



**Safe-T-Cube
Area Monitor for use with Impact/Impact Pro
and MiniGas MK5/XL only**

TABLE OF CONTENTS

Section	Page
1. GENERAL DESCRIPTION	9
1.1 INTRODUCTION	9
1.2 SPECIFICATION	9
1.2.1 Safe-T-Cube	9
1.2.2 Battery charger	11
1.3 STANDARD ACCESSORIES	12
1.4 BRIEF DESCRIPTION	13
2. USING THE Safe-T-Cube	14
2.1 INTRODUCTION	14
2.2 PREPARATION	14
2.2.1 Fitting a gas monitor to the Safe-T-Cube	15
2.2.2 Entry checks	16
2.3 NORMAL USE OF THE Safe-T-Cube	16
2.3.1 Switching on and off	16
2.3.2 Watchdog signal	18
2.3.3 Alarm signals	19
2.3.4 Fault signals	19
2.4 STORAGE OF THE Safe-T-Cube	19
3. ROUTINE MAINTENANCE	20
3.1 PREVENTIVE MAINTENANCE	20
3.2 CORRECTIVE MAINTENANCE	20
3.3 BATTERY MAINTENANCE	21
3.3.1 Recharging the battery	21
3.3.2 Replacing the battery	22
3.4 CALIBRATION AND ADJUSTMENTS	24

SAFE-T-CUBE USER MANUAL

This User Manual contains Instructions for the Safe-T-Cube.

Intrinsically Safe versions of the Safe-T-Cube can be identified by the ATEX approval label at the rear of the Safe-T-Cube (reference 03ATEX0379X).

WARNING

The connection between Safe-T-Cube and the gas detector is made by an acoustic tube. Failure of this connection will result in the Safe-T-Cube not responding to the gas detector.

WARNINGS:

THE Safe-T-Cube MUST BE SERVICED, INCLUDING CHARGING THE BATTERY, ONLY IN A SAFE AREA.

CAUTIONS:

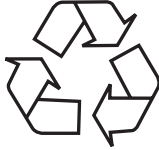
The Safe-T-Cube must be operated and serviced only by qualified personnel trained by Zellweger Analytics or by a Zellweger appointed agent.

This User Manual must be read and fully understood before using or servicing the Safe-T-Cube.

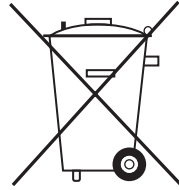
The charger (see page 11 for details) has a nominal output of 15VDC. Note that for I.S. certification purposes it is assumed that under fault conditions to have a U_{max} of 250Vrms.

SAFE-T-CUBE USER MANUAL

DISCARDING BATTERIES FROM THE SAFE-T-CUBE



Pb



Pb

To comply with the European Directive on Batteries and Accumulators Containing Certain Dangerous Substances (91/157/EEC), the battery in the Safe-T-Cube must be disposed of in accordance with local legislation.

Details of removing the battery from the Safe-T-Cube are contained in Chapter 3 of this Manual.



Within the European Union, the CE mark is used to show conformity with applicable New Approach Directives specifying the health and safety requirements. These requirements include EMC and ESD standards.

Within the limits of EMC Directive 89/336/EEC, the design of the Safe-T-Cube has been tested to EN50 082-2:1992 to ensure that it has adequate immunity to RFI and ESD encountered in recommended applications.

Similarly, tests have been carried out to EN55 022:1987 Class B to ensure that the Safe-T-Cube does not produce electrical interference.

SAFE-T-CUBE USER MANUAL

INTRINSIC SAFETY APPROVAL

Electrical equipment can be used in explosive atmospheres (referred to as hazardous areas) if it is certified Intrinsically Safe by an appropriate authority.

The Safe-T-Cube has been approved as intrinsically safe by Baseefa 2001 Ltd. in the UK, and has been issued with certificate number Baseefa 03ATEX0379X.

The classification code for this certificate is:

EEx ia IIC T4



EEx indicates that the instrument has been approved to European standards and is suitable for use in explosive atmospheres.

ia indicates that the instrument can be used in areas where explosive gases are present and is approved as intrinsically safe (I.S.).

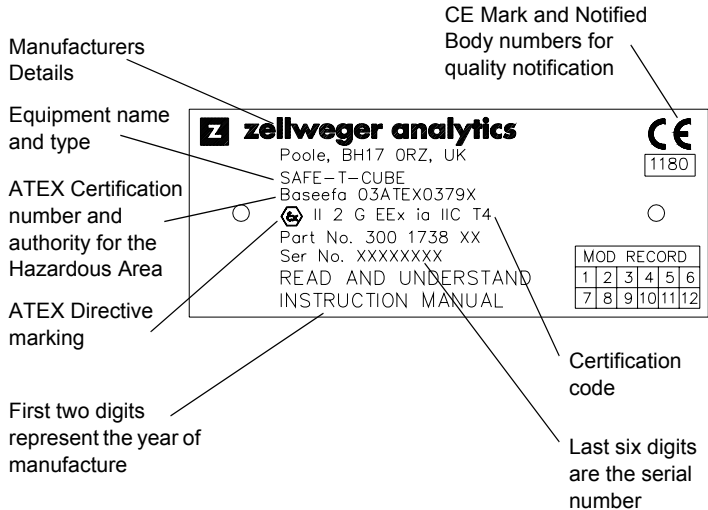
IIC specifies the apparatus group within which the Safe-T-Cube can be used. Group IIC includes use with materials such as acetylene, hydrogen and ethylene.

T4 indicates that, even under double-fault conditions, and at a maximum ambient temperature of +40°C, the surface temperature of the instrument will not rise above 135°C. For a complete list of gases that this excludes, you must refer to British Standard EN50014 and BS5345 Part 1 and subsequently EN60079-14: 1997.

SAFE-T-CUBE USER MANUAL

-  **II 2 G** ATEX Coding
 -  European EU explosive atmospheres symbol
 - II** Equipment group, i.e. II for surface use only (non-mining applications)
 - 2** Equipment category 2 is for Zone 1 use (not Zone 0)
 - G** Type of gas atmosphere G is gas or vapour mists for surface use only (non-mining).

Certification Label Detail



CE Mark and Notified Body numbers for quality notification

Manufacturers Details

Equipment name and type



ATEX Certification number and authority for the Hazardous Area

ATEX Directive marking

First two digits represent the year of manufacture

Certification code

Last six digits are the serial number

z zellweger analytics					
Poole, BH17 0RZ, UK					
SAFE-T-CUBE					
Baseefa 03ATEX0379X					
 II 2 G EEx ia IIC T4					
Part No. 300 1738 XX					
Ser No. XXXXXXXX					
READ AND UNDERSTAND INSTRUCTION MANUAL					
					
1180					
MOD RECORD					
1	2	3	4	5	6
7	8	9	10	11	12

SAFE-T-CUBE USER MANUAL

WARNING

THIS IS A CERTIFIED PRODUCT. SERVICE, REPAIR OR CALIBRATION OTHER THAN BY THE MANUFACTURER OR A MANUFACTURER'S RECOMMENDED AGENT MAY CAUSE INVALIDATION OF CERTIFICATION, WARRANTY, AND RESULT IN A SAFETY HAZARD.

P.J. Iredale, Chairman, CoGDEM October 1992

WARNINGS:

SUBSTITUTION OF COMPONENTS MAY IMPAIR THE INTRINSIC SAFETY OF THE SAFE-T-CUBE - REPLACEMENT PARTS MUST BE APPROVED BY ZELLWEGER ANALYTICS.

FAILURE TO USE THE CORRECT TYPE OF BATTERY FOR THE SAFE-T-CUBE RENDERS THE INTRINSIC SAFETY APPROVAL VOID.

IN PERFORMING THE INSTRUCTIONS IN THIS MANUAL, YOU MAY BE REQUIRED TO WORK IN HAZARDOUS AREAS. REFER TO LOCAL PROCEDURES AND REGULATIONS BEFORE WORKING IN A HAZARDOUS ENVIRONMENT.

Note: Failure to observe and abide by the above warnings and cautions, renders the intrinsic safety approval, where applicable, void and may remove any right of claim against Zellweger Analytics relating to product liability or consequential damage to any third party.

ABBREVIATIONS

The following abbreviations and terminology are used throughout this manual.

A	Ampere
ac	Alternating current
Ah	Ampere hour
dc	Direct current
g	Gram (weight)
Hz	Hertz (frequency)
In.	Inch
IS	Intrinsically safe
kg	Kilogram
LED	Light emitting diode
lb	Pound (weight)
m	Metre
max	Maximum
min	Minimum
min.	Minute
mm	Millimetre
oz	Ounce (weight)
rh	Relative humidity
S	Seconds (time)
v	Volt

1. GENERAL DESCRIPTION

1.1 INTRODUCTION

When used in conjunction with a compatible Neotronics gas monitor, the Safe-T-Cube (Fig. 1.1) operates as a safe area monitor and provides audio and visual repeat indications of any monitored alarms.

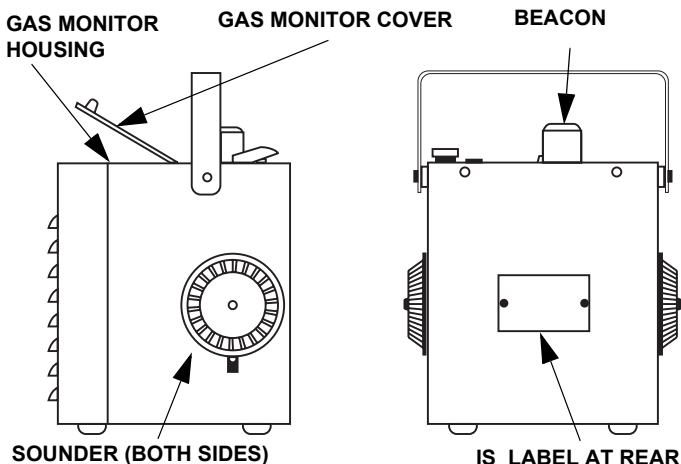


Fig. 1.1 The Safe-T-Cube safe area monitor

1.2 SPECIFICATION

1.2.1 Safe-T-Cube

Note: The following details apply only to the Safe-T-Cube unit. Specification details for the associated gas monitor are provided in the appropriate User Manual.

Intrinsic safety certification:

Intrinsic safety approval has been issued by Baseefa certificate number Baseefa 03ATEX0379X. The classification code for this certificate is EEx ia IIC T4, which is compatible with Impact and Impact Pro gas monitors, under the ATEX directive. If the Safe-T-Cube is used with the non-ATEX approved Minigas detector, the combination of Safe-T-Cube and Minigas must be risk assessed by the end user.

1. GENERAL DESCRIPTION

Associated User Manuals are as follows:

Gas Monitor	User Manual (Zellweger part no.)
MiniGas-XL	059 0313 00
MiniGas Mk 5	2987M5023 and 2987M3033
Impact/Impact Pro	2302M5030 and 2302M05010

Dimensions and weight:

Depth	240 mm (9.4 in.)
Width	270 mm (10.6 in.)
Height	320 mm (12.6 in.)
Weight	9.0 kg (19.8 lb), including battery

Alarm indicators (IS version):

Visual	Xenon beacon
Audible (typical)	Two sounders, each 91 dBA at 1 m

Environmental limits:

Operational temperature	-10°C to +40°C
Storage temperature	-20°C to +50°C
Humidity	0 to 95% rh
Protection	IP20

Power supply (lead-acid rechargeable battery pack):

Suitable batteries are as follows:

Type	Sonnenschein Dry Fit A300 Series A312/3.0S
Rating	12 V, 3.0 Ah
Type	Yuasa NP2.8-12
Rating	12 V, 2.6 Ah
Capacity (min)	100 h (no alarms) 5 h (alarm mode)

Instrument Bracket:

Maximum weight 3.2kg

1. GENERAL DESCRIPTION

WARNING:

THE ONLY APPROVED BATTERIES ARE THOSE DETAILED ABOVE. THE USE OF ANY OTHER MAKE OR TYPE OF BATTERY WILL RENDER THE INTRINSIC SAFETY APPROVAL VOID.

Operational modes:

Watchdog indication	Beacon flashes within one second of gas detector confidence beep
Alarm indication	Beacon flashes continuously, sounder operates continuously
Low battery prewarning	Beacon flashes continuously
Low battery warning	Beacon flashes continuously, sounder operates continuously
Gas Monitor Fault indication	Beacon flashes and sounder operates continuously

WARNING:

ENSURE THAT THE CONFIDENCE SIGNAL IS ENABLED (USING THE ICU PC SOFTWARE) BEFORE USING THE SAFE-T-CUBE WITH IMPACT OR IMPACT PRO GAS DETECTORS.

1.2.2 Battery charger

CAUTION:

The use of a battery charger other than one approved by Zellweger Analytics may cause permanent damage to the Safe-T-Cube battery, and impair battery capacity.

1. GENERAL DESCRIPTION

Power supply requirements (3 options):

Zellweger part no.	
300 1737 00	120 V (+10% to -15%), 50/60 Hz
Zellweger part no.	
300 1737 01	230 V ($\pm 10\%$), 50 Hz (European plug)
Zellweger part no.	
300 1737 02	230 V ($\pm 10\%$), 50 Hz (UK plug)

Re-charging the Safe-T-Cube battery:

Charge rate	Slow charge only
Charge time	15 h, typical

Dimensions and weight:

Depth	58 mm (2.3 in.)
Width	56 mm (2.2 in.)
Length	93 mm (3.7in.)
Weight	500 g (17 oz)

Environmental limits:

Operational temperature	-10°C to +40°C
Storage temperature	-20°C to +50°C
Humidity	0 to 95% rh

1.3 STANDARD ACCESSORIES

Standard accessories provided with a Safe-T-Cube are as follows:

- (1) Acoustic tube, MiniGas/Impact/Impact Pro, Zellweger part no. 325 9565 01.
- (2) Safe-T-Cube User Manual (this document).

1. GENERAL DESCRIPTION

1.4 BRIEF DESCRIPTION

The Safe-T-Cube enables an Impact or MiniGas personal gas monitor to be used for area monitoring without any change to the gas monitor itself.

Acoustically coupled to the gas monitor, the Safe-T-Cube responds to any monitored alarms by operating its audible and visual indicators. These indicators comprise a two-tone sounder fitted to each side of the Safe-T-Cube case and a high-visibility beacon on the top, either of which is able to attract attention over a wide area.

Independently powered by its own sealed lead-acid battery, the Safe-T-Cube is approved for use in hazardous areas. Re-charging these batteries, however, must be carried out in a safe area, using a Zellweger-approved dedicated charger.

The case is constructed from Zinc plated mild steel, which is painted for maximum corrosion resistance.

2. USING THE SAFE-T-CUBE

2.1 INTRODUCTION

This chapter provides instructions for the use of the Safe-T-Cube when used in conjunction with a compatible Neotronics gas monitor (See Section 1.2.1 *Safe-T-Cube*). It is essential that the user fully understands the operation of the gas monitor itself and has access to the associated User Manual before using the gas monitor in conjunction with the Safe-T-Cube.

The top panel of the Safe-T-Cube is shown in Fig. 2.1.

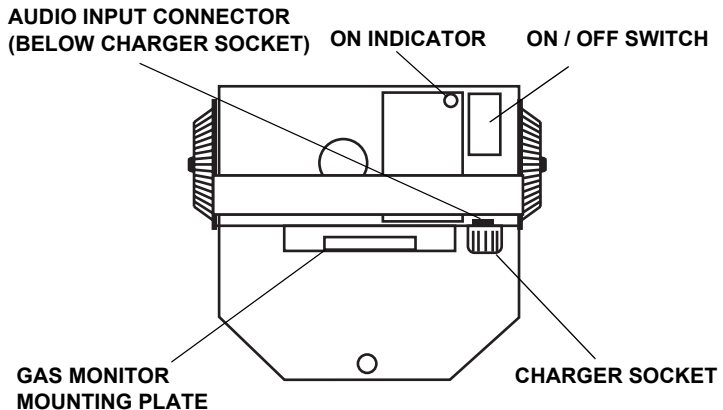


Fig. 2.1 Safe-T-Cube top panel

2.2 PREPARATION

Before using the Safe-T-Cube it is recommended as safe working practice to ensure that the battery is fully charged (Section 3. *ROUTINE MAINTENANCE*), and any preparation of the monitor that is specified in the appropriate User Manual is carried out satisfactorily.

2. USING THE SAFE-T-CUBE

2.2.1 Fitting a gas monitor to the Safe-T-Cube

- (1) Select an acoustic tube (to couple the gas monitor to the Safe-T-Cube) for the gas monitor to be used with the Safe-T-Cube:

Gas Monitor	Acoustic tube (Zellweger part no.)
Impact and MiniGas	325 9565 01 (right-angled connector)

- (2) Lift the gas monitor cover (hinged lid over the gas monitor housing).
- (3) Insert the open end of the acoustic tube into the **AUDIO INPUT** connector at right-hand side of the Safe-T-Cube housing. Press the acoustic tube firmly into the connector until a stop is felt. Pull gently to check security.

CAUTION:

Do not try to remove the acoustic tube simply by pulling on it (See Section 2.3.2 *Watchdog signal*).

- (4) Insert the other end of the acoustic tube into the gas monitor sounder port.

CAUTION:

It is important that the acoustic tube is connected correctly and securely. Check these connections before fitting the gas monitor to the mounting plate.

- (5) Refer to Fig. 2.2 and identify the fixing slots in the Safe-T-Cube mounting plate for the gas monitor to be fitted.
- (6) Insert the feet (on the underside of the gas monitor) into the appropriate keyhole slots on the mounting plate.

2. USING THE SAFE-T-CUBE

- (7) Slide the feet to the end of the of the keyhole slots and ensure that the gas monitor is securely positioned.

CAUTION:

Ensure that the acoustic tube is neither kinked nor squashed.

- (8) Close the gas monitor cover.

2.2.2 Entry checks

Before using the Safe-T-Cube in a hazardous area, ensure that the entry checks detailed in the gas monitor User Manual are carried out satisfactorily.

2.3 NORMAL USE OF THE SAFE-T-CUBE

2.3.1 Switching on and off

Switch on the Safe-T-Cube as follows:

- (1) Switch on the gas monitor in accordance with the instructions in the gas monitor User Manual, allowing it to warm up and run through any self-test sequence.
- (2) At the right-hand side of the Safe-T-Cube top panel, set the **ON/OFF/CHARGE** switch to **ON**. Check that the **ON** LED is illuminated.
- (3) Ensure that the Safe-T-Cube responds to the gas monitor 'watchdog' signal (Section 2.3.2 *Watchdog signal*).

WARNING:

IF, AT ANY TIME, THE WATCHDOG SIGNAL STOPS, THE SAFE-T-CUBE MUST BE CONSIDERED DEFECTIVE AND ALTERNATIVE SAFETY PROCEDURES INITIATED.

2. USING THE SAFE-T-CUBE

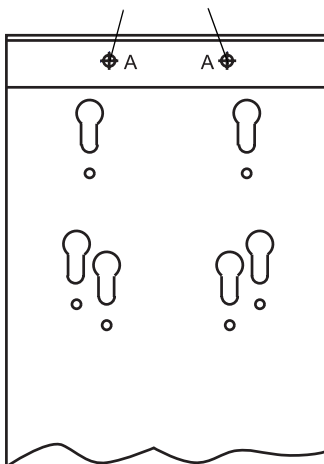


Fig. 2.2 Safe-T-Cube mounting plate

- (4) If the beacon flashes continuously, without the audible alarm sounding, the Safe-T-Cube battery needs re-charging. If necessary, recharge the Safe-T-Cube battery (See Section 3.3 *BATTERY MAINTENANCE*).

CAUTION:

The Safe-T-Cube must not be used when the battery needs re-charging.

- (5) Whilst operating normally, the Safe-T-Cube responds to any audible alarm from the gas monitor (Section 2.3.3 *Alarm signals*) by flashing the beacon and sounding the two-tone alarm continuously.

2. USING THE SAFE-T-CUBE

WARNING:

IF THE SAFE-T-CUBE ALARM SOUNDS, CARRY OUT LOCAL SAFETY PROCEDURES IMMEDIATELY.

When not in use, switch off the Safe-T-Cube as follows:

- (1) At the right-hand side of the Safe-T-Cube top panel, set the **ON/OFF/CHARGE** switch to **OFF/CHARGE**. Check that the **ON** LED is extinguished.
- (2) Switch off the gas monitor in accordance with the instructions in the gas monitor User Manual.
- (3) Withdraw the gas monitor from the Safe-T-Cube housing, and remove the acoustic tube from the gas monitor.
- (4) Remove the acoustic tube at the **AUDIO INPUT** connector by first applying pressure to the black surround of the connector and then pulling the acoustic tube out of the connector.

Notes: 1. Do not pull at the acoustic tube until pressure has been applied to the black surround.

2. Due to the location of the connector, it is easier to apply pressure with an instrument such as a small screwdriver rather than using the fingers.

2.3.2 Watchdog signal

Normally, the Safe-T-Cube responds to the gas monitor 'watchdog' signal by flashing the beacon on the top panel. Refer to the gas monitor User Manual for conditions under which the 'watchdog' signal occurs at other frequencies. For example, the MiniGas 'watchdog' occurs once every 60 seconds in 'standby' mode.

2. USING THE SAFE-T-CUBE

2.3.3 Alarm signals

Under alarm conditions, the Safe-T-Cube beacon flashes and the two-tone audible alarm sounds continuously. The specific alarm mode is indicated on the gas monitor.

Refer to the gas monitor User Manual to identify each alarm mode, and for the appropriate cancellation procedure.

2.3.4 Fault signals

Under gas monitor fault conditions, the Safe-T-Cube beacon flashes and the two-tone audible alarm sounds continuously. The specific fault mode is indicated on the gas monitor. Refer to the gas monitor user manual to identify the fault mode and take appropriate action.

2.4 STORAGE OF THE SAFE-T-CUBE

When the Safe-T-Cube is to be placed in storage, or removed from service for more than a few days, ensure that the gas monitor is removed and stored under the conditions specified in the gas monitor User Manual.

Ensure that the Safe-T-Cube batteries are fully charged before storage.

During long-term storage of the Safe-T-Cube, the batteries must be recharged at intervals of six months, or less.

3. ROUTINE MAINTENANCE

WARNING:

THE SUBSTITUTION OF COMPONENTS IN THE IS VERSION OF THE SAFE-T-CUBE MAY IMPAIR ITS INTRINSIC SAFETY.

CAUTION:

The Safe-T-Cube must be serviced only by qualified personnel trained by Zellweger Analytics, or a Zellweger appointed agent.

3.1 PREVENTIVE MAINTENANCE

Preventive maintenance comprises those actions that need to be carried out to ensure continuing correct operation of the Safe-T-Cube. These actions are as follows:

- (1) Ensure that the exterior is clean, dry and free of corrosive contaminants after use.
- (2) Ensure that the batteries are kept fully charged.
- (3) Every 12 months, return the Safe-T-Cube to Zellweger Analytics for servicing.

3.2 CORRECTIVE MAINTENANCE

For all corrective maintenance, including changing the batteries, the Safe-T-Cube must be returned to Zellweger Analytics or a Zellweger appointed agent.

3. ROUTINE MAINTENANCE

3.3 BATTERY MAINTENANCE

3.3.1 Recharging the battery

WARNING:

THE SAFE-T-CUBE BATTERY MUST NOT BE RECHARGED IN A HAZARDOUS AREA.

Recharge the Safe-T-Cube battery as follows:

- (1) Move the Safe-T-Cube to a safe area, and set the top-panel **ON/OFF/CHARGE** switch to **OFF/CHARGE**.
- (2) Use a Safe-T-Cube battery charger appropriate to the ac supply available.

CAUTION:

The use of a battery charger other than one approved by Zellweger Analytics may cause permanent damage to the Safe-T-Cube battery, and impair battery capacity.

Zellweger charger (part no.)	ac supply
300 1737 00	120 V
300 1737 01	230 V (Euro)
300 1737 02	230 V (UK)

- (3) Unscrew the cover from the Safe-T-Cube charger socket, at the right-hand side of the gas monitor housing, and insert the connector from the battery charger (polarising slots at top and left). Secure the connector with the locking ring.
- (4) Plug the battery charger into the ac supply and switch on at the ac supply. Leave for fifteen hours to fully charge the Safe-T-Cube battery.

3. ROUTINE MAINTENANCE

- (5) Disconnect the battery charger, and replace the cover on the Safe-T-Cube charger socket.

3.3.2 Replacing the battery

Note: The operational life of the Safe-T-Cube battery is more than 200 full discharge/charge cycles, and considerably greater if only partially discharged before recharging. The battery should be replaced when the battery capacity (without alarm conditions) is reduced to less than 25 hours operating time before recharging, or at any time that a reduced battery capacity makes operation inconvenient.

- (1) Switch off the Safe-T-Cube and ensure that it remains switched off during the battery replacement procedure.
- (2) On both side faces of the Safe-T-Cube, slacken the 2 mm Allen screw beneath the sounder that secures the sounder locking arm. Rotate the locking arm away from the sounder.

Note: Not all Safe-T-Cubes have these locking arms fitted.

- (3) Remove each sounder by turning the sounder counter-clockwise (approximately 15°) and then pulling it away from the side of the Safe-T-Cube.

Note: Normally, the sounder is tight push-fit in its rubber sealing ring. If necessary, carefully pull the sounder away from the Safe-T-Cube using two Allen keys.

- (4) Make a note of the wire connections to the screw terminals of each sounder, and then disconnect the sounders. Do not alter the internal switch settings of the sounders.
- (5) Locate the six 2.5 mm Allen screws securing the inner metalwork of the Safe-T-Cube to the outer case (four of these screws are on the underside and two on the rear face).

3. ROUTINE MAINTENANCE

Lay the Safe-T-Cube on its back to remove the four underside screws, then remove the two rear-face screws.

- (6) Fold the Safe-T-Cube handle down over the back of the unit and then remove the inner metalwork from the outer case.

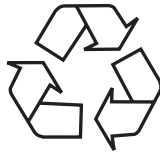
Slide the inner metalwork forward to the front of the outer case.

- (7) Holding the metalwork, **NOT the perspex cover**, lift, tilt forward (and turn slightly clockwise) the inner metalwork in order to clear the right-hand corner (near the on/off switch) over the outer cover.

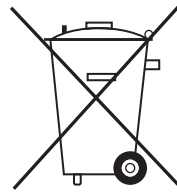
Lift the inner metalwork away from the outer cover.

- (8) Remove the four 2.5 mm Allen screws securing the battery bracket to the inner metalwork.

DISCARDING BATTERIES FROM THE SAFE-T-CUBE



Pb



Pb

To comply with the European Directive on Batteries and Accumulators Containing Certain Dangerous Substances (91/157/EEC), the battery in the Safe-T-Cube must be disposed of in accordance with local legislation.

- (9) Remove the two push-on connectors from the battery terminals. Remove the battery from the battery bracket.

- (10) Dispose of the used battery in accordance with local legislation. **Refer to Section 1. GENERAL DESCRIPTION, page 10 for suitable types of replacement battery.**
- (11) Push a new battery into the battery bracket. Ensuring that the red wire connects to the positive (+) terminal, fit the push-on connectors to the battery. Using four 2.5 mm Allen screws, secure the battery bracket to the inner metalwork.
- (12) Lower the inner metalwork into the outer cover. Lay the Safe-T-Cube on its back and, using four 2.5 mm Allen screws, secure the inner metalwork to the outer cover. Fit the two 2.5 mm Allen screws at the rear of the Safe-T-Cube.
- (13) Using the connection details noted in Step (4), connect the two sounders.
- (14) Fit the two sounders into the outer cover.

First, ensure that the sounder wiring is coiled so that it will not be trapped when the sounder is inserted into its holder.

Secondly, line up the sounder bayonets with the holder slots before pushing into the outer cover seal. If necessary, make a suitable pencil mark on the seal.

When you feel the sounder bayonets locating with the holder slots, push in and lock by turning clockwise.
- (15) Position and secure the sounder locking arms.

3.4 CALIBRATION AND ADJUSTMENTS

There are no calibration or adjustment procedures for the Safe-T-Cube. If there is any reason to doubt the performance of the Safe-T-Cube, it should be returned to Zellweger Analytics for servicing.

3. ROUTINE MAINTENANCE

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UNITED KINGDOM & INTERNATIONAL

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