Fieldmeter.

3. USE

Your Fieldmeter consists of a case and a probe. to connect it, simply position it in the axis of the case, turn the probe and push it in. Lock in position by pulling the black ring on the probe towards the case (multi-contact push-pull socket).

⚠ Never try to turn the probe when it is fitted to the case, you may cause damage to the sensor and its connections.

To switch On the instrument, position the rotary switch to one of the On positions corresponding to the type of measurement to make. The display makes a general self-test, then shows (top right) the remaining service life as a % (150% maximum for a new battery), finally, the result of the measurement is displayed with the appropriate symbol (measurement unit, function ...). Choose a special function if necessary by pressing the corresponding button when switching On (See SPECIAL FUNCTIONS).

The measurement of the field is done by moving the aerial in the environment to be measured. You obtain a direct wide band measurement of the field that the measurement sensor is subjected to. To find the value of the field emitted by a source of interference, simply point the aerial towards it and get as close as possible (the value of the field is inversely proportional to the distance of the sensor/emission source).

To switch Off the instrument, set the switch to Off (the display goes blank). Auto Off may be triggered if you have not turned the switch or pressed the buttons during 10 minutes of operation. In this case, if you want to wake up your Fieldmeter, simply press any button or turn the switch (except to the OFF position). The display comes On again and the instrument starts taking measurements again without taking into account the button pressed to wake it up.

After your measurements, position the switch to OFF and preferably put your Fieldmeter away in its case. To do this, remove the probe by undoing the locking ring (in the axis, push the ring of the case towards the probe) then carefully separate the two parts and put them away.

4. SPECIAL FUNCTIONS

4.1 SWITCHING ON PERMANENTLY

After 10 minutes of operation without pressing a button or turning the rotary switch or reading the digital output, a battery economy system puts the instrument to sleep. This auto Off is preceded by a beep and flashing of the digital display for one minute.
If you operate the instrument whilst it is flashing, the instrument will continue its active operation for a further period of 10 minutes in the selected functions and without taking into account the button pressed to wake it up. If you turn the switch the instrument will continue to operate for a further 10 minutes.

To avoid your Fieldmeter setting to sleep mode every 10 minutes, you can cancel the Auto Off function.
To do this, **press HOLD** simultaneously when switching On with the rotary switch. The **P** symbol is displayed indicating that the fieldmeter is in permanent operation. This cancellation of the Auto Off function is cancelled when the instrument is next switched Off (switch to the OFF position).

Note: Auto Off is automatically cancelled on RECORD mode and in certain cases, on the SCAN function.

4.2 DEACTIVATING THE «BEEP»

A buzzer, which is a piezzo-electric chip, is used to indicate that buttons are being pressed and different functions used. The table below defines the frequencies and the lengths of the beeps in all the functions of the instrument.

FUNCTIONS	40 ms	65 ms		125 ms		250 ms	Continuous		
	2 kHz	2 kHz	4 kHz	1 kHz	2 kHz	1 kHz	1 kHz	2 kHz	4 kHz
Press button		X							
Press button > 2 s						X			
Button inoperative			X						
MIN recording				X					
MAX recording					X				
Low alarm							X		
High alarm									X
Alarms crossed								X	
Auto Off		X							
Memory	X								

These beeps can be suppressed it they seem too noisy to you. To do this, **simultaneously press MIN MAX as you switch On with the rotary switch**. The disappearance of the symbol from the screen shows that the beep is switched Off. This deactivation of the beep will be continued even after the instrument is switched off (switch to the OFF position). To activate the beep function again, switch the instrumnet On again, whilst simultaneously pressing **MIN MAX**.

4.3 DISPLAYING THE PRESENT TIME

A digital clock allows the display of the present time as well as the time of the different recordings or memorisations.

This clock operates permanently, even when the instrument is asleep or completely switched Off, which makes it posibble to display the precise time as soon as the instrument is switched On.

This clock displays hours and minutes in accordance with the international 24 hour standard.

When the time is displayed, the ◴ symbol appears opposite the display of a session which is announced by the Δt symbol being lit.

A colon (:) is displayed between the hours and the minutes, if it flashes this shows that the time displayed is the present time. When it is continuously displayed, this indicates that the time displayed is a set time corresponding to the moment when the displayed measurement was recorded.

To display the present time, **simultaneously press SMOOTH when you switch On with the rotary switch**. Similarly, to cancel the display of the present time, you must switch Off your instrument (switch to the OFF position) then simultaneously press **SMOOTH** whilst turning the switch.

Notes:
When changing the battery, a reserve power supply ensures normal operation of the clock for one minute. If the power supply to the clock is cut, the clock displays 0:00 flashing for one minute, then starts normal operation again from 0:01 (new present time).

4.4 PRINTOUT OF THE PROGRAM MEMORY

To print the contents of the program memory, **press PRINT simultaneously when switching On with the rotary switch** (the **PRINT** symbol is displayed when pressed).

This command is active when the button is released. At this time, the **PRINT** symbol disappears while the **COM** symbol appears indicating transmission.

This is done via the TxD output by a series of data consisting of three groups of four lines, giving the four values programmed for each measurement unit. At the end of this transmission the instrument returns to the measurement function and the **COM** symbol disappears.

The presentation of the results is done in superimposed lines, each line corresponds to a programmed function.

Each line containes three groups of data separated by a space and ends with a carriage return and paper advance.

<group 1> <group 2> <group 3>

Group 1 contains 4 characters lined up on the left, indicating the programmed function. They are given in the following order:

LO AL : For the low threshold
HI AL : For the high threshold
SCAN : For the number of minutes of the Scan (display HH MM)
Δt : For the duration of the time interval expressed in hours, minutes and separating two sets of data in the memory.

The unused characters are replaced by spaces.

Groupe 2 contains 5 characters lined up on the right, indicating the programmed digital value with 4 digits plus possibly a decimal point.

The insignificant digits are replaced by spaces.

Groupe 3 contains 6 characters lined up on the left, indicating the different programming units, they are output in this order:

V/m
A/m
mW/cm²

SCAN and **Δt** are expressed in hours, minutes.

The separation between each unit is done by advancing by one line.

The unused characters are replaced by spaces so that the group is always the same length.

If the values are not programmed they are indicated by three hyphens **- - -**.

During data output, the **COM** and **PRINT** symbols are shown on the display.

When the instrument is switched On during initialisation of the program, the instrument may send false data to the serial output, symbolised by the code «error 4» (ER4).

4.5 ERASING THE PROGRAM MEMORY

To initialise the program memory, **press PRGM simultaneously when switching On with the rotary switch and continue to press** until it disappears.

The **PRGM** symbol appears, the **Init** message is continuously displayed on the digital display, for 3 seconds, then it flashes once and a beep indicates that the memory has been erased.

Note:
Before the beep, you can release the **PRGM** button at any time. In this case, it will not be erased.

4.6 ERASING THE MEASUREMENT MEMORY

To initialise the measurement memory, **press simultaneously on MEM when switching On with the rotary switch and do not release** until it is erased. The **MEM** symbol lights up, the **Init** message is continuously displayed (top right) for 3 seconds and the number of addresses available appears on the digital display.

After 3 seconds **Init** flashes once and a beep indicates that the memory has been erased. The number of addresses available then changesto 1920 which is the maximum capacity of the memory.

Note:
Before the beep you can release the **MEM** button at any time. In this case, it will not be erased.

4.7 ACCESS TO SEVERAL SPECIAL FUNCTIONS

As applicable, it may be useful to cancel the Auto Off$_{(1)}$ and beep functions$_{(2)}$. To do this, press **HOLD** $_{(1)}$, when switching On with the rotary switch, then press **MIN MAX** $_{(2)}$ before releasing the first button. This method allows you to access several special functions normally accessible only when switching the instrument On.

5. MEASUREMENT MODE

Whatever the measurement mode, the sampling time is always 250µs. The table below summarizes the measurement times of the various modes described in this chapter.

Measurement mode	Symbol	Digital measurement time
Normal measurement		400 ms
Recording (of MIN, MAX and AVG)	RECORD	400 ms
Smooth measurement	SMOOTH	4 s
Recording in smoothed values	RECORD SMOOTH	4 s
Peak measurement	PEAK	100 ms
Recording in peak values	RECORD PEAK	1 ms

The time required for updating analogue measurements shown by the bargraph is always 20 ms.

5.1 HOLD THE DIGITAL DISPLAY

One press on **HOLD** allows you to hold the digital display on the last measurement displayed whilst the analogue display continues to indicate the instantaneous value of the measurement. The display indicates HOLD. Pressing **HOLD** again resets the instrument to instantaneous measurement mode and HOLD disappears from the display.

5.2 SMOOTH MEASUREMENTS

A first press **SMOOTH** triggers smoothing of the measurement (**SMOOTH** displayed). The digital value shown is then the result of a sliding average calculated over the last 10 measurements (i.e. approx 4 seconds).
The bargraph still shows the instantaneous measurement. A second press on **SMOOTH** cancels the filter and the **SMOOTH** symbol disappears.

The smoothed measurement value is constantly calculated. This allows you to obtain the result of the filtering as soon as the button is pressed.

5.3 MEASUREMENT «PEAK» VALUES

The **PEAK** function allows you to make measurements with an acquisition speed of 1ms for peak measurements.

The 50 Hz filter for rejection of low frequency fields is suppressed. The C.A 43 becomes sensitive to the power supplies of electric equipment, mains cable runs, ...

A first press on **PEAK** switches On the function and the **PEAK** symbol appears on the display.

- The bargraph indicates the average value of the four highest peak values measured over 100 ms.

- The digital display indicates the average value of four measurements on the bargraph. This corresponds to the average of the 16 peak values measured over 400 ms.

A second press on **PEAK** cancels the fast acquisition and the **PEAK** symbol disappears.

This function allows you to measure the depth of modulation of the amplitude of an AM signal.

When the frequency modulation is less than 1 kHz and of constant amplitude, the ratio Normal measurement / Peak measurement gives the modulation percentage.

5.4 RECORDING MIN, MAX AND AVG

The **MIN MAX** function allows you to record the minimum, maximum and average values of the measurements. A short press (less than 2 seconds) on **MIN MAX** sets the instrument to record mode (the **RECORD** and P symbols light up).

MIN value
As soon as **MIN MAX** has been pressed the value displayed is allocated to the MIN register. Each time a measurement is less than that contained in the register, it is transferred to the MIN register and a beep is emitted.

MAX value
Similarly, a measurement higher than the value contained in the MAX register will cause it to be updated. Each time the contents of the MAX register is modified, a beep is emitted.

AVERAGE value
Initially, the average value corresponds to the value displayed when **MIN MAX** is first pressed. Every second the instrument inputs the digital measurement, then it takes the sum of all the values input since the beginning of the record command and divides the whole by the number of seconds that have gone by. The result (the average value) is transferred to the AVG register.* Thus the contents of the AVG register are updated every second. This average value can be assimilated to the average dose of fields measured over a given period (dosemeter function). The duration of AVG is shown on the clock display as HH MM.

* AVG: abbreviation of AVERAGE.

Reading MAX, MIN and AVG values
The display of the values contained in the MAX, MIN and AVG registers is done by successive presses on **MIN MAX**.
The cycle of the display successively indicates the maximum value reached (MAX symbol), the minimum value reached (MIN symbol), the average value (AVG symbol) then the value of the current measurement and so forth.
The time of the recording is specified for the maximum and minimum values. The duration of averaging Δt is specified for the average value (AVG). If this duration is greater than 24 hours, OL* is displayed.

Cancelling the MIN, MAX and AVG functions
The MIN, MAX and AVG recording functions are switched Off by pressing MIN MAX for more than two seconds.

Notes:

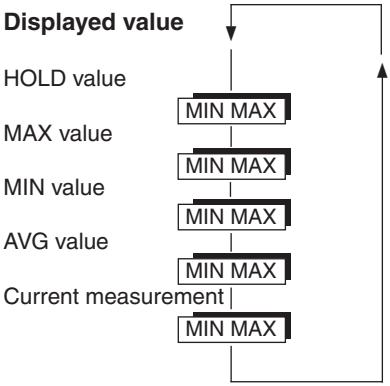
- On the **MIN MAX** function, Auto Off is automatically cancelled (P symbol displayed).
- Switching On or Off **SMOOTH** and **PEAK** modes during a **MIN MAX** recording erases the MIN, MAX and AVG vaues already stored.
- During the reading of the MIN, MAX and AVG memories, the recording of new minimum, maximum and average values is taken into account. It is impossible to memorise them manually: pressing **MEM** only displays the remaining memory capacity.
- When the **RECORD** and **SMOOTH** symbols are displayed, the smoothed values are recorded (MIN, MAX and AVG) with a measurement constant of 4 seconds.
- Similarly, when the **RECORD** and **PEAK** symbols are displayed, the peak values are recorded (MIN, MAX and AVG), with a measurement constant of 1 ms.
- In all cases, the analogue display (BARGRAPH) constantly displays the current measurement with update of the display every 20ms.

HOLD function on MIN, MAX and AVG recording mode
When **HOLD** is pressed with RECORD displayed:

- **HOLD** and **PAUSE** light up.
- The recording is stopped and the values contained in the MIN, MAX and AVG registers are the last values before HOLD.
- The digital display indicates the value of the last measurement, or, the MIN, MAX or AVG value if the instrument is reading these values.
- The analogue display continues to indicates the current measurement.

Press **HOLD** again to stop recording MIN, MAX and AVG values:
- The **HOLD** and **PAUSE** symbols disappear.
- The digital display indicates the current measurement or the contents of the MIN, MAX or AVG registers on read mode.
- The instrument is again on MIN, MAX and AVG mode but the registers have not yet been reinitialised and they contain the MIN, MAX and AVG values present before HOLD was used.

When the **HOLD** and RECORD-PAUSE symbols are displayed, it is also possible to cyclically display the values recorded and the instantaneous measurement by short presses on **MIN MAX** (see the sequance diagram below).
The analogue display always shows the value of the current measurement.



	Symbols displayed	
HOLD	**RECORD-PAUSE**	◴ (time of recording)
MAX	**RECORD-PAUSE**	◴ (time of recording)
MIN	**RECORD-PAUSE**	◴ (time of recording)
AVG	**RECORD-PAUSE**	Δt (duration of averaging)
	RECORD-PAUSE	◴ (present time)

Whatever the position of the display:
- One press on **HOLD** stops the recording without reinitialising the memories.
- One press on **MIN MAX** for more than 2 seconds cancels the record function.

Remark :
In normal measurement (without recording, so without **RECORD** symbol) if, after having pressed **HOLD**, the user starts recording by pressing **MIN MAX** and if the readout of the contents of the MIN or MAX or AVG memories is needed during this **HOLD**, the display will show three hyphens - - -, the contents of these memories will not be significant because the instruction to record was made during the **HOLD** function, which blocks the reinitialisation of these memories.

5.5 ALARM ON / OFF

When the thresholds are programmed, press **ALARM** to switch on detection of crossing these thresholds. the $\overset{LO}{AL}$ or $\overset{HI}{AL}$ symbols, or both, light up on the display depending on the type of threshold programmed. On the bargraph, the segments correspond to the thresholds shown in reverse contrast.

When the alarms are On, a second press on **ALARM** switches Off the alarm function (the alarm symbols disappear).

Note :
If no threshold value has been programmed, when **ALARM** is pressed, a sound signal (button inoperative) will be emitted by the buzzer and this will not be taken into account.

Sound signal :

The minimum duration of operation of the buzzer on an alarm is 400ms even when this takes place on a peak value of lesser duration.

When a threshold is crossed, a hysteresis of 1% is applied to its set point, which obliges the measurement to fall below this lesser value to exit the alarm.

Triggering the alarm :

The digital measurement is below the low threshold, the buzzer switches On and the low overhead symbol, ◀ LO AL , is lit on the display.

The digital measurement is above the high threshold, the buzzer switches On and the high overload symbol, HI AL ▶ , is lit on the display.

The digital measurement is below the low threshold or above the high threshold (with programmed value of the low threshold below the programmed value of the high threshold), the buzzer switches On and the corresponding overload symbol is displayed.

If, during programming, the value of the low threshold LO AL is higher than the value of the high threshold HI AL , the operation of the detection is reversed giving a sound alarm in the central zone with the buzzer On and display of both alarm symbols.

Notes :

- When the SMOOTH or PEAK function is in service, detection by the alarms is done on the smooth or peak values.
- On the HOLD function, the comparison of programmed thresholds continues to be done on the current measurement.

6. MEMORY MODE

It is possible to enter measurements in the memory when the selector switch is on one of the two measurement positions: V/m (A/m) or µW/cm².

The memory can be accessed and read when the switch is set to MR.

6.1 MANUAL MEMORY

A single press on **MEM** allows you to store all the parameters of the measurement that are present, in the measurement memory, when the command is sent:

<Time> <Filter> <Measurement> <Unit>

< Time >	contains the time on the clock when the command is sent in HH MM.
< Filter >	may contain **SMOOTH** or **PEAK**
< Measurement >	contains the digital measurement displayed
< Unit >	contains the symbol for the measurement unit

Note :
The **HOLD** function, that may be active when the data is placed in the memory, is not held in the memory.

When **MEM** is pressed, the **MEM** symbol is displayed for one second and the digital display flashes once to indicate the storage operation.

If you continue to press the button, the digital measurement is replaced by the number of the box for the address in the memory (which has just been allocated), then the current memory appears.

If the measurement memory is full the **MEM** symbol flashes for 2 seconds, the error beep (button inoperative) is emitted and the value is not stored in memory. The maximum address, 1920, is displayed.

6.2 AUTOMATIC MEMORISATION

The C.A 43 Fieldmeter can be used for site monitoring. With a ∆t session programmed from 1 minute to 24 hourss, the min, max and average values corresponding to each session are memorised automatically.

Firstly, set the session (see ∆t programming). Then press **MIN MAX** to trigger automatic memorisation of the MIN, MAX and AVG recordings at the selected interval (the **RECORD** and **MEM** symbols are displayed).

Note :
If the value of ∆t is not programmed (symbolised by three hyphens on the ∆t programming), the morisation does not function and the **MEM** symbol is not displayed.

Each memorisation is dated. This date, recorded in HH MM, also corresponds to a particular memory address. Thus, for each wave of MIN, MAX and AVG recordings there corresponds 3 separate addresses with the time of memorisation, the unit of the measurement and the **SMOOTH** or **PEAK** function that may have been selected.

At each memorisation the **MEM** symbol flashes once and a beep is sounded.

If the measurement memory is full (1920 addresses), the **MEM** symbol flashes and memorisation stops.

Automatic memorisation mode is stopped by pressing **MIN MAX** for more than two seconds. During memorisation, if the rotary switch or the measurement probe are handled, the function is also stopped.

Notes :
The MIN, MAX and AVG values accessible in measurement mode for reading with the **MIN MAX** button are not memorised. In fact, these values do not correspond to the time chosen, but to the total operating time of the recording mode since the first press on **MIN MAX** Δt (see in MEASUREMENT MODE, min, max and average recording).

6.3 READ MEASUREMENT MEMORY

Set the rotary switch to MR to read the different values in the memory (**MR** is displayed on the screen).

Automatically, the last memorisation appears, by date.

The colon (:) at the middle of the time display is continuously visible to show that the time displayed is not the current time. (time and date).

For each memorisation (each memory address), the different symbols remind the user of all the parameters of the measurement at the time of the memorisation.

Press **MEM** at any time to display the number of the memory address of the screen display.

You may :

- either, read all the contents of the measurement memory by scrolling the different memorisations by means of the ▼ and ▲ buttons;
- or, read only the memorisations that have triggered an alarm by pressing **ALARM** beforehand.

▼ On read memory mode, the **PEAK** button changes to its second function as indicated by the ▼ symbol printed on the case.

This second function allows you to decrease the different addresses of the measurement memory, each press moves back the read address by one.

If the read address contains a manual memorisation, the display will indicate all parameters present at the time of memorisation. **MEM** (Time, SMOOTH Filter or PEAK and Unit, but not the alarms, even if they were selected, not the state of the alarms).

If the read function is done by automatic memorisation (Δt programmed), each wave of memorisation occupies threee consecutive addresses for the values AVG, MAX and MIN.

These three values are available by successive decreases:

The first address that si read contains the parameters of the AVG value (the time display contains the duration of Δt programmed). Press ▼ to display the parameters of the MAX measurement (the clock shows the time at which this maximum occured).

The third address read whilst decreasing contains the parameters of the MIN measurement (the clock gives the time when this minimum occured).

If you continue to press the decrease button ▼, the display is scrolled more quickly. The symbols and the digital values become illegible but the bargraph allows you to easily and quickly follow the evolution of the memorised values.

The decrease is stopped at the first memorisation made. At this address 000, each new press on ▼ will cause a button inoperative beep and the display will remain on the contents of this first address (all the memory has benn displayed).

If the address requested does not contain any measurement value (reading after reinitialising to zero - see SPECIAL FUNCTIONS), the digital display will show three hyphens, the bargraph will be on zero and the clock will display three hyphens.

▲ On read memory mode, the **SMOOTH** button changes to its second function shown by the symbol ▲ printed on the case.

It functions in a similar way to ▲, but increasing. So, this button is inoperative (beep) if you have just set the switch to MR since the value MR corresponds to the last memory address.

ALARM The alarms can be swtched On or Off during the read function by simply pressing ALARM the type of alarm programmed is shown on the display (LO AL or HI AL symbols).

Each press on ▼ or ▲ allows you to directly access the value beyond the next threshold.

If both low and high alarms are programmed all the overloads bellow the low threshold or above the high threshold will cause them to be displayed.

The user can therefore find a minimum or maximum value by reading the values with the alarms On, then by deactivating them.

If, during programming, the values of the thresholds have been crossed, all the values between these two thresholds will be displayed.

During fast search, the scroll function may straddle several different memorisation sequences involving different units. In this case, the scrolling stops at each change of unit and the alarms are deactivated.

If no threshold is programmed, the ALARM button is inoperative and you must change to Programming mode to be able to set a threshold value.

Each time that a threshold overload is displayed, the ◀ LO AL or HI AL ▶ symbol for crossing the alarm threshold specifies the type of alarm in use.

When you exit the read memory mode, it is not necessary to go back to the last memorisation. On manual or automatic memorisation, the address pointer will automatically increase the address number so as not to erase the preceding data in memory.

7. PRINT MODE

7.1. MANUAL PRINTOUT

On measurement function or memorisation function, each press on PRINT transmits to the TxD optical output a series of data in the following form:

<Time> <Filter> <Function> <Measurement> <Unit>

Each group is separated by 1 space.

The output of the five groups is ended by a carriage return and 2 line paper advance.

Contents od each group:
<Time> Contains the time or the duration of Δt displayed on the instrument when the command is sent, in the form HH:MM.
<Filter> Contains the **SMOOTH** or **PEAK** function which is in service when the command is sent.
<Function> Contains the MEAS function information (current mesurement), **AVG**, **MIN**, **MAX**, **HOLD**.
<Measurement> Contains the digital measurement , 4 digits plus decimal point.
<Unit> Contains the measurement symbol displayed.

Example of printout:

___	10:30	SMOOTH	HOLD	12,3	V/m
___	09:30	PEAK	MIN	1999	µW/cm²
Δt	15:05	___	AVG	12,57	A/m

During the duration of the transmission, the **COM** and **PRINT** symbols are lit on the display.

- the **PRINT** symbol indicates a demand for transmission.
- the **COM** symbol indicates the effective output of the data.

On the read memory function, press PRINT to send the contents of the memory to the digital output, starting from the last memorisation and decreasing the addresses to the first memorisation according to the date.

The data is presented in the same form (see previous paragraph). The **MR** symbol specifies that it is a printout of the measurement memory. The time corresponds to the date of each event describe. When the memory is empty, the instrument transmits a line of three hyphens.

To interrupt the current printout of the measurement memory, simply press PRINT a second time.

7.2 AUTOMATIC PRINTOUT

When the Scanning function (printout every n minutes) is programmed, press PRINT to start the measurements printing cycle with the SCAN time interval programmed.

This cycle starts by printing the measurement displayed when this command is sent.

The **SCAN** symbol remains lit on the display throughout the duration of operation of the automatic printout mode. At each printout, the **COM** symbol lights up during data output.

If the programmed duration exceeds 10 minutes and Auto Off has not been cancelled, the instrument will go to sleep automatically after the first 10 minutes, then will wake up again at the time of the new transmission, then will go to sleep again until woken again automatically.

To interrupt the programmed sequence, press PRINT a second time (the **COM** and **SCAN** symbols disappear from the display).

During operation of the automatic printout function, press one of the buttons or turn the rotary switch to interrupt the current print cycle (the **P** and **SCAN** symbols disappear from the display).

8. PROGRAM MODE

8.1 ALARM / ΔT SESSION / CLOCK 🕘 / SCAN RATE

Pressing the PRGM button on Measurement mode allows you to activate the Program mode. The **PRGM** symbol lights up on the display.

This command blocks all the functions which are in service including the digital output. The different symbols of these functions disappear and the instrument does not make any more measurements. All the buttons then give access to the second functions printed in yellow on the case. A second press on PRGM allows you to return to normal measurement mode and to validate the programming.

In program mode (**PRGM** displayed), five values can be set by pressing different buttons:

	Press button *	Symbol on screen
Low alarm	1st press ALARM	LO AL
High alarm	2nd press ALARM	HI AL
Memorisation session	1st press 🕘	Δt
Current time	2nd press 🕘	🕘
Print rate	1st press SCAN	**SCAN**

(*) The digital value which is displayed corresponds to the contents of the program memory for the chosen function; If no value had been programmed before, three hyphens appear.

Note :
Before entering the values, check the position of the rotary switch and the type of probe used. The choice of unit depends on this position (A/m, V/m, µW/cm²). Manipulation of the switch, or changing the probe, exits the Fielfmeter from the program mode.

8.2 WRITING A NUMBER

After having chosen the function to program, the former value (a number of three hyphens) is displayed.

If three hyphens are displayed, simply press ▲ or ▼ to display the minimum value (0 for the alarms, 1 mm for the clock, Δt and SCAN).

Automatically, the digit on the right flashes: this is the active digit.

To increase the value of the active digit, keep ▲ pressed in. Likewise, to reduce the value, keep ▼ pressed in. Changing the active digit upwards (... 7, 8, 9, 0, 1, 2, ...) or downwards (..., 3, 2, 1, 0, 9, 8, 7, ...) automatically increases or decreases the figure(s) to the left of this. Release the button when the required digit is shown.

If during the operation increasing or decreasing the digit, the maximum or minimum capacity of the display is exceeded, three hyphens again appear.

The ◄ and ► buttons allow you to move the active digit (flashing) that you want to program respectively to the left, or to the right.

When the digit furthest to the left is active, press ◄ to display three hyphens and the previously displayed value disappears. Idem for the ► button when the active digit is located on the far right of the display.

Note :
The increase of the digit on the left gives access to tens by carrying the remainder. The validation of «- - -» allows you to block the current programming which will no longer appear on the display in measurement mode. To do this, simply return to measurement mode by pressing PRGM when these symbols are displayed.

8.3 SPECIAL CASE OF µW/cm²

The programming of alarms in the case of µW/cm² measurements is distinguished by the possibility of suppressing or setting the decimal point (whole number or decimal number).

To suppress the decimal point, activate the digit on the right (see previous paragraph «Writing a number») press ► again to suppress the decimal point.

To set the decimal point (only one decimal possible), activate the digit on the left then press ► again. The decimal point appears again.

8.4 RE-READING PROGRAMS

To re-read the information contained in the program memory you must, for each unit, call up the programming by pressing the PRGM button, then scroll each value by pressing the different function buttons. The digital display then indicates the values contained in the memory, with the function symbol displayed.

In all cases, changing from programming mode to measurement mode by pressing PRGM or changing programming function, will validate all the values present in the memory at this time.

9. USING PROBES

The measurement of an electric field works on the same principle as an aerial which picks up a radioelectric signal. The sensitive part of the aerial is a detection cell with a very low threshold.

This DC signal resulting from the detection is transmitted to the measurement instrument by a resistive line ensuring maximum transparency that does not disturb the electrical field in which the instrument and its aerial is immersed.

9.1 OPERATING PROCEDURE

- Connect the appropriate measurement probe to the C.A 43. The connection is made through the multicontact push-pull socket located at the top of the instrument.
  - Position the probe in the axis of the case,
  - Turn the probe to align the locking system,
  - Push the probe in and push the ring until it locks (clicks).
- Switch on the instrument by turning the rotary switch to select V/m, A/m or µW/cm² measurement.
- Choose the required operating mode (PEAK, ALARM, ..).
  - We recommand using the MIN/MAX recording function which allows you to obtain, after inspection, the minimum, maximum and average values of the field measured. Before stopping the MIN/MAX recording, you must hold the measurement with the HOLD function. This allows you to memorize the different parameters before exiting the field.
  - If the field is fluctuating (i.e. the display varies without changes in the position of the probe) the use of the SMOOTH and PEAK functions will be particularly useful:

    SMOOTH to read an average value which is more representative of the global field.

PEAK to identify the peaks, some of which may exceed the maximum level that is wanted. (Example: the peaks due to the closeness of a neon light are often greater than 3V/m and cannot be classed as level II in accordance with IEC 801-3 and IEC 1000-4-3). The PEAK function switches OFF the 50Hz rejection fliter for low frequency fields. Consequently, your instrument becomes sensitive to the 50Hz electrical environment: mains cable runs, equipment power supply, etc.

- Point at the target and make the measurements (with probe EF1, certain procedures are necessary: see below paragraph probe EF1).

  As the field diminishes proportionally with distance, take care to place the extremity of the probe as close as possible to the zone to checked.
  The operator must take care not to be between the source of disturbance and the zone to be checked: the human body shields electromagnetic fields.

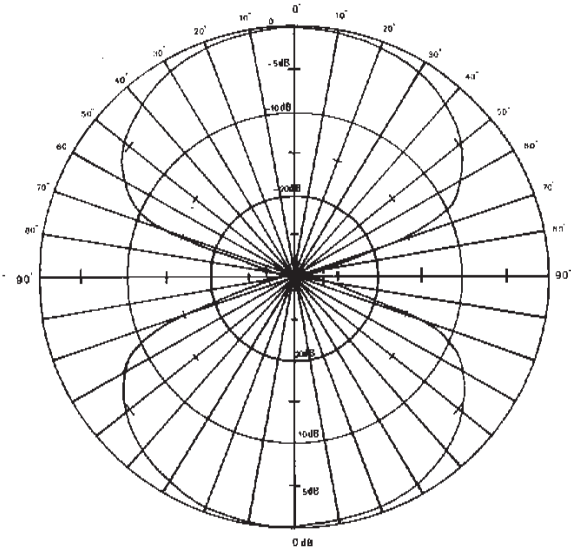
- After each measurement session, switch OFF the instrument by returning the rotary switch to the OFF position. Remove the probe from the instrument by pushing the locking ring. Tidy away the elements in the carrying case.

9.2 PROBE EF2

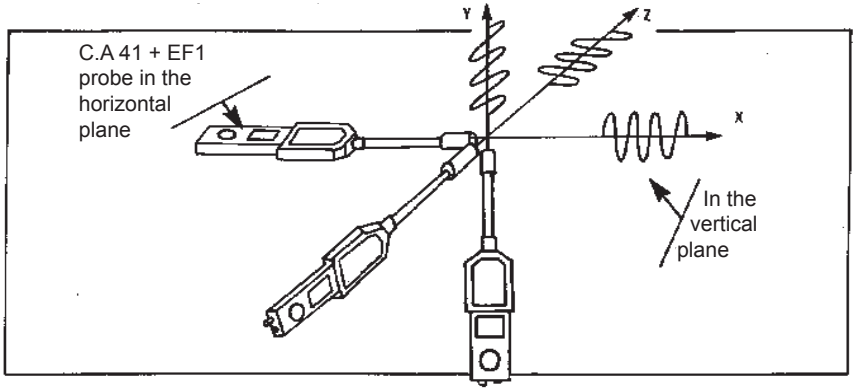
As the EF2 probe is isotropic, it does not require special handling. Its sensitive part measures the field according to 3 axes without the aerial having to be moved in the 3 planes. Simply point it at the target to make the measurement.

9.3 PROBE EF1

The EF1 probe supplied with the C.A 43 is anisotropic. Reception is only via the vertical polarisation. Consequently, the reception diagram in the horizontal plane is circular. In the vertical plane, the reception diagram conforms to the pattern shown below.
When the field is perpendicular, the sensitivity is at a maximum. At 90° in relation to the vertical axis of detection, the sensitivity is minimal.



Because of the anisotropy of the measurement probe, during measurement in a given atmosphere, the aerial must be moved in all planes, along all axes (see figure) :



10. DIGITAL OUTPUT

The C.A 43 has a digital output. this bi-directional interface allows the instrument to communicate with external peripherals.

To connect the instrument, use the optic fibre and the opto-electric adaptor. This transforms the optic signal into a usable electric signal. The optic fibre connects to the COM output of the instrument (see lug for correct position). The 25 pin opto-electric adaptor connects to the serial port of the computer or the printer. The mode changer and 25/9 pin reducer could be useful to you as applicable.

This serial output is not perfectly bi-directional as the micro-controllers used do not allow a full duplex link.

The convention adopted for this link only takes into account, on the Rx input, the first transition 0 -> 1 which is taken as an interruption for the output. At this point, the instrument sets to receiver mode to decode the message.

Thus, during a transmission, any character sent to input Rx will block it at the end of the current output.

If an ON character is then sent, the output will start again at the point where it was interrupted, in the same function. But if a code corresponding to another message is sent to the instrument, the output wil start again in the new function requested. If an OFF code is sent, the instrument definitively exits the interrupted output mode.

At the end of each transmission, an ASCII 4 code is emitted to indicate the end of the frame. This allows the peripheral which is connected to know that it can interrupt the transmission.

If the request to interrupt comes before the end of emission character, this command will not be taken into account until the end of the frame.

A frame consists of a set of information which can not be separated. When you print a current measurement, this frame is equivalent to a line. For a measurement in MIN/MAX recording mode, it is three lines.

The transmission levels are set as follows:

- Level 1 = light present
- Level 0 = no light present

The transmission rate is 1200 bauds

The link-up format is set:

- 1 START bit/8 data bits/1 STOP bit/no parity

Transmission code: All the transmission characters are in ASCII code, except for the transmission of rapid measurements which are transmitted in a specific format.

Transmission protocol: pseudo X ON / X OFF

The transmission is done on two optic fibres:

- RxD Reception of data
- TxD Transmission of data

This interface allows the transmission of the results of the measurement, of the content of the program memory, or measurement of the state of the instrument.

This transmission is obtained from a command, this may be local, directly from the instrument, or at a distance, from an external control unit.

11. REMOTE DEAD

It is possible to establish a dialogue between the Fieldmeter and a computer equipped with a serial type RS 232 interface. The operation of the interface is described in the chapter «DIGITAL OUTPUT».

This readout is sent to the instrument on the RxD input.

The readout consists of sending a special code to the instrument.

If the code transmitted does not correspond to a code known by the letter, the instrument sends the error code 4 (ER 4) to the Tx ouput.

The output of the codes will start 100ms max after the last character applied to the RxD input.

As the digital link is not a true FULL DUPLEX, the control commands can not be sent simultaneously with the emission of measurement parameters.

If the instrument is on emission, you must first send it a transition 0 -> 1 on the input Rx. This information commands it to interrupt its transmission. Then, when this is terminated, after sending the end of frame code, the message command is sent. If the latter is sent too early, it will not be entirely decoded and the instrument will send the error code ER4.

The minimum time separating 2 read instructions is 1.275s.

The distance mode has priority over the local mode.

The remote control can not start the auto print function.

The remote control can not wake up the instrument which has gone to sleep after 10 minutes of operation without being manipulated.

There are five types of remote read possible described in the following paragraphs.

11.1 READ MEASUREMENT

Codes to send to the instrument to get the value of the instantaneous measurement:

- 3F Hexa, 63 Decimal corresponding graphic: ?

For this read instruction to take effect, the instrument must be on Measurement mode or Record mode. Otherwise, the letter will send back the code Error 1 (ER1) if the instrument is in Read memory mode, or the code Error 3 (ER3) if the instrument is in Programming mode.

The presentation of the results will be the same as for the local mode (press button).

- From 1 to 5 lines of 38 characters according to the functions of the instrument.

If, during printout of the measurement, the rotary switch is operated or a button is pressed, the printout of the current message is terminated when the end of frame is sent. Then, the instrument sets itself to the new function requested.

11.2 READ THE STATE OF THE INSTRUMENT

Codes to send to obtain the output of the state of the instrument regarding the alarms, the condition of the battery, the type of sensor connected and the position of the rotary switch:

- 26 Hexa, 38 decimal corresponding graphic: &

The reponse to this read instruction is the emission by the instrument on the TxD output, of the codes corresponding to the different states of the instrument. Presentation on 5 lines each comprising 2 groups separated by a space:

< Group 1 > < Group 2 >

The first group contains the function, with 4 characters max:

LO AL	for Low alarm
HI AL	for High alarm
BAT	for the condition of the battery
SEN	for the type of probe connected
COMM	for the position of the rotary switch

The second group contains the state of the function in 3 characters:

- **LO AL** and **HI AL** OFF if the alarm is not On
  ON if the alarm is On
  - - - if the alarm is not in service

- **BAT** Digit corresponding to the remaining service life of the battery in %.
  It is the same digit wich appears when the instrument is switched On.

- **SEN** Code of the probe in service.

- **COMM** Measurement unit in service or MR if the Read Memory mode is selected.

The sensor code is a digit between 0 and 255 inclusive. it defines the linearisation curves to use to obtain the display in the selected measurement unit.

A value comprised between 251 and 255 indicates that no probe is connected.

A value comprised between 250 and 139 indicates that a V/m measurement probe is connected.

A value comprised between 138 and 0 indicates that a measurement probe in A/m is connected.

Each V/m and A/m sub-assembly is divided into subgroups of 13 measurement points to define the different linearisations. This latter information is only useful for decoding rapid measurements.

11.3 READ THE MEASUREMENT MEMORY

For this read instruction to take effect, the instrument must be in read memory mode, otherwise the instrument sends back the code Error 2 (ER 2).

Codes to send to obtain the output of the contents of the measurement memory:

- 21 Hexa, 33 decimal Corresponding graphic: !

The response to this read instruction will be the output of the complete contents of the measurement memory, in the form of 1920 lines maximum. The contents of the memory is given from Δt to Δt if the recordings have been done in MIN/MAX record mode, or from measurement to measurement, if they have been done in Measurement mode.

The information transmitted is given in accordance with the same format as for the measurement printout in local mode. The output starts with the last memory cell containing a measurement and ends with the first value memorised at address 000.

If the rotary switch is operated during the output of information, the output is interrupted.

The buttons are inoperative during all the output of information.

To stop the data output, set the rotary switch to OFF.

11.4 READ THE MEMORY PROGRAM

This function is accessible in all operating modes.

Codes to send to the instrument to obtain the contente of the memory program:

- 2A Hexa, 42 decimal Corresponding graphic: *

The response to this message will be the emission by the instrument, to the TxD output, of the codes corresponding to the values contained in the memory. The output format is the same as for the interrogation of the memory when the instrument is switched On.

The non-programmed functions are indicated by three hyphens (- - -).

During the printout of the values contained in the memory program, the operation of the rotary switch, or pressing one of the buttons, has no effect on the data output. Only the OFF position stops the instrument.

11.5 RAPID READ OF THE MEASUREMENT

This read instruction gives access to the measurement with a very short time constant. This allows processing by peripheral computer.

To be taken into account, this read instruction must be sent to the instrument when it is in Measurement or Record mode, otherwise an error code is sent back:

- Code Error 1 if the instrument is in Read Memory mode
- Code Error 3 if the instrument is in Programming mode

The minimum time between 2 read instructions may not be < 100 ms.

Two measurement values are available: normal measurement and PEAK measurement, the latter allowing the analysis of pulse signals.

Reading the Normal 20ms measurement gives the measurement corresponding to the averaging of 80 measurements of 250µs.

This 20ms measurement is obtained by sending the following code to RxT :

- 22 Hexa, 34 decimal Corresponding graphic: «

Reading the PEAK measurement is obtained by sending a different code according to the type of PEAK desired:

- to obtain the PEAK MAX 250µs value (measures 250µs max made during a 20ms measurement), you must send the code:

- 23 Hexa, 35 decimal Corresponding graphic: #

- to obtain the PEAK MIN 250µs value (minimum value during a 20ms measurement), you must send the code:

- 24 Hexa, 36 decimal Corresponding graphic: $

The output format is in binary on 2 bytes + trame byte (code ASCII 4)

See in appendix the coding of the response transmitted.

11.6 EXAMPLE OF RAPID READOUT

The following Program allows you to make a rapid readout of 100 measurements at a rate of 100ms. Measurement decoding is done in accordance with probe table 231. The language used is Turbo Basic.

```
cls
p=0 : dim X1(200)  'creation of the data table
gosub ROUTINE01
gosub ROUTINE02
print:print «Retrieval of 100 points ... see COM display on C.A 43»
beep
for N=1 to 100
        delay 0.08        "delays by 20 mS to allow for C.A 43 processing time
        gosub ROUTINE03
        X1(N)=K
next N
beep
print : print «display of 100 data retrieved:» : print
for N=1 to 100
        print «data:»;X1(N)
        delay 0.1
next N
print :print «****  End of program  ****» : close #1
end

'==================== S U B - P R O G R A M S ======================
ROUTINE01:  'table of sensor 231(taken as example)
        B(1)=00000:F(1)=000033:CF(1)=4.666e-2:Q(1)=00.000
        B(2)=00033:F(2)=000250:CF(2)=9.953e-3:Q(2)=01.211
        B(3)=00250:F(3)=000820:CF(3)=5.438e-3:Q(3)=02.340
        B(4)=00820:F(4)=002640:CF(4)=3.022e-3:Q(4)=04.322
        B(5)=02640:F(5)=011776:CF(5)=1.893e-3:Q(5)=07.300
        B(6)=11776:F(6)=143360:CF(6)=1.294e-3:Q(6)=14.360
return

ROUTINE02:
        print «setting up RS232 on COM1...»
        open «COM1:1200,N,8,1,RS» AS #1
return

ROUTINE03:
        print #1,chr$(34);
        if p=0 then A$=input$(1,#1):p=1   'delete the first byte
        A$=input$(3,#1) : A$=left$(A$,2)  'delete 3 byte and keep the first two
        A1A2% = asc(left$(A$,1)) : B1B2% = asc(right$(A$,1))
        A1% = fix(A1A2%/16)  : B1% = fix(B1B2%/16)
        A2% = A1A2% - 16*A1% : B2% = B1B2% - 16*B1%
        R=((B2%*256+A1%*16+A2%)*2^B1%)/80
        gosub ROUTINE04
return

ROUTINE04:
        K=-1
        for I=6 to 1 step -1
                if R >= B(I) then
                        K=R*CF(I)+Q(I)
                        ptr = I
                        goto LABEL01
                end if
        next I
        LABEL01:
return
```

12. SOUND DEMODULATION

The demodulation function allows the amplitude modulation which may be present on the HF signal to be heard on an internal loud speaker. This detection of modulation is limited to the audible frequencies between 500 Hz and 5kHz inclusive.

The best result is obtained for fields measured between 5 V/m and 30 V/m inclusive with a modulation depth of 50% minimum. As a result of the filtering constants of the instrument, this function is only available on PEAK mode.

This function is controlled by a switch coupled to a single turn potentiometer (1). The potentiometer allows adjustment of the sound volume as a function of the field and the depth of modulation.

Note :
The power consumed by the internal speaker greatly reduces the service life of the battery. Please only use this function for real applications. We recommend switching OFF the demodulation function with the switch as soon as it is no longer used.

13. SPECIFICATIONS

13.1 ELECTRICAL SPECIFICATIONS

Measurement extent:

FUNCTION	MEASUREMENT EXTENT
V / m	0.1 to 199.9
µW / cm²	0.1 to 1999
A / m	0.1 to 19.99

- Pass band: from 100 kHz to 2,5 GHz

The measurement from 100 kHz to 1 MHz is purely indicative.

- Specified measurement domain:

Measurements are taken in a distant field in order to obtain a flat wave.
The impedance of the ambient field must be equal to 377 Ω.

RANGE	V/m from 0 to 1 V/m	V/m from 1 to 10 V/m	V/m from 10 to 100 V/m	V/m from 100 to 199.9 V/m	µW/cm² from 0.1 to 199.9 µW/cm²	µW/cm² from 200 to 1999 µW/cm²(1)
Resolution	0.1 V/m	0.1 V/m	0.1 V/m	0.1 V/m	0.1 µW/cm²	1 µW/cm²
Accuracy(2)	0.7 V/m	0.5 V/m	1 dB	2 dB	1 dB	2 dB
Stability				0.2 dB		

(1) The power density is limited to the maximum display capacity of 1999µW/cm² corresponding to a field of 86.8V/m.
(2) Instrument only (without probe) : ± 0.5% of the reading ± 0.2% of the range.
Error due to the interchangeability of sensors: ± 0.5dB.

■ Reference conditions

Distortion magnitudes	Reference conditions	Tolerances
Ambient temperature	20°C	± 2 K
Relative humidity	60 % HR	± 10 %
Battery voltage	9 V	± 1 V
Field frequency	150 MHz	± 1 %
Field level	10.0 V/m	± 0.1 V/m

■ Variation in the operating range

Distortion magnitude	Limit of range	Magnitude distorted	MAX variation
Ambient temperature	0 to 50°C	All magnitudes	0.3 % / °C of the reading ± 0.5 V/m per 10 °C
Humidity	10 to 90 % no condensation	All magnitudes	< 0.5 V/m
Power supply	7.5 to 11 V	All magnitudes	0.05 % / V
Frequency of field	20 to 500MHz 1 MHz to 1 GHz 1 MHz to 2.5 GHz	All magnitudes	± 1 dB ± 1.5 dB ± 2 dB
Level of field	0.1 to 10 V/m 0.1 to 100 V/m 0.1 to 200 V/m	All magnitudes	± 0.5 V/m ± 1 dB ± 2 dB
Interchangeability of sensors	Frequency from 1 MHz to 2.5 GHz	All magnitudes	± 1 dB
	Level of field from 0.1 to 200 V/m	all magnitudes	± 0.5 dB
All distortion magnitudes	from 0 to 50 °C from 10 to 90 % HR Power supply from 7.5 V to 10 V Frequency from 1 MHz to 2.5 GHz Level from 0.1 to 200 V/m	Threshold of alarm detection	± 0.2 V/m of the programmed value

■ Adherence to standards

Class III instrument IEC 61010.

Electrostatic discharge (IEC 801-2 and IEC 1000-4-2)

Class of severity:

- Level 2 (4 kV) no destruction of build components, but change of function that can be reset by a new instruction.
- Level 4 (15 kV) no destructive.

Radiated electrical fields (EN 55081-2 class B)

Protection from electromagnetic fields in accordance with standard EN 55082-2 up to 200 V/m.

Class of severity:

- Level 4 (200 V/m).

■ Power supply

The power supply of the instrument is produced by a 9V battery type 6 LF 22.
Voltage range ensuring correct operation: 6.5 V to 11 V.

- Display of symbol  flashing for a battery voltage < 7.5 V (remaining service life approx. 1 hour).
- Display of symbol  continuously for a battery voltage < 7 V (remaining service life approx. 10 minutes).
- Display of the «**bAt**» symbol and auto OFF for a battery voltage < 6.5 V (no operation possible, the battery must be changed).

Average service life: 30 hours in continuous operation without use of the demodulation function. Each time the instrument is switched ON, the remaining service life (3) as a percentage of the capacity appears on the display of the C.A 43.

Saline batteries, Lithium batteries and rechargeable accumulators are also accepted.

13.2 MECHANICAL SPECIFICATIONS

■ **Operating range**

Temperature: 0°C to +50°C (limited to 30°C for a humidity of 90% RH),
Relative humidity: 10 to 90 % HR (no condensation).

■ **Storage range**

Temperature: -20°C to +60°C,
Relative humidity: 10 to 95 % HR (no condensation).

■ **Adherence to standards (for the measuring instrument)**

- Watertightness: IP 50 (IEC 529),
- Drop resistance: 0.5 m (IEC 68-2-32), 0.25 m with probe,
- Shock resistance: 3 shocks of 100 g - 6 ms, in the 3 axes (IEC 68-2-27),
- Vibration resistance: 10 cycles from 10 Hz to 55 Hz at 10 g or 0.75 mm in the 3 axes (IEC 68-2-6),
- Bump resistance: 100 bumps of 10 g in the 3 axes (IEC 68-2-29).

■ **Dimensions and weight**

- C.A 43 (without probe): 216 x 72 x 37 mm - 350 g
- measurement probe (EF1/EF2): length : 320 mm - diameter : 50 mm

14. MAINTENANCE

14.1 CHANGING THE BATTERY

Before making a measurement, check by switching On the instrument that the battery symbol is not visible on the display. If it is, you must change the battery.

The user has one minute in which to change the battery without having to reset the clock.

Open the battery compartment at the back of the instrument using a coin (tool release screw).

- Remove the battery inside,
- Change the battery (type 6LF22) in accordance with the polarity shown in the battery compartment,
- Close the battery compartment using the coin.
- Check, by switching On the instrument, that the displayed time is not flashing. If it is, reset the time on the clock.

With the new battery, the indication of the available battery capacity, shown when the instrument is switched On, may be greater than 100 %.

14.2 CLEANING

The case can be cleaned with any non abrasive and non acid product, such as: alcohol, flugene, etc.

14.3 MAINTENANCE

Repair operations that may be necessary are made easy as the Fieldmeter has only one circuit that combines all the components. Nevertheless, repair must only be carried out by qualified personnel.
To check the accuracy of the instrument and its probes, a periodic calibration every two years should be expected for the instrument, and every year for the probes.

15. WARRANTY

Unless otherwise stated, our instruments are guaranteed against any manufacturing defect, or defective parts. They do not have «Safety» specification. Our guarantee, which may not under any circumstances exceed the amount of the invoiced price, will not extend beyond repair of our instruments, returned carriage paid to our workshops. It applies for normal use of our instruments, and does not apply to damage or destruction caused, in particular due to failure to connect up correctly, mechanical accident, defective use, overload or excess voltage, or calibration done by third parties.
Our responsability being strictly limited to pure and simple replacement of faulty parts in our instruments, the purchaser expressly resigns the right to claiming responsability from us for damages or losses caused directly or indirectly.

Our guarantee applies, unless expressly stipulated, for twelve (12) months after the date at which the equipment is supplied. The repair, the modification or replacement of a part during the guarantee period will not extend the period of this guarantee.

16. APPENDIX

16.1 CODING THE RESPONSE TO A RAPID READOUT OF THE MEASUREMENT

The two bytes transmitted in response to a rapid instruction are coded according to a special law.

A byte comprises two digits coded in Hexadecimal called A_1, A_2 for the first byte, and, et B_1, B_2 for the sencond byte transmitted.

To decode this information which arrives in the form $A_1A_2B_1B_2$, you must start by putting the information in order, to get a new digit in the form $B_2A_1A_2B_1$.

These four digits contain the measurement information in the form of a digital value with three digits, followed by an exponential to the power 2 which multiplies the preceding digital value:

x x x X 2^x i.e. $B_2A_1A_2$ X 2^{B1}

Example: the two bytes transmitted after the normal measurement readout are: AF 6D.

After putting bytes in order, the final value becomes DAF x 2^6

After decoding this new value in decimal the measurement becomes:
DAF = (13 x 256) + (10 x 16) + 15 = 3503
3503 x 2^6 = 3503 x 64 = 224192

This figure corresponds to 80 measurements of 250µs. To get the 250µs measurement, you must therefore divide the figure obtained by 80.

The measurement becomes 316352/80 = 2802.4

The measurement thus calculated must be linearised according to the following formula to get the true measurement: Measurement = Xa + b

The coefficients a and b are given in the table below, they depend on the type of probe used, which can be found from the probe code given by reading the state of the instrument.

In the example used above, if the coefficient a is 1.893 10-3 i.e. 0.00163 and coefficient b is 7.300, the real measurement becomes:

2802.4 x 0.001893 + 7.300 = 12.60 V/m

Each probe code contains 6 linearisation slopes whose coefficients depend on the measurement.

The table below indicates the number of the linearisation table allocated to each of the 17 probe codes.

Probe code	Linearisation table number	Measurement Unit
from 255 to 251	Measurement blocked	Display ANT
from 250 to 237	01	V/m
from 236 to 223	02	"
from 222 to 209	03	"
from 208 to 195	04	"
from 194 to 181	05	"
from 180 to 167	06	"
from 166 to 153	07	"
from 152 to 139	08	"
from 138 to 125	09	A/m
from 124 to 111	10	"
from 110 to 97	11	"
from 96 to 83	12	"
from 82 to 69	13	"
from 68 to 55	14	"
from 54 to 41	15	"
from 40 to 27	16	"
from 26 to 0	17	"

Each table contains 6 linearisation straight lines which are given for tables 2, 3, 4 and 5 (consult us if necessary for the other tables).

The values for the start of the slope and end of slope correspond to the measurement values available on rapid interrogation of measurement.

Coefficients of table 02 probe EF1 first sensitivity:

N° straight line	Start	End	Coeff. a	Coeff. b
1	0 ct	33 cts	4.666 10e-2	0
2	33 cts	250 cts	9.953 10e-3	1.211
3	250 cts	820 cts	5.438 10e-3	2.340
4	820 cts	2640 cts	3.022 10e-3	4.322
5	2640 cts	11776 cts	1.893 10e-3	7.300
6	11776 cts	143360 cts	1.294 10e-3	14.36

Coefficient of table 03 probe EF1 second sensitivity:

N° straight line	Start	End	Coeff. a	Coeff. b
1	0 ct	33 cts	4.666 10e-2	0
2	33 cts	184 cts	1.298 10e-2	1.111
3	184 cts	748 cts	5.851 10e-3	2.423
4	748 cts	2704 cts	3.476 10e-3	4.199
5	27040 cts	10624 cts	1.944 10e-3	8.342
6	10624 cts	135168 cts	1.372 10e-3	14.42

Coefficient of table 04 probe EF2 first sensitivity :

N° straight line	Start	End	Coeff. a	Coeff. b
1	0 ct	27 cts	5.925 10e-2	0
2	27 cts	143 cts	1.207 10e-2	1.274
3	143 cts	572 cts	6.993 10e-3	2.000
4	572 cts	2544 cts	3.651 10e-3	3.911
5	2544 cts	8512 cts	1.776 10e-3	8.681
6	8512 cts	180224 cts	1.025 10e-3	15.07

Coefficient of table 05 probe EF2 second sensitivity :

N° straight line	Start	End	Coeff. a	Coeff. b
1	0 ct	27 cts	5.925 10e-2	0
2	27 cts	143 cts	1.207 10e-2	1.274
3	143 cts	572 cts	7.459 10e-3	1.933
4	572 cts	2048 cts	4.268 10e-3	3.758
5	2048 cts	8000 cts	1.889 10e-3	8.611
6	8000 cts	175104 cts	1.053 10e-3	15.37

As for the example taken before, if the probe code is 227, use table 02..

The value of the measurement in points is 2802.4. It falls in the extreme values of the fifth slope, thus the coefficients to take to linearise the measurement are:

a = 0.001893 and b = 7.300

The time separating two readouts is limited by the rate of the instrument which is 20ms for a rapid measurement.