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RDW

Vehicle Technology Division

THE NETHERLANDS
(NEDERLAND)

EEC TYPE-APPROVAL CERTIFICATE

Communication concerning the:
- ~~granted of type-approval~~
- extension of type-approval
- ~~refusal of type-approval~~
- ~~withdrawal of type-approval~~

of a type of ~~vehicle/component~~/separate technical unit with regard to 72/245/EEC Directive as last amended by 95/54/EC Directive.

Type-approval N°: e4*72/245*95/54*0350*02
Reasons for extension N° : **See test report 0305223**

Approval mark : e 4
020350

SECTION I

0.1.	Make (trade name of manufacturer)	:	FEDERAL SIGNAL VAMA, S.A.
0.2.	Type and general commercial description(s)	:	**2000/3000 Light-bar series**
0.3.	Means of identification of type, if marked on the ~~vehicle/component~~/separate technical unit	:	See technical documentation
0.3.1.	Location of that marking	:	See technical documentation
0.4.	Category of vehicle	:	- - -
0.5.	Name and address of manufacturer	:	FEDERAL SIGNAL VAMA, S.A. C/ Dr. Ferran , 7 . 08339 Vilassar de Dalt , Barcelona (SPAIN)
0.7.	In the case of components and separate technical units, location and method of affixing of the approval mark	:	See technical documentation
0.8.	Address(es) of assembly plant(s)	:	C/ Dr. Ferran, 7 . 08339 Vilassar de Dalt, Barcelona (SPAIN) C/ Narcis Monturiol, 21-23 . 08339 Vilassar de Dalt, Barcelona (SPAIN)

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Vehicle Approval and Information

Type-Approval Number : **e4*72/245*95/54*0350*02**

Appendix to Type-Approval Communication Form N° e4*72/245*95/54*0350*02
Concerning the Type-Approval of a Vehicle with regard to Directive 72/245/EEC as last amended by Directive 95/54/EC

1.	Additional information (where applicable)		
1.1.	Electrical system rated voltage	:	12 or 24V, negative ground
1.2.	This ESA can be used on any vehicle type with the following restrictions	:	- - -
1.2.1.	Installation conditions, if any	:	- - -
1.3.	This ESA can be used only on the following vehicle types	:	The use of this ESA is strictly reserved to priority vehicles legally authorised
1.3.1.	Installation conditions, if any	:	This ESA will be mounted on vehicle roof, located as far as possible from aerial of radio equipment following manufacturer mounting instructions.
1.4	The specific test method(s) used and the frequency ranges covered to determine immunity were	:	Free field; 20 – 1000 MHz
1.5.	Approved/accredited laboratory responsible for carrying out the tests	:	IDIADA L'Albornar, P.O. Box 20 E-43710 Santa Oliva (Tarragona) SPAIN
5.	Remarks (if any)	:	- - -

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Type-Approval Number : **e4*72/245*95/54*0350*02**

SECTION II

1.	Additional information (where applicable)	:	See appendix
2.	Technical service responsible for carrying out the tests	:	IDIADA L'Albornar, P.O. Box 20 E-43710 Santa Oliva (Tarragona) SPAIN
3.	Date of test report	:	30.07.2001, 25.01.2002, 26.05.2003
4.	Number of test report	:	0107075, 0112127, 0305223
5.	Remarks (if any)	:	See appendix
6.	Place	:	Zoetermeer
7.	Date	:	11 JUNI 2003
8.	Signature	:	P. Berger RDW

9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

- Test report: see section II item 4 (Pages 2)
- Technical documentation (Pages 56)

IDIADA AUTOMOTIVE TECHNOLOGY

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Tel. +34 977 166 000 - Fax +34 977 166 007
e-mail: idiada@idiada.es

REPORT Nº 0305223

DIRECTIVE 72/245/EEC AND 95/54/EC RELATING TO ELECTROMAGNETIC COMPATIBILITY

E X T E N S I O N II

Applicant	:	FEDERAL SIGNAL VAMA, S.A. C/ Dr. Ferran, 7. 08339 Vilassar de Dalt, Barcelona (SPAIN)
Manufacturer	:	FEDERAL SIGNAL VAMA, S.A.
Trade mark	:	FEDERAL SIGNAL VAMA
Type	:	**2000/3000 Light-bar series**
Commercial descriptions	:	2000 Light-bar, 3000 Light-bar, 7000 Light-bar, 8000 Light-bar, Vector Light-bar, Vista Light-bar
Place and date of issued the test report	:	IDIADA 26 May 2003

Ref.: 0305223

CONCLUSIONS: Modifications introduced to this Electrical/electronic sub-assembly (ESA), as detailed in the Annex attached to this report, grant ground for extensions of homologation with respect to formerly certified electrical/electronic sub-assembly (ESA) type, performed by this technical department (Test Report 0107075) and OBEYS with the prescriptions about electromagnetic compatibility, in application to Directive 72/245/EEC, last amended by Directive 95/54/EC.

Performed by:

M.J. Martínez Pérez
TEST ENGINEER

INSTITUTO DE INVESTIGACION APLICADA DEL AUTOMOVIL
29.05.03
SALIDA Nº 3005

Revised by:

R. Santafé i Guiu
HOMOLOGATION MANAGER

ANNEX TO THE REPORT

INTRODUCED MODIFICATIONS IN THIS EXTENSION

- Technical documentation update

Place: IDIADA AT
Date: 26 May 2003

TEST ENGINEER

0305223

IDIADA TECHNOLOGY

TECHNICAL DOCUMENTATION

Exp.n 0305223

RDW

APPLICATION FOR EXTENSION #2

OF HOMOLOGATION e4 020350

LIGHT-BAR SERIES 2000/3000

0. General description

0.1. Mark
0.2. Type and commercial names
0.5. Name and address of the manufacturer
0.7. Approval mark location
0.8. Adresses of assembly plants

1. Approval form

2. Restrictions of use and installation conditions

Appendix A. Technical description (*)

Appendix B. Schematics

Appendix C. User´s Manuals

0. General description.

We define under the generic description 2000/3000 a complete family of light-bars, to be used as a warning system in priority vehicles, that comprises two base models and diferent optional items.

Base models are:

2000 light-bar. Main warning lights are halogen lamps, with a rotating parabolic reflector. At each end of the light-bar, one or two lights are installed. If two, its turning is synchronized.

3000 light-bar. Main warning lights are strobe lamps, filled with Xenon gas. One lamp at each end of the light-bar.

Optional items in both models:

- Vertical sign in central position, lighted by filament lamps. Message set by customer.
- Working lights, fitted with a fixed metallized parabole, directed towards front or/and rear part of the vehicle. They can be fixed or flashing. In the last case they are switched by a relay installed inside the light-bar.
- SMLED. Directional lights formed by 6, or 8, blocks of Led's, installed in the rear of the light-bar, switched by a control box located inside the vehicle.
- SM. Directional lights formed by 6, or 8 halogen lamps, installed in the rear of the light-bar, switched by a control box located inside the vehicle. (*)
- Filament lamps switched together with stop light, sidelights or blinker lights of the vehicle.

Mechanical frame of the light-bar is an extruded aluminum base on which color lenses and lights are mounted. It gives also convenient rigidity and supports elements fixing light-bar to vehicle.

Lens covering light-bar is made by extruded polycarbonate. This cover can be divided in several parts of diferent color. Ends of the light-bar are closed by a moulded polycarbonate lens. Lens of different colors are separated by a watertight joint, made by a double injection process in which an elastic material is injected over a rigid part.

Length of both models is variable according to the width of the vehicle and optional items installed.

Other options refer to fixing modes to the vehicle: permanent or removable, for flat or curved roofs.

All possible configurations of bar-lights can be supplied for 12 Vdc, and 24 Vdc.

Electromagnetic interferences can arise from:
a) motors of rotating lights.
b) strobe lamps and its power supply.
c) Led's modules of SMLED and its control box.
d) Relay switching intermittent halogen lights.
e) Switching of SM and its control box.

Technical description of these items is found in Appendix A.

0.1. Mark

FEDERAL SIGNAL VAMA

0.2. Type and commercial names:

Type:.2000/3000 Light-bar series.

Commercial names: 2000 Light-bar
3000 Light-bar
7000 Light-bar
8000 Light-bar
Vector Light-bar
Vista Light-bar

0.5. Name and address of the manufacturer:

FEDERAL SIGNAL VAMA S.A.
c/ Dr. Ferran nr.7
08339 VILASSAR DE DALT
BARCELONA (SPAIN)

Exp.n 030523

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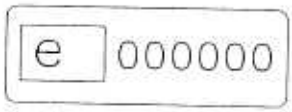
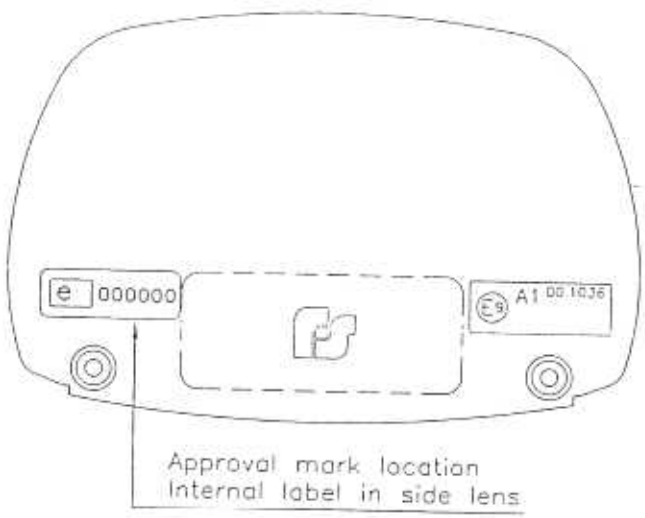
0.7 In the case of components and separate technical units, location and method of affixing of the EEC aproval mark.

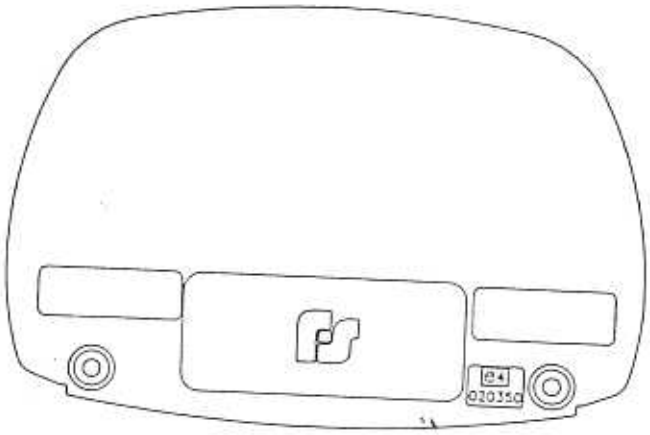




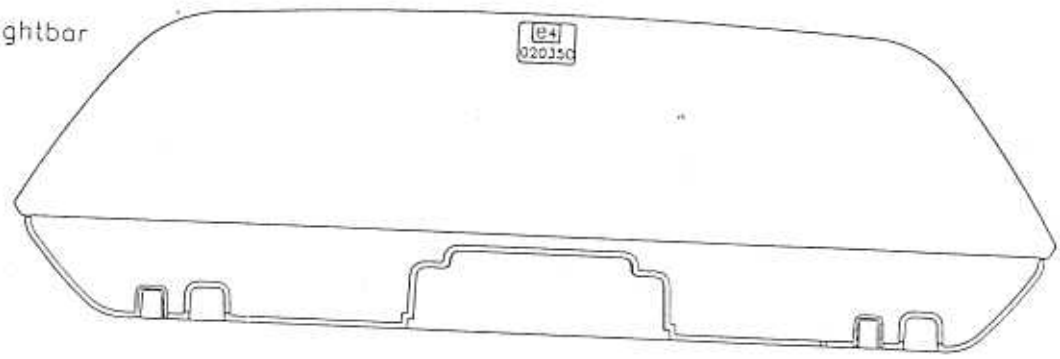
Exam 0305223

RDW

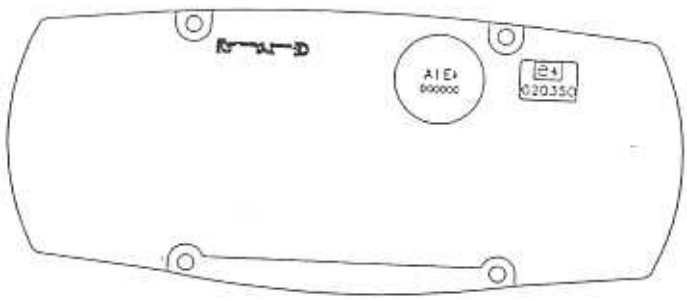
2000/3000 Lightbar



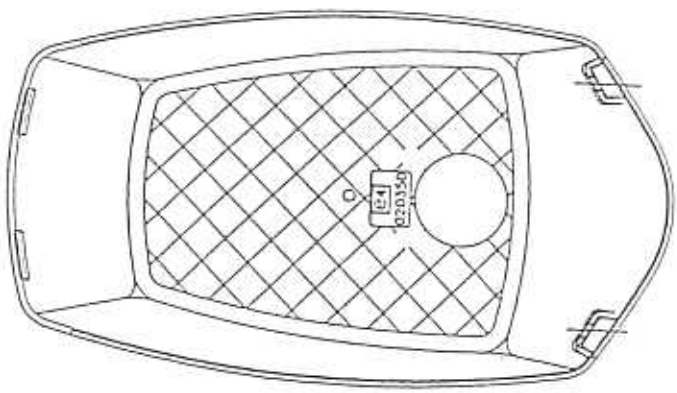
VISTA Lightbar



7000/8000 Lightbar



VECTOR Lightbar



0.8. Adresses of assembly plants:

FEDERAL SIGNAL VAMA S.A.
c/ Dr. Ferran nr 7
08339 VILASSAR DE DALT
BARCELONA (SPAIN)

FEDERAL SIGNAL VAMA S.A.
c/ Narcis Monturiol nr 21-23
08339 VILASSAR DE DALT
BARCELONA (SPAIN)

1. This ESA will be homologated as STU.

2. Restrictions of use and installation conditions.

Use of this ESA is strictly reserved to priority vehicles legally authorized.

It will be mounted on vehicle roof, located as far as possible from aerial of radio equipment, following manufacturer mounting instructions.

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APPENDIX A

A1. Technical description

A1.1. 2000 Model.

At each end of the light-bar a dc motor turns priority light parabole. If there is a double light, turning of both paraboles is syncronized through a teeth-belt, driven by one motor.

Motor is fitted with a varistor to reduce parasitic emission due to brushes switching.

A1.2. 3000 Model.

Strobe lights are connected to the outputs of a 70 W power supply, model FA-702 DF, or FA-702B DF.

Electronic circuit of FA-702 DF is composed of the following functional blocks (see Block Diagram and Electronic diagram).

- dc/dc Converter.

It is a fixed frequency (29,5 kHz) fly-back oscillator driven by two paralleled MOS transistors. The secondary of the trasformer tranfers power stored during first part of cycle to two 200 μF electrolytic capacitors connected in series, that are charged at the high voltage needed by lamps to work. Transistors current passes through the primary winding of a current transformer; from its secondary winding we get information needed by current limiter. When current limiter detects a current transistors equal to set value, controller switches transistors gate voltage to zero and its current is turned off. When primary winding current of the main transformer is zeroed, secondary voltage is inverted and stored energy is transferred to output electrolytic capacitors. This process is repeated at each oscillation cycle, until capacitors charge rises its voltage to value set for flashing of the lamps.

- Current limiter.

It sets transistors peak current to level required to get nominal output power. A voltage proportional to transistors instant current, got from secondary winding of current transformer, above mentioned, is applied to an input of the integrated circuit controlling the power supply. This voltage is compared to an internal set value. When both values equal, transistors gate voltage is zeroed, until the start of next cycle.

- Voltage limiter.

If voltage at which output capacitors are charged arrives to set limit, oscillator is stopped, until output voltage will be lowered from this limit (normally by discharge of capacitors through lamps).

A voltage divider is connected trough terminals of output capacitors, from which we get a low voltage proportional to capacitors voltage. It is applied to a controller input and is compared with an internal set value. When capacitors voltage is over set value, controller stops converter.

This circuit avoids that, in case of capacitors failing to discharge in the expected moment (due to failure of lamps, or of their trigger circuits), output voltage can raise whithout control to a dangerous value that could damage circuit components.

- Trigger circuits.

It is composed by a timer, setting flashing frequency of each lamp, and by circuits sending convenient signals to lamp connectors. It stops also converter while lamp is flashing and sends a signal to lamp failure detector at the moment in which a lamp is triggered.

Logic circuits drive timer output to gates of each trigger SCR. They switch to ground one plate of a capacitor previously charged to 200 V. Negative pulse of other plate is connected to primary winding of trigger transformer, mounted in lamp housing.

- Lamp failure detector.

This block drives a relay that switches a lamp mounted inside the vehicle, if a lamp fails to flash at the set moment; no matter if failure comes from lamp itself, or from trigger circuit.

A.1.3. SMLED.

Signal Master Led is composed by a bar of Led modules and by a circuit decoding signals sent by a control box and switching modules following a set sequence.

Two models can be mounted in the light-bar: SMLED6 – KS (6 Led modules)
SMLED8 – KS (8 Led modules)

Both models are made for 12 V and for 24 V.

Control box sends coded signals generated by a microprocessor, clock frequency of which is 4 MHz.

Five lighted buttons of the control box select function mode of the SMLED.

1. Modules are switched on sequentially, proceeding from the center to both ends.
2. If double fast stroke, it switches beetwen to values of sequence speed.
   If single stroke, it switches beetwen day and night mode. In night mode, when one module is swithed on, preceding module in the sequence is turned off.
3. Central modules alternate with end modules.
4. Progression from right to left.
5. Progression from left to right.

A.1.4. Intermittent halogen lights.

These lights are switched by a relay fitted with a varistor in its terminals to limit electrical noise generated by switching.

Two models of relay can be used: Ref. 9019043 and Ref. 200 6001. In samples sent for evaluation both models are used to check all possibilities.

A.1.5. Programmable Led sign.

All light-bars can be fitted with a programmable sign, where letters of the message are made by Led's. Different messages are included in its memory and can be selected by user.

A.1.6. 7000 Light-bar.

Similar to 2000 series. Differ slightly in physical shape and dimensions.
Fitted with same rotating and auxiliary lights as 2000 series.
Sample tested (our Ref. 20160089) is fitted with rotating halogen lamps and flashing halogen lamps (A.1.4.).

A.1.7. 8000 Light-bar.

Similar to 3000 series. Physical shape as 7000 series.
Fitted with two strobe lamps, one at each end of light-bar, supplied by FA-702 DF, or FA-702B DF, up to six strobe lamps if supplied by FA-188/6S power supply; or with four strobe linear lamps, two at each end of light-bar, supplied by FA-188/4 DF power supply. If more than four strobe lamps are installed, two power supplies can be mounted in light-bar.

Two samples have been tested:

- our Ref. 2017931IT5: fitted with two strobe lamps, one FA-188/6S power supply (A.1.7.1) and a Programmable led sign (A.1.5).
- our Ref, 20170030: fitted with four strobe lamps, one FA-188/4DF (A.1.7.1) power supply and flashing halogen lamps (A.1.4).

A.1.8. FA-188/6S and FA-188/4DF power supplies.

Both models are 70 W power supplies, composed by similar functional blocks as FA-702 DF. (See Block Diagrams, and specific Electronic Diagrams).

A.1.9. Vector light-bar.

V-shaped frame with a certain number of lights; they can be rotating, oscillating or fixed halogen lamps, as well as strobe lights supplied each one by individual power supplies installed in the same pod, under strobe lamp.
Lens covering each lamp can be of different color.
Sample tested is fitted with two rotating lamps (A.1.10), two strobe lamps (A.1.11),two fixed halogen lamps and one oscillating halogen lamp (A.1.10).

A.1.10. Vector rotating or oscillating lamps.

Halogen lamps with parabolic reflector activated by a dc motor.

A.1.11. Vector strobe lamps.

Strobe lamp is directly connected to the printed circuit board in which power supply is mounted. Power supply is rated at 18 W. (See Block Diagram and specific Electronic Diagram).

A.1.12. Vista Light-bar.

Oval-shaped frame that can mount strobe lamps, rotating and other auxiliary halogen lamps, flashing of fixed; front, side or rear directed; in some cases, they can scan different directions by means of the same dc motor as rotating lights.

Strobe lamps will be supplied by one or two FA-804 power supplies. The number of power supplies depends on the number of strobe lamps installed.

Samples tested:

- our Ref. 2051385, fitted with rotating halogen lamps, oscillating halogen lamps, and flashing halogen lamps.
- our Ref. 2051384, fitted with 8 strobe lamps, two FA-804 power supplies (A.1.9.1), oscillating halogen lamps and flashing halogen lamps.

(*) Vista Light-bar can also be fitted with FA-188/4DF power supply.

A.1.13. FA-804 Power supply.

It is a 80 W power supply. (See Block Diagram and specific Electronic Diagram).

Four strobe lamps can be connected to it. If more than four strobe lamps are installed in light-bar, a second FA-804 is mounted.

A.1.14. FA-702B DF.

This power supply is a FA-702 DF modified to have independent lamp failure detection of each strobe lamp. (See Block Diagram and specific Electric Diagram).

(*) Added items.