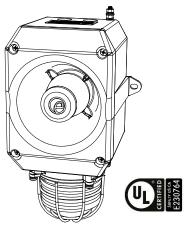


# INSTRUCTION & SERVICE MANUAL D2xC1 ALARM HORN AND STROBE For Use In Hazardous Locations



# 1) Introduction

The D2xC1 is an ATEX, IECEx and UL certified Alarm Horn and Strobe which produces a loud warning signal and bright visual signal in a hazardous area. Sixty-Four first stage alarm sounds can be selected by internal switches and each one can be externally changed to a second, third or fourth stage alarm sound. The unit may be used for Gas applications in Zone 2 / Class I Zone 2 / Class I, Division 2 as well as for Dust applications in Zone 22 / Class II Zone 22 / Class II Divison 2 / Class III Division 1 & 2. The beacon flashes at a set rate of 1Hz. The D2xC1X05DC024 & D2xC1X10DC024 are also listed as Audible & Visual Appliances for use in Fire Alarm Systems Private Mode in accordance with UL464 Tenth Edition & UL1638 Fourth Edition.

# 2) Warnings

SUITABLE FOR USE IN CLASS II, DIVISION 2, GROUPS A, B, C AND D HAZARDOUS LOCATIONS

SUITABLE FOR USE IN CLASS II, DIVISION 2, GROUPS E, F AND G HAZARDOUS LOCATIONS

WARNING: DO NOT OPEN WHEN EXPLOSIVE ATMOSPHERE IS PRESENT

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF ANY COMPONENT MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF ANY COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS II, DIVISION 2.

POTENTIAL ELECTROSTATIC CHARGING HAZARD – CLEAN ONLY WITH A DAMP CLOTH

USE HEAT RESISTANT CABLES AND CABLE GLANDS (RATED 90°C OR HIGHER)

EXPLOSION HAZÁRD. DO NOT REMOVE OR REPLACE LAMPS, FUSES OR PLUG-IN MODULES UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS KNOWN TO BE FREE OF IGNITIBLE CONCENTRATIONS OF FLAMMABLE GASES OR VAPORS.

EXPLOSION HAZARD. DO NOT DISCONNECT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITIBLE CONCENTRATIONS.

DO NOT PAINT

NE PAS PEINTURER

# 3) Ratings and Markings

# 3.1 ATEX / IECEx certification

The D2xC1 Alarm Horn and Strobe complies with the following standards:

EN60079-0:2012+A11:2013 / IEC60079-0: ed. 6.0 (2011-06) EN60079-15:2010 / IEC60079-15: ed. 4.0 (2010-01) EN60079-31:2009 / IEC60079-31: ed. 1.0 (corr. 1 2009)

The EC-Type Examination Certificate DEMKO 14ATEX4786493904X / IECEx ULD14.0004X has been issued by UL. This confirms compliance with the European ATEX Directive 94/9/EC for Group II, Category 3G/D equipment. The unit carries the Community Mark and subject to local codes of practice, may be installed in any of the EEA member countries. This instruction sheet describes installations which conform to the current issue of EN60079-14/IEC60079-14 Electrical Installation in Hazardous Areas; EN60079-10-1 / IEC 60079-10-1 Explosive Atmospheres - Classification of Areas. Explosive Gas Atmospheres; EN60079-10-2 / IEC 60079-10-2 Explosive Atmospheres - Classification of Areas. Explosive Dust Atmospheres. When designing systems for installation outside the UK, the local Code of Practice should be consulted.

The D2XC1X05 is rated as follows:



\] \] II 3G Ex nA IIC T2 Gc (Ta -40⁰C to +50°C)

 $\times$  II 3D Ex tc IIIC T90°C Dc (Ta -40°C to +50°C)

The D2XC1X10 is rated as follows:



- II 3G Ex nA IIC T1 Gc (Ta -40°C to +50°C)
- / II 3G Ex nA IIC T2 Gc (Ta -40°C to +40°C)
- II 3D Ex tc IIIC T110°C Dc (Ta -40°C to +50°C)

CE marking:



# Zones, Gas / Dust Groups and Temperature Classification

When connected to an approved system the D2X unit may be installed in:

- Zone 2 explosive gas air mixture not likely to occur in normal operation, and if it does, it will only exist for a short time.
- Zone 22 explosive dust air mixture not likely to occur in normal operation, and if it does, it will only exist for a short time.

### May be used with gases in groups:

Group IIA	propane
Group IIB	ethylene
Group IIC	hydrogen / acetylene

Having a temperature classification (for Gas applications) of:

T1	450°C
T2	300°C

Sheet 1 of 8

### May be used with Dust types:

Group IIIA	combustible flyings
Group IIIB	non-conductive dust
Group IIIC	conductive dust

### Maximum Surface Temperature for Dust Applications:

For D2xC1X05: 90°C

For D2xC1X10: 110°C

### 3.2 Class / Zone ratings for US

The D2xC1 Alarm Horn and Strobe complies with the following standards:

ANSI/UL 60079-0-2013 ANSI/UL60079-15-2013 ISA60079-31-2013

The D2XC1X05 Alarm Horn and Strobe is rated as follows:

Class I, Zone 2 AEx nA IIC T2 Gc (Ta -40°C to +50°C) Zone 22 AEx tc IIIC T120°C Dc (Ta -40°C to +50°C)

The D2XC1X10 Alarm Horn and Strobe is rated as follows:

Class I, Zone 2	2 AEx nA IIC T1 Gc	(Ta -40°C to +50°C)
Class I, Zone 2	2 AEx nA IIC T2 Gc	(Ta -40°C to +40°C)
Zone 22	AEx tc IIIC T120°C Dc	(Ta -40°C to +50°C)

Installation must be carried out in compliance with the National Electric Code

### 3.3 Class / Zone ratings for Canada

The D2xC1 Alarm Horn and Strobe complies with the following standards:

CAN/CSA C22.2 No. 60079-0:11 CAN/CSA C22.2 No. 60079-15:12 CAN/CSA C22.2 No. 60079-31:12

The D2XC1X05 Alarm Horn and Strobe is rated as follows:

Ex nA IIC T2B Gc X	(Ta -40°C to +50°C)
Ex nA IIC T2C Gc X	(Ta -40°C to +45°C)
Ex tc IIIC T120°C Dc	(Ta -40°C to +50°C)
Class II, Div 2 EFG T4A	(Ta -40°C to +50°C)

The D2XC1X10 Alarm Horn and Strobe is rated as follows:

Ex nA IIC T1 Gc X	(Ta -40ºC to +50°C)
Ex nA IIC T2 Gc X	(Ta -40°C to +40°C)
Ex tc IIIC T120°C Dc	(Ta -40°C to +50°C)
Class II, Div 2 EFG T4A	(Ta -40°C to +50°C)

Installation must be carried out in compliance with the Canadian Electric Code

### 3.4 Class / Division Ratings for US and Canada

D2xC1 Alarm Horn and Strobe complies with the following standards:

ANSI/ISA 12.12.01-2013 CSA C22.2 No. 213-M1987 CSA C22.2 No. 157-92:2006

### For D2xC1X05:

	-	
Class I Div 2	ABCD T2B	Ta -40°C to +70°C
Class I Div 2	ABCD T2C	Ta -40°C to +55°C

 Class I Div 2
 ABCD T2D
 Ta -40°C to +40°C

 Class II Div 2
 FG T5
 Ta -40°C to +50°C

 Class III Div 1&2
 Ta -40°C to +50°C

### For D2xC1X10:

Class I Div 2	ABCD T1	Ta -40°C to +70°C
Class I Div 2	ABCD T2	Ta -40°C to +50°C
Class II Div 2	FG T4A	Ta -40°C to +50°C
Class II Div 2	FG T5	Ta -40°C to +40°C
Class III Div 1&2	2	Ta -40°C to +50°C

Installation must be carried out in compliance with the National Electric Code / Canadian Electric Code

### 3.5 Ambient Temperature Range:

-40°C to +70°C (Class I Div 2 only) -40°C to +50°C

# 3.5 Ingress Protection Ratings

The product is rated for ingress Protection as follows: IP rating per EN60529: IP66 Type rating per UL50E / NEMA250: 4 / 4X / 3R / 13

To maintain the ingress protection rating, the two off M20 cable entries must be fitted with suitably rated, certified cable entry and/or blanking devices during installation.

### 3.6 Electrical Ratings

Part No.	Nominal Voltage	Nominal Current	Voltage Range	Max Current
D2xC1X05 DC024	24Vdc	513mA	20-28Vdc	521mA @ 20Vdc
D2xC1x05 DC048	48Vdc	311mA	42-58Vdc	328mA @ 42Vdc
D2xC1x05 AC115	115Vac	174mA	115- 125Vac 60Hz	183mA @ 125Vac
D2xC1x05 AC230	230Vac	63mA	215- 250Vac5 0Hz	77mA @ 250Vac
D2xC1X10 DC024	24Vdc	876mA	20-28Vdc	876mA @ 20Vdc
D2xC1x10 DC048	48Vdc	461mA	42-58Vdc	475mA @ 42Vdc
D2xC1x10 AC115	115Vac	320mA	115- 125Vac 50Hz	343mA @ 125Vdc
D2xC1x10 AC230	230Vac	100mA	215- 250Vac 60Hz	115mA @ 250Vdc

A supply voltage variation of +/-10% is permissible.

### 3.7 Fire Alarm Ratings

The following models are approved for use as Audible and Visual Appliance for use in Fire Alarm Systems – Private Mode (UL1638/UL464) and produce a sound pressure level above 75dB(A) at 10 feet:

### D2xC1X05DC024 & D2xC1X10DC024

For Fire Alarm applications, the Sounder Volume must be at the highest setting, (see volume control section).

For fire alarm use, the temporal pattern tone No. 12 as per the tone table provided in these instructions must be selected. This tone produces a minimum sound pressure level of:

European Safety Systems Ltd. Impress House, Mansell Road, Acton, London W3 7QH

Sheet 2 of 8

UL464: 92.2dB(A)<sup>†</sup> at 10 feet. (<sup>†</sup>reverberation room)

Model	Flash Rate	Light output ir cd eff.	Lens colour
D2xC1X05DC024	60 fpm	15.6	Clear
D2XC1X05DC024		4.8	Red
D2xC1X10DC024	60 fpm	64.2	Clear
D2xC1X10DC024 60 fpm		13.6	red

### On-Axis Flash Rate and min. light output:

# 4) Special Conditions for Safe Use

Special Condition for safe Use as stated on the Type Examination Certificate DEMKO 14 ATEX 4786493904X / CoC IECEX ULD 14.0004X:

End user shall adhere to the manufacturer's installation and instruction when performing housekeeping to avoid the potential for hazardous electrostatic charger during cleaning, by using a damp cloth.

The D2xC1 is not to be mounted with the horn facing upwards The equipment shall only be used in end use with appropriately certified cable entry devices and blanking plugs

### 4.1 Installation

The product must only be installed by suitably qualified personnel in accordance with the latest issues of the relevant standards.

The installation of the units must also be in accordance with any local codes that may apply and should only be carried out by a competent electrical engineer who has the necessary training.

The equipment is not to be mounted with the horn facing upwards.

The equipment has not been assessed as a safety-related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).

The cable entry temperature may exceed +70°C / the cable branching point may exceed 80°C. Therefore suitable heat resisting cables and cable glands must be used, with a rated service temperature of at least  $90^{\circ}$ C

To maintain the ingress protection rating and mode of protection, the M20 x 1.5 cable entries must be fitted with suitably rated, certified cable glands and/or suitably rated, certified blanking devices during installation. If a high IP (Ingress Protection) rating is required then a suitable sealing washer must be fitted under the cable gland. For use in explosive gas atmospheres a minimum ingress protection rating of IP54 must be maintained. For use in explosive dust atmospheres a minimum ingress protection rating of IP64 must be maintained.

Only the front cover is to be used for access to the enclosure for installation, service and maintenance. Once the product is opened, the Type Rating cannot be maintained anymore unless a full verification of the gasket material is done and there is no damage.

Connections are to be made into the terminal blocks using solid or stranded wire, sizes 0.5-2.5mm2 / AWG 20-14. Wire insulation needs to be stripped 6-7mm. Wires may be fitted

securely with crimped ferrules. Terminal screws need to be tightened down with a tightening torque of 0.56 Nm / 5 Lb-in.

Internal earthing connections should be made to the internal earth terminal on the PCBA. The earth conductor should be at least equal in size and rating to the incoming power conductors. The internal earth bonding wire connects the PCBA earth terminal to the internal earth terminal in the enclosure back box.

External earthing connections should be made to the M5 earth stud, using a ring crimp terminal to secure the earth conductor to the earth stud. The external earth conductor should be at least  $4mm^2$  / AWG 11 in size.

Check that the earth bonding wire between the two castings is secure and the 'O' ring seal is in place and in good condition.

### 4.2 Maintenance, Overhaul and Repair

Maintenance, repair and overhaul of the equipment should only be carried out by suitably qualified personnel in accordance with the current relevant standards:

EN60079-19 / IEC60079-19 Explosive atmospheres -Equipment repair, overhaul and reclamation EN 60079-17 / IEC60079-17 Explosive atmospheres -Electrical installations inspection and maintenance Units must not be opened while an explosive atmosphere is present.

If opening the unit during maintenance operations a clean environment must be maintained and any dust layer removed prior to opening the unit.

Electrostatic charging hazard - Clean only with a damp cloth

# 5) Installation

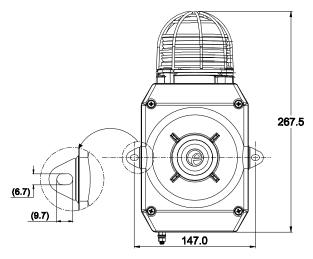


Fig. 1 Fixing locations.

D2xC1 Alarm Horn and Strobe should only be installed by trained competent personnel.

### 5.1 Mounting

The D2xC1 Alarm Horn and Strobe may be secured to any flat surface using the two 9.7 x 6.7mm, 147mm pitch fixing holes. The enclosure provides IP66 protection and is suitable for installation in exterior locations providing it is positioned so that water cannot collect in the horn, and the cable entry is sealed.

European Safety Systems Ltd. Impress House, Mansell Road, Acton, London W3 7QH

Sheet 3 of 8

### 5.2 Installation procedure

- Secure the D2xC1 Alarm Horn and Strobe to a a) flat surface via the two 9.7 x 6.7mm, 147mm pitch fixing holes in the mounting feet.
- b) Remove the front of the unit by unscrewing the four captive cover screws and pulling the front
- four captive cover screws and putting the from away from the enclosure. Fit an M20x1.5 suitably rated, certified cable gland or conduit entry into the hole in the enclosure and connect the field wiring to the appropriate alarm horn terminals as shown in section 9 and fig 8 (DC) or section 8 fig 5 (AC) of this manual. The power supply terminals are duplicated so that horns may be connected in parallel and for DC units only an end of line c) parallel and for DC units only an end of line monitoring resistor may be fitted. If the second M20x1.5 entry is not used a suitably rated, certified stopping plug must always be fitted
- Select the required output tone by positioning the d) six switches as shown in Table 1 and Fig 2
- e) Adjust the internal volume control to provide the required sound level.
- f) Check that the O-ring seal in the front cover is in good condition and not damaged.
- Replace the front of the unit and tighten the four g) captive cover screws.

#### 6) Volume Control

The alarm horn output level of the D2xC1 unit can be set by adjusting the volume control potentiometer (see Fig 2). For maximum output, set the potentiometer fully clockwise.

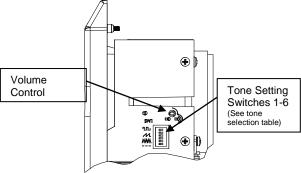
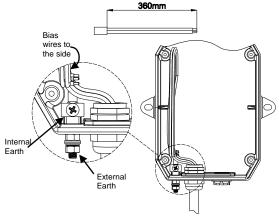


Fig. 2 Location of field controls

#### 7) **Cable Routing and Tone Selection**

# 7.1 Cable Routing

Due to the compact design of the D2x units, it is important that the user strips the outer sheath of and biases any cables over the size of 1mm<sup>2</sup> as shown below.



\*Glands and/or stopping plugs to be customer supplied to suit application.

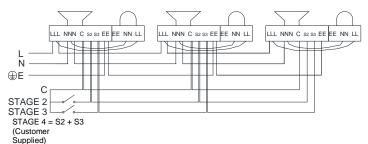
Fig 3. Cables are to be stripped and biased toward side of unit with allocated spacing as shown.

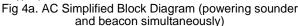
# 7.2 Tone Selection

The D2xC1 alarm horns have 64 different tones. The tones are selected by operation of the tone setting DIP switches (see Fig. 2) on the PCB. The alarm horns can also be switched to sound the second, third and fourth stage alarm tones. The tone table (Table 1) shows the switch positions for the 64 tone and which tones are available for the second, third and fourth stages.

#### 8) AC Wiring

### 8.1 Wiring Diagram





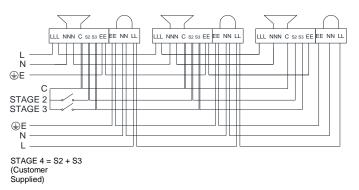


Fig 4b. AC Simplified Block Diagram (powering sounder and beacon independently)

# 8.2 Unit's First Stage Tones

Stage one (S1) operation: Simply connect the supply voltage to the L and N supply terminals, (see fig. 5). The Strobe is powered via factory installed wires connected to the sounder. The wires connecting the alarm horn and strobe can be removed if the user wishes to power the strobe separately.

### 8.3 Second, Third and Fourth Stage Tone Selection

To select the second, third and fourth stage tones on the D2xS1 AC alarm horns.

Stage two (S2) operation: Power L and N, link the common (C) and S2 terminal.

Stage three (S3) operation: Power L and N, link the common (C) and S3 terminals.

Stage four (S4) operation: Power L and N, link the common (C) and both the S2 and S3 terminals.

Strobe will continue to flash during alarm horn S2, S3 & S4 stages.

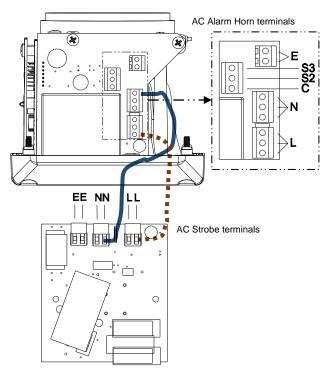


Fig. 5 AC Terminals

# 9) DC Wiring

# 9.1 DC Stage Polarity Control

The stage switches of the DC powered D2x units can be activated via Positive (+ve) or Negative (-ve) switching. All units are factory set to -ve switching as standard. If +ve switching is required, the two wire links should be removed from the '-' positions of the stage polarity control terminals and fitted to the '+' positions as shown in fig 6.

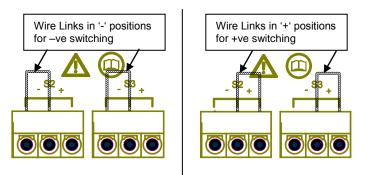
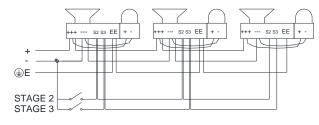
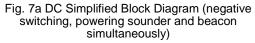


Fig. 6 Stage Polarity Control settings.

### 9.2 Wiring Diagrams





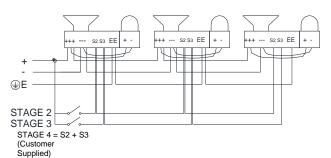


Fig. 7b DC Simplified Block Diagram (positive switching, powering sounder and beacon simultaneously)

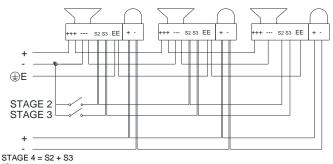




Fig. 7c DC Simplified Block Diagram (negative switching, powering sounder and beacon independently)

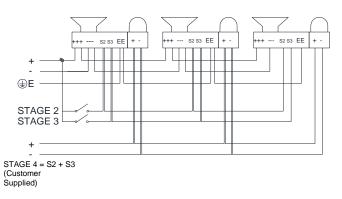


Fig. 7d DC Simplified Block Diagram (negative switching, powering sounder and beacon independently)

### 9.3 Units First Stage Tones

Stage one (S1) operation: Simply connect the supply voltage to the + and - supply terminals, (see fig. 8). The Strobe is powered via factory installed wires connected to the alarm horn. The wires connecting the alarm horn and strobe can be removed if the user wishes to power the strobe separately.

### 9.4 Second, Third and Fourth Stage Tone Selection

### For units set up for -ve switching (default setting):

Stage two (S2) operation: Power +ve and -ve, link a -ve supply line to the S2 terminal.

Stage three (S3) operation: Power +ve and -ve, link a -ve supply line to the S3 terminal.

Stage four (S4) operation: Power +ve and –ve, link a -ve supply line to both the S2 & S3 terminals.

Strobe will continue to flash during alarm horn S2, S3 & S4 stages.

06-12-19

Sheet 5 of 8

### For units set up for +ve switching (refer to 9.1):

Stage two (S2) operation: Power +ve and -ve, link a +ve supply line to the S2 terminal.

Stage three (S3) operation: Power +ve and -ve, link a +ve supply line to the S3 terminal.

Stage four (S4) operation: Power +ve and –ve, link a +ve supply line to both the S2 & S3 terminals.

Strobe will continue to flash during alarm horn S2, S3 & S4 stages.

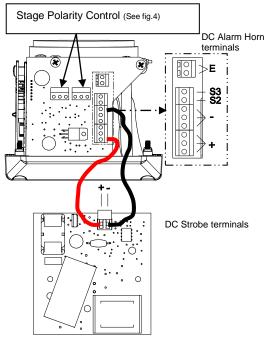


Fig. 8 DC Terminals

# 10) Earthing

The unit has both internal and external earth terminals, (please see fig 3).

Internal earthing connections should be made to the internal earth terminal on the PCBA, (please see fig 5 for AC, fig 8 for DC). The earth conductor should be at least equal in size and rating to the incoming power conductors. The internal earth bonding wire connects the PCBA earth terminal to the internal earth terminal in the enclosure back box.

External earth connections should be made to the M5 earth stud, using a ring crimp terminal to secure the earth conductor to the earth stud. The external earth conductor should be at least 4mm<sup>2</sup> in size. The external earth crimp ring should be located between the two M5 plain washers provided and securely locked down with the M5 spring washer and M5 nut.

# 11) End Of Line Monitoring (DC Units Only)

On D2xC1 DC units, dc reverse line monitoring can be used if required. All DC units have a blocking diode fitted in their supply input lines. An end of line monitoring resistor can be connected across the +ve and –ve terminals. If an end of line resistor is used it must have the following values:-

### 24V DC Alarm Horn and Strobe

Minimum Resistance 3k9 ohms	Minimum wattage 0.5W
Minimum Resistance 1k ohms	Minimum wattage 2.0W

### 48V DC Alarm Horn and Strobe

Minimum Resistance 15k ohms Minimum Resistance 3k9 ohms Minimum wattage 0.5W Minimum wattage 2.0W

The resistor must be connected directly across the +ve and -ve terminals of the sounder board only, as shown in the following drawing. Whilst keeping its leads as short as possible, a spacing of at least 1/16 inch (1.58mm) must be provided through air and over surfaces between uninsulated live parts.

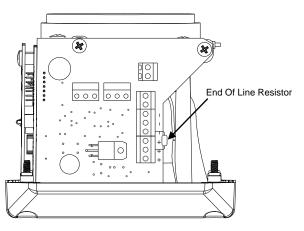


Fig. 9 End Of Line Resistor

### 12) Sound Directional Characteristics for Fire Alarm

# **Horizontal Axis**

Angle	OSPL	Angle	OSPL
Reference (90°)	101.2dB(A)	Reference (90°)	101.2dB(A)
115°	-3dB(A)	68°	-3 dB(A)
129°	-6dB(A)	55°	-6 dB(A)
180°	92.4dB(A)	0°	92.4

### **Vertical Axis**

Angle	OSPL	Angle	OSPL
Reference (90°)	101.5dB(A)	Reference (90°)	101.5dB(A)
123°	-3 dB(A)	65°	-3 dB(A)
137°	-6 dB(A)	50°	-6 dB(A)
180°	91 dB(A)	0°	88.5 dB(A)

European Safety Systems Ltd. Impress House, Mansell Road, Acton, London W3 7QH

Stage 1 Tone No	Tone Description	Tone Visual	Switch Settings 1 2 3 4 5 6	Stage 2 Tone (S2)	Stage 3 Tone (S3)	Stage 4 Tone (S2 + S3)
1	1000Hz PFEER Toxic Gas	1000Hz	000000	3	2	44
2	1200/500Hz @ 1Hz DIN / PFEER P.T.A.P.	1200Hz 500Hz 1s	100000	1	3	44
3	1000Hz @ 0.5Hz(1s on, 1s off) PFEER Gen. Alarm	1000Hz 1s 1s	010000	1	2	44
4	1.4KHz-1.6KHz 1s, 1.6KHz- 1.4KHz 0.5s NF C 48-265	1600Hz 0.5s 1400Hz 1s	110000	44	24	1
5	544Hz(100mS)/440Hz (400mS) NF S 32-001	544Hz 0.1s 440Hz 0.4s	001000	52	19	1
6	1500/500Hz - (0.5s on , 0.5s off) x3 + 1s gap AS4428	1500Hz 0.5s 0.5s 0.5s 0.5s 0.5s 1.5s	101000	7	44	1
7	500-1500Hz Sweeping 2 sec on 1 sec off AS4428	1500Hz 500Hz2s1s	011000	6	44	1
8	500/1200Hz @ 0.26Hz(3.3s on, 0.5s off) Netherlands - NEN 2575	1200Hz 500Hz <u>3.3s</u> 0.5s	111000	44	24	35
9	1000Hz (1s on, 1s off)x7 + (7s on, 1s off) IMO Code 1a	1000Hz 1s 1s 1s 1s 1s 7s	000100	18	34	1
10	1000Hz (1s on, 1s off)x7 + (7s on, 1s off) IMO Code 1a	1s   1s   1s   1s   1s   1s    7s	100100	21	34	1
11	420Hz(0.5s on, 0.5s off)x3 + 1s gap ISO 8201 Temporal Pattern	420Hz 0.5s 0.5s 0.5s 1.5s	010100	44	1	8
12	1000Hz(0.5s on, 0.5s off)x3 + 1s gap ISO 8201 Temporal Pattern	1000Hz 0.5s 0.5s 0.5s 1.5s	110100	44	1	8
13	422/775Hz - (0.85 on, 0.5 off) x3 + 1s gap NFPA - Temporal Coded	775Hz 422Hz 0.85s 0.5s 0.85s 0.85s 1.5s	001100	44	1	8
14	1000/2000Hz @ 1Hz Singapore	2000Hz 1000Hz 1s	101100	23	3	35
15	300Hz Continuous	300Hz	011100	44	24	35
16	440Hz Continuous	440Hz	111100	44	24	35
17	470Hz Continuous	470Hz	000010	44	24	35
18	500Hz Continuous IMO code 2 (Low)	500Hz	100010	44	24	35
19	554Hz Continuous	554Hz	010010	64	24	35
20	660Hz Continuous	660Hz	110010	44	24	35
21	800Hz IMO code 2 (High)	800Hz	001010	44	24	35
22	1200Hz Continuous	1200Hz	101010	44	24	35
23	2000Hz Continuous	2000Hz	011010	15	3	35
24	2400Hz Continuous	2400Hz	111010	48	20	35
25	440 @0.83Hz (50 cycles/minute) Intermittent	440Hz 0.6s 0.6s	000110	1	44	8
26	470 @0.9Hz - 1.1s Intermittent	470Hz 0.55s 0.55s	100110	1	44	8
27	470Hz @5Hz - (5 cycles/second) Intermittent	470Hz 0.1s 0.1s	010110	1	44	8
28	544Hz @ 1.14Hz - 0.875s Intermittent	470Hz 0.43s 0.44s	110110	44	24	8
29	655Hz @ 0.875Hz Intermittent	655Hz 0.57s 0.57s	001110	1	44	8
30	660Hz @0.28Hz - 1.8sec on, 1.8sec off Intermittent	660Hz 1.8s 1.8s	101110	44	24	8
31	660Hz @3.34Hz - 150mS on, 150mS off Intermittent	660Hz 0.15s 0.15s	011110	30	24	8

06-12-19

Sheet 7 of 8

32         Zéble di tile interminent         1111110         44         24         8           33         Border, G.Sise ont         B								1
33         Non-meter         1         000001         53         24         8           34         RMP1 2014 00 00 1 5         1000001         56         24         8           35         1000001         51         24         8           36         240016 01 12         1100001         24         24         8           37         200016 01 51         1100001         53         24         8           37         200016 01 51         1100001         53         24         8           38         3051016 01 14         8         19         311         011001         1         8         19           39         4000016 02 16         011001         1         8         19         11         10         1         8         19           40         64446 02         005         1110001         1         8         19           41         Abronating         4001         000101         1         8         19           42         04446 0000101         1         8         19         100101         1         8         19           43         24466 0001001         0000101         1         8	32	745Hz @ 1Hz Intermittent		3	111110	44	24	8
34         WORE 02 Htt MUCCAD 3.0         WORE 02001         0.0001         56         2.4         8           35         MODEL 02 Htt Immunitient         MODEL 02 Htt Immunitient         MODEL 02 Htt Immunitient         MODEL 02 Htt Immunitient         200011         0.0001         2.4         8           36         Sample 02 Htt Immunitient         200011         Sample 02 Htt Immunitient         200011         100001         2.1         2.4         8           37         2000011 02 Htt Immunitient         200011         Sample 02 Htt Immunitient         200011         1100001         1         8         19           39         400000111 02 Htt Immunitient         200011         Sample 02 Htt Immunitient         200011         1         8         19           40         555444Htt 02 Htt Ammunitient         200011         1         8         19         1110001         1         8         19           41         56544Htt 02 Htt Ammunitient         200011         1         8         19         1001001         1         8         19           42         56544Htt 02 Htt Ammunitient         200011         1         8         19         200111         1         8         19           42         56544Htt 20 Httt Ammu	33				000001	53	24	8
35         1000H & 11k insemitter         1000H & 0 is optimized         0 i	34	800Hz @ 2Hz IMO code 3.a			100001	56	24	8
36         200Hr # Bitz memilient         224         8           37         2200Hr # Bitz memilient         50Hr			1000Hz 0.5s	[	010001			
37         200H2 @ BH2 Mammanding         200H2 Mammanding         200H1 Mammanding         200H2 Mammanding <th< td=""><td></td><td></td><td>2400Hz 0.5s</td><td></td><td>110001</td><td></td><td></td><td></td></th<>			2400Hz 0.5s		110001			
37         2000+t         88         10 <th< td=""><td></td><td></td><td>2900Hz 0.1s</td><td>[</td><td>001001</td><td></td><td></td><td></td></th<>			2900Hz 0.1s	[	001001			
363       363/5 (91+2) (91+2) Alternaling       300+2       100       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1       1       1       0       1       1       0       1       1       0       1       1       0       1       1       0       1 <td></td> <td>2900Hz @ 5Hz Intermittent</td> <td>518Hz 0</td> <td></td> <td></td> <td></td> <td></td> <td></td>		2900Hz @ 5Hz Intermittent	518Hz 0					
339       480500Hz @ 122 Alternating       400 transmit       111 0 0 1       1       0       139         400       556440Hz @ 112 Alternating       400 transmit       056       111 0 0 0 1 0 1       1       8       199         41       556440Hz @ 112 Alternating       400 transmit       056       0 0 0 1 0 1 0 1       1       8       199         42       55014 @ 0.581 transmit       65014       0.561 transmit       0 0 0 1 0 1 0 1       1       8       199         43       70004000 Hz @ 0.591 transmit       0.501 transmit       0.501 transmit       0 0 0 1 0 1 0 1       1       8       199         44       Alternating       50014 transmit       0.502 transmit       0.01 0 1 0 1       1       8       199         45       500100014 transmit       50014 transmit       50014 transmit       5025 transmit       0.01 1 0 1 1       1       8       199         46       500100014 transmit       5014 transmit       5025 transmit       0.01 1 1 0 1       53       24       199         47       Marcaning       5027 transmit       0.01 1 1 0 1       53       24       12         50       500100014 transmit       5014 transmit       100011 1       54       24		363/518Hz @ 1Hz Alternating	303112	255		1	8	
440       564/40/br @ 1/2 Alternating       400br 2	39	450/500Hz @ 2Hz Alternating	430112	5s		1	8	19
41         Assumanta         cost         0000101         1         8         19           42         cockendaria         cost         0         0         10         1         8         19           43         Assurate         0         0         0         0         0         1         8         19           43         Assurate         0         0         0         0         1         8         19           43         Assurate         0         0         0         1         1         8         19           44         Assurate         0         0         0         1         1         8         19           44         Bool 000012         212         Assurate         0         0         1         1         8         19           45         97080012         212         Assurate         0         0         0         1         1         8         19           46         Assurate         0         0         0         1         1         8         19           47         Assurate         0         0         0         1         1         1	40					44	24	19
42       cpdi/2604z       0.0814z       00       sitte       0.0       1       0.0       1       1       8       19         43       Atternating       7000500+z       0.24b       0.22b       0.1       0.1       1       8       19         44       Atternating       0000+z       0.25b       0.1       0.1       1       8       19         44       Atternating       0000+z       0.25b       0.25b       0.0       1       1       8       19         45       9700800+z       0.2+z Atternating       970+z       0.25b       0.0       0.0       1       1       8       19         46       600/1000+z       0.05+z       0.05+z       0.000+z       0.0       1       1       8       19         47       200200+z       0.25b       0.0       0.1       1.0       1       8       19         48       500/1000+z       0.0+z       3.4s       1       1.0       1.4       2.4       12         500       500+050+z       0.3+z       500+z       5.4       0.0       0.0       1.4       2.4       12         500       500+02       0.3+z       500	41		440Hz0.8s		000101	1	8	19
43       Allendary and the original formation of the or	42		561Hz0.6s	)s	100101	1	8	19
44       80011000Hz       92Hz       800Hz       0.258       110101       5       24       19         45       970800Hz       9.2Hz       800Hz       0.258       0011001       1       8       19         46       9001100Hz       80.875Hz       900Hz       0.258       0011101       1       8       19         47       2400/200Hz       80.875Hz       900Hz       0.258       011101       57       24       19         48       5001200Hz       0.3Hz       200Hz       0.258       0111101       57       24       19         48       5001200Hz       0.3Hz       500Hz       0.258       0111101       44       24       12         49       500Hz       0.3Hz       500Hz       0.3Hz       500Hz       0.3Hz       1000011       44       24       12         50       560/1200Hz       0.18Hz       500Hz       0.3H       1000011       44       24       12         51       5001250Hz       0.12Hz       500Hz       0.3H       100011       56       24       12         52       5001250Hz       0.14S       110011       57       24       12	43		0.020	52s	010101	1	8	19
45         970800Hz @ 2Hz Alternating         9704z 0.256 BOOT         0.0256 D256         0.0110.01         1         8         19           46         800/1000Hz @ 0.875Hz Atternating         8004z 0.873Hz BOOT         10.110.1         53         24         19           47         40007000Hz @ 0.875Hz Atternating         8004z 0.873Hz BOOT         2005E         0.1110.1         53         24         19           48         Sweeping         500/1200Hz @ 0.384z         500Hz 0.356         0.1110.1         57         24         19           48         Sweeping         500Hz 0.356         0.1110.1         57         24         19           49         500/1200Hz @ 0.12Hz         500Hz 0.356         0.000.01.1         44         24         12           500         Sweeping         50Hz 0.38         100.01.1         44         24         12           500         Sweeping         0.10.01.1         44         24         12           500         Sweeping         0.10.01.1         64         24         12           51         11.00.11         64         24         12           53         8001000Hz @ 0.128         10.10.11         57         24         12	44		0.05	255	110101	5	24	19
46 $300^{11000Hz}$ (# 0.875Hz Atternating $1000Hz$ $0.376$ $101101$ $53$ $24$ $19$ 47 $2400Hz$ $203Fe$ $0.11101$ $57$ $24$ $19$ 48 $300Hz$ $203Fe$ $0.11101$ $57$ $24$ $19$ 48 $500^{1100Hz}$ $0.3Hz$ $500Hz$ $3.34s$ $1111101$ $44$ $24$ $12$ 49 $560^{1100Hz}$ $0.0Hz$ $5.47s$ $0000011$ $44$ $24$ $12$ 50 $560^{1100Hz}$ $0.3Hz$ $560Hz$ $5.47s$ $0000011$ $44$ $24$ $12$ 50 $560^{1120Hz}$ $0.3B$ $1000011$ $44$ $24$ $12$ 51 $500^{1120Hz}$ $0.18$ $010011$ $56$ $24$ $12$ 52 $580^{1120Hz}$ $0.125Hz$ $500Hz$ $0.38$ $010011$ $56$ $24$ $12$ 53 $800^{1120Hz}$ $0.14$ $110011$ $57$ $24$ $12$ $56$ 54 $800^{1120Hz}$ $0004z$	45		0.200	255	001101	1	8	19
47         24002900Hz @ 2Hz Alternating         200Hz 2400Hz         0225 (025)         0111101         57         24         19           48         500/120Hz @ 0.3Hz         500Hz         3.34s         1111101         44         24         12           49         Sweeping         100Hz         5.47s         0.00011         44         24         12           50         560/105Hz @ 0.18Hz         560Hz         5.47s         0.00011         44         24         12           50         560/105Hz @ 0.18Hz         560Hz         0.3s         100011         44         24         12           51         600/125Hz @ 0.125Hz         560Hz         120Hz         0.3s         010011         44         24         12           52         660/120Hz @ 1Hz         660Hz         1s         0.10011         64         24         12           53         800/100Hz @ 1Hz         660Hz         1s         0.11011         57         24         12           54         800/100Hz @ 7Hz         80Hz         0.02s         0.11011         57         24         12           55         800/100Hz @ 7Hz         200Hz         0.14s         0.110111         57         24		800/1000Hz @ 0.875Hz	1000Hz 0.5		101101	53		
48         500/120Hz         0.3Hz         120Hz           49         560/105Hz         0.18Hz         500Hz         3.34s         0.00011         44         24         12           49         560/105Hz         0.18Hz         500Hz         5.47s         0.00011         44         24         12           50         560/105Hz         0.3Hz         560Hz         0.3s         100011         44         24         12           51         560/105Hz         0.12SHz         500Hz         0.3s         010011         44         24         12           52         660/120Hz         0.12SHz         500Hz         15         110011         64         24         12           53         800/1000Hz         0.14z         1s         0.01011         56         24         12           53         800/1000Hz         0.14z         0.14a         101011         57         24         12           54         800/1000Hz         50Hz         800Hz         0.02s         0.11011         54         24         12           55         Sweeping         200Hz         0.02s         0.14s         1110011         57         24         12		2400/2900Hz @ 2Hz	2900Hz 0.2	55	011101			
48       Sweeping       500H2       3.34s       44       24       12         49       S60/1055H2 @ 0.18Hz       560H2       5.47s       0 0 0 0 0 1 1       44       24       12         50       Sweeping       1055Hz       5.47s       0 0 0 0 1 1       44       24       12         51       600/1250Hz @ 0.125Hz       5.47s       0 0 1 0 0 1 1       44       24       12         52       Sweeping       1000Hz       8       0 1 0 0 1 1       44       24       12         52       Sweeping       1000Hz       8       0 1 0 0 1 1       44       24       12         53       800/1200Hz @ 1Hz       112       1000Hz       11       11 0 0 1 1       56       24       12         54       800/1000Hz @ 1Hz       800Hz       0.14s       1 0 1 0 1 1       57       24       12         55       Sweeping       800Hz       0.02s       0 1 1 0 1 1       57       24       12         56       Sweeping       200Hz       0.14s       1 1 1 0 0 1 1       57       24       12         57       Sweeping       200Hz       0.02s       0 1 0 1 1 1       44       24       12		500/1200Hz @ 0.3Hz	1200Hz		111101			
Solution								
50         Sweeping         560Hz         0.3s         1000111         44         24         12           51         Bweeping         001250Hz         001250Hz         010011         44         24         12           52         Bweeping         1200Hz         0014         66         010011         44         24         12           52         Bweeping         1200Hz         18         010011         64         24         12           53         B00/1000Hz @ 1Hz Sweeping         B00Hz         1s         0001011         56         24         12           54         B00/1000Hz @ 7Hz Sweeping         B00Hz         0.14s         101011         57         24         12           55         Bweeping         B00Hz         0.02s         011011         57         24         12           56         Sweeping         2400Hz         0.02s         011011         57         24         12           56         Sweeping         2400Hz         0.02s         0110111         57         24         12           57         Sweeping         2400Hz         0.02s         100111         47         24         12           58	49				000011	44	24	
51       Sweeping       600Hz       6s       010011       44       24       12         52       560/1200Hz       @ 1Hz       1200Hz       18       110011       64       24       12         53       800/1000Hz       @ 1Hz       560/1200Hz       1000Hz       1000Hz       110011       56       24       12         54       800/1000Hz       @ 7Hz       800Hz       0.14s       101011       57       24       12         55       800/1000Hz       @ 50Hz       800Hz       0.14s       1011011       57       24       12         56       Sweeping       800Hz       0.02s       011011       54       24       12         56       Sweeping       2400/2900Hz       0.14s       111011       57       24       12         56       Sweeping       2400/2900Hz       0.14s       1110111       47       24       12         57       Sweeping       2400Hz       0.02s       0.001111       47       24       12         58       Sweeping       2400Hz       0.02s       1001111       54       24       12         59       Sweeping       2500Hz       0.5s       011011	50	Sweeping			100011	44	24	12
52       Sweeping       660Hz       1s       1100111       64       24       12         53       800/1000Hz @ 1Hz Sweeping       800Hz       1s       0010111       56       24       12         54       800/1000Hz @ 7Hz Sweeping       800Hz       0.14s       101011       57       24       12         55       800/1000Hz @ 7Hz Sweeping       800Hz       0.02s       011011       57       24       12         56       Sweeping       2400/2900Hz @ 7Hz       2400Hz       0.02s       011011       57       24       12         57       Sweeping       2400/2900Hz @ 7Hz       2400Hz       0.14s       111011       57       24       12         57       Sweeping       2400Hz       0.14s       100111       47       24       12         58       Sweeping       2400Hz       0.14s       0.111       47       24       12         58       Sweeping       2400Hz       0.02s       010111       44       24       12         59       Sweeping       2500/300Hz @ 7.7Hz       3000Hz       0.02s       0101111       44       24       12         61       800Hz Motor Siren       1.6s       0	51	Sweeping		/	010011	44	24	12
53       800/1000Hz @ 1Hz Sweeping       800Hz       1s       0 0 1 0 1 1       56       24       12         54       800/1000Hz @ 7Hz Sweeping       800Hz       0.14s       1 0 1 0 1 1       57       24       12         55       Sweeping       800Hz       0.02s       0 1 1 0 1 1       57       24       12         56       2400/2900Hz @ 7Hz       200Hz       0.02s       0 1 1 0 1 1       57       24       12         57       Sweeping       2400Hz       0.14s       1 1 1 0 1 1       57       24       12         57       Sweeping       2400Hz       0.14s       1 1 1 0 1 1       57       24       12         57       Sweeping       2400Hz       0.14s       1 1 0 0 1 1 1       54       24       12         58       Sweeping       2400Hz       0.02s       1 0 0 0 1 1 1       54       24       12         59       Sweeping       2500Hz       0.5s       0 1 0 1 1 1       44       24       12         60       Sweeping       2500Hz       0.5s       0 1 0 1 1 1 1       44       24       12         61       800Hz Motor Siren       1 6s       0 0 1 1 1 1 1       44       24 <td>52</td> <td></td> <td>660Hz 1s</td> <td><u></u></td> <td>110011</td> <td>64</td> <td>24</td> <td>12</td>	52		660Hz 1s	<u></u>	110011	64	24	12
54       800/1000Hz @ 7Hz Sweeping       800Hz       0.14s       101011       57       24       12         55       800/1000Hz @ 50Hz       800Hz       0.02s       011011       54       24       12         56       2400/2900Hz @ 7Hz       2900Hz       0.14s       111011       57       24       12         57       Sweeping       2400Hz       0.14s       111011       57       24       12         57       Sweeping       2400Hz       0.14s       0.14s       111011       57       24       12         58       Sweeping       2400Hz       0.14s       0.02s       100111       54       24       12         59       Sweeping       2400Hz       0.02s       1001111       54       24       12         60       2500/3000Hz @ 50Hz       2500Hz       0.02s       0.101111       44       24       12         60       Sweeping       2500Hz       0.5s       0101111       44       24       12         61       800Hz Motor Siren       1.6s       0011111       44       24       12         62       120Hz Motor Siren       1.6s       0111111       44       24       12	53	800/1000Hz @ 1Hz Sweeping	800Hz 1s		001011	56	24	12
55       800/1200Hz @ 50Hz       800Hz       0.02s       0 1 1 0 1 1       54       24       12         56       Sweeping       2400/2900Hz @ 7Hz       2900Hz       0.14s       1 1 1 0 1 1       57       24       12         57       Sweeping       2400Hz       0.14s       0 0 0 1 1 1       47       24       12         57       Sweeping       2400Hz       0.14s       0 0 0 0 1 1 1       47       24       12         58       Sweeping       2400Hz       0.02s       1 0 0 1 1 1       54       24       12         59       S00/2000Hz @ 2Hz       3000Hz       0.02s       0 1 0 0 1 1 1       54       24       12         60       Sweeping       2500Hz       0.5s       0 1 0 1 1 1       44       24       12         61       800Hz Motor Siren       1.6s       0 0 1 1 1 1       44       24       12         62       120Hz Motor Siren       1.7s       0 1 1 1 1 1       44       24       12         63       240Hz Motor Siren       1.7s       0 1 1 1 1 1       44       24       12         64       Sir Hu Hz Mater       145       145       145       144       14       14	54	800/1000Hz @ 7Hz Sweeping	800Hz 0.14s		101011	57	24	12
56       2400/2900Hz @ 7Hz Sweeping       2400Hz       0.14s       1 1 1 0 1 1       57       24       12         57       Sweeping       2400Hz       1s       0 0 0 1 1 1       47       24       12         58       Sweeping       2400Hz       1s       0 1 0 1 1 1       54       24       12         59       Sweeping       2500/3000Hz @ 2Hz       3000Hz       0.02s       0 1 0 1 1 1       44       24       12         60       2500/3000Hz @ 7.7Hz       3000Hz       0.13s       1 1 0 1 1 1       44       24       12         61       800Hz Motor Siren       1.6s       0 0 1 1 1 1       44       24       12         62       1200Hz Motor Siren       1.6s       0 0 1 1 1 1       44       24       12         63       2400Hz Motor Siren       1.7s       0 1 1 1 1 1       44       24       12         64       65       2400Hz Motor Siren       1.7s       0 1 1 1 1 1 1 1 44       24       12	55				011011	54	24	12
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	56	2400/2900Hz @ 7Hz	2900Hz		111011	57	24	12
58 $2400/2900Hz$ @ 50Hz $2900Hz$ $2400Hz$ $0.02s$ $1001111$ $54$ $24$ $12$ 59 $2500/3000Hz$ @ 2Hz $3000Hz$ $0.02s$ $0.11111$ $44$ $24$ $12$ 60 $2500/3000Hz$ @ 7.7Hz $3000Hz$ $0.5s$ $0101111$ $44$ $24$ $12$ 60 $8weeping$ $2500Hz$ $0.13s$ $1101111$ $44$ $24$ $12$ 61 $800Hz$ Motor Siren $1.6s$ $0011111$ $44$ $24$ $12$ 62 $1200Hz$ Motor Siren $2s$ $1011111$ $44$ $24$ $12$ 63 $2400Hz$ Motor Siren $1.7s$ $0111111$ $44$ $24$ $12$ 64 $61$ $800Hz$ Motor Siren $1.7s$ $0111111$ $44$ $24$ $12$		2400/2900Hz @ 1Hz						
59       2500/3000Hz @ 2Hz       3000Hz       0.5s       0 1 0 1 1 1       44       24       12         60       Sweeping       2500Hz       0.13s       1 1 0 1 1 1       44       24       12         61       800Hz Motor Siren       1.6s       0 0 1 1 1 1       44       24       12         62       1200Hz Motor Siren       2s       1 0 1 1 1 1       44       24       12         63       2400Hz Motor Siren       1.7s       0 1 1 1 1 1       44       24       12		2400/2900Hz @ 50Hz	2900Hz					
60       2500/300Hz @ 7.7Hz       300Hz       110111       44       24       12         61       800Hz Motor Siren       1.6s       001111       44       24       12         62       1200Hz Motor Siren       2s       101111       44       24       12         63       2400Hz Motor Siren       1.7s       011111       44       24       12         64       65       101111       44       24       12		2500/3000Hz @ 2Hz	3000Hz	<u></u>				
60       Sweeping       2500Hz       0.13s       1 1 0 1 1 1       44       24       12         61       800Hz Motor Siren       1.6s       0 0 1 1 1 1       44       24       12         62       1200Hz Motor Siren       2s       1 0 1 1 1 1       44       24       12         63       2400Hz Motor Siren       1.7s       0 1 1 1 1 1       44       24       12         64       65       1 1 4 1 1 1       44       24       12								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			,					
63     2400Hz     011111     44     24     12       64     0:     1450Hz     1450Hz     1450Hz     12	61	800Hz Motor Siren		~~~~~	001111	44	24	12
63     2400Hz Motor Siren     1.7s     0 1 1 1 1 1 44     24     12       64     0: +++ +D #     1450Hz 0.25s     11 1 1 1 1 1 44     21     12	62	1200Hz Motor Siren		~~~~~	101111	44	24	12
	63	2400Hz Motor Siren	1.7s	<u></u> ٦	011111	44	24	12
	64	Simulated Bell		•	111111	44	21	12

06-12-19

Sheet 8 of 8