



AEV MIRAGE

Broadcast Audio Processor 3-band



Guarantee

The equipment is warranted for a period of 2 years from the date of invoice (ex-works). The warranty does not cover faults provoked by carelessness, natural causes and parts subject to wear. In addition, the cost of labour and shipment is not covered. The warranty will be voided if the equipment is mishandled.

Feedback

AEV welcomes your comments on our products. Your suggestions may be extremely useful to develop new equipment and manuals and this will be of benefit to you too! Let us have your comments on our products and we will be pleased to read them.

Send your information by e-mail to the following address: service@aev.eu, or send a letter to the AEV SERVICE Department.

Technical Support

If you require technical support, contact AEV SERVICE giving a clear and concise account of your specific problem. Quote the serial number of your equipment by referring to the AEV nameplate attached to the equipment itself as this is the most important piece of information to be provided.

Factory Service and Repairs

If problems arise while the equipment is being installed, consult this manual and check that the installation is being carried out properly. If the problems still cannot be solved, call the AEV SERVICE Department for further information. If the problem is a minor one we can a telephone call will probably suffice. If, on the other hand, the equipment is to be shipped to AEV for service or repairs.

Shipping Instruction

When shipping the equipment to AEV, use the original package in order to be certain that it will be fully protected during handling. If you need the original package, call us for a new one.

If you ship the equipment in a different packing container, take care to provide a double package by interposing padding material between the two containers in order to fully protect the equipment during shipment. The package should be marked "FRAGILE" in red.

SAFETY PRECAUTIONS

IMPORTANT: Carefully read this paragraph as it contains important instructions concerning operator safety and directions regarding the installation, operation and maintenance of the equipment.

Failure to observe the safety instructions and information given in this manual **constitutes an infringement of the safety rules and design specifications provided for this piece of equipment.**

Futurcom declines all responsibility if any one of the safety rules given herein is not observed.

Futurcom declines all responsibility if the end-user resells the product.

The equipment is to be used by people capable of operating it in a trouble-free manner and **it is assumed that they are aware of the following safety rules.**

- Keep this manual with the utmost care and close at hand so that it can be consulted whenever needed
- After unpacking the equipment, check it for condition.
- Avoid banging the equipment.
- The packing material (plastic bags, polystyrene, nails, etc.) must never be left within the reach of the children, as **these items are potential sources of danger.**
- Do not use the equipment in places where the temperature is not within the recommended range, as specified by the manufacturer.
- Before connecting the equipment, make sure the nameplate specifications correspond to the mains electricity supply (the nameplate is located on the equipment enclosure).
- Do not remove the sticker from the equipment as it contains important specifications and the relevant serial number.
- To join the equipment to the mains supply, use the power cord purchased with the equipment.
- The equipment must be used only for the purpose it was designed for.



- Abuse or misuse of the equipment is **extremely dangerous** for people, pets and property. The manufacturer declines all responsibility for damage and injury resulting from **improper use** and **mishandling**.
- Certain basic safety rules must be observed when using electrical equipment, in particular:
 - Never touch the equipment with wet and/or damp hands or other parts of the body.
 - Keep the equipment away from drops of water or sprinkling systems.
 - Never use the equipment near high heat sources or explosive material.
 - Do not introduce any extraneous matter into the equipment.
 - Do not allow children or untrained people to use the equipment.
- Before cleaning or servicing the equipment outside, disconnect it from the supply and wait at least 2 seconds before working on it, as recommended by current safety regulations.
- In the event of faults and/or improper operation, turn off the equipment, shut off the electrical power and call your dealer. covers/guards or circuit boards are to be removed.
- Blown fuses inside the power supply indicate that there may be a fault in the power supply itself. The fuses must be replaced by qualified and authorised persons. It is advisable to call your nearest dealer.
- Call your dealer for any repairs and be certain original spare parts are used. **Failure to observe this rule may adversely affect the safety level of your equipment.**
- The equipment is to be connected to the mains supply and provided with adequate and efficient earth conductors.
- The electrical wiring must be done in compliance with current electrical codes CEI 64-8 "Electrical specification for domestic buildings".
- When installing, leave a clearance of at least 1 cm around the equipment to allow air to pass freely.

NOTE. This piece of equipment has been manufactured to the highest standards of workmanship. It must be used properly and serviced as recommended to ensure long-term dependable operation.

The installation must be done in order to be able to guarantee an easy access to the cable of feeding. The device of dissection of the equipment is the cable of feeding, so it must be unconnected from the equipment every time it is necessary to do any type of maintenance.

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Introduction - General Description

The MIRAGE AM Audio Processor is a complete audio signal processing system for AM transmission.

The image and professionalism of the broadcaster is defined by its sound quality; hence the obvious importance of the AUDIO PROCESSOR.

Multi-band processing is the best method of audio signal processing; MIRAGE AM is based on the processing of the audio signal split into THREE BANDS.

MIRAGE AM allows the integrated control of processing parameters in such a way as to provide your broadcaster with a competitive sound with more punch, continuity, presence and clarity, without pumping or other undesirable effects.

Total control of peak modulation

MIRAGE offers total control of audio signal levels for FM transmission and can be interfaced to any commonly used transmitter, anywhere in the world.

The MIRAGE audio processor gives dynamic control over the level of pre-emphasis; intervention is inaudible and produces a clear, open and brilliant sound, better than the original program.

MIRAGE exerts an extremely precise control over peaks, limiting overmodulation levels to just 1.5 dB!

The stereo encoder of the MIRAGE uses a digital control circuit to contribute to the excellent performance of the system, featuring high stability and total control of the signal. Both amplitude and phase are adjustable to ensure the best adaptation to any transmission system and the highest level of stereo separation.

MIRAGE helps prevent distortion arising in successive encoders and other transmission components, through the use of bandwidth limiting filters (10 KHz low-pass filters), following the overmodulation compensation circuits.

Concepts of audio processing

It is possible to define average and peak values for any sound source.

The average value contains a large part of the signal power and is therefore the most important part of the signal, as opposed to the peak value whose contribution is very low in terms of signal power.

Unfortunately, however, the maximum deviation of 75 KHz for FM transmission is determined by the peak value; this constrains the average value to a low level which produces a dull sound.

The sound level can be raised by reducing the peak/average ratio; if the peaks can be reduced, the average level can be increased within the modulation constraints.

This can be effected by limiting and expanding the signal.

Clipping is performed on that part of the signal which cannot be compressed; this operation is always necessary to guarantee that the maximum deviation never exceeds 75 KHz.

Clipping does not produce audible effects providing it is done with moderation. If excessive clipping is applied, it can give rise to unpleasant distortion effects.

Initial power-up

Before switching on the MIRAGE, check that the line voltage corresponds to the voltage selected on the rear of the power supply unit. Check also that the supply to which the MIRAGE FM is connected has a good ground connection.

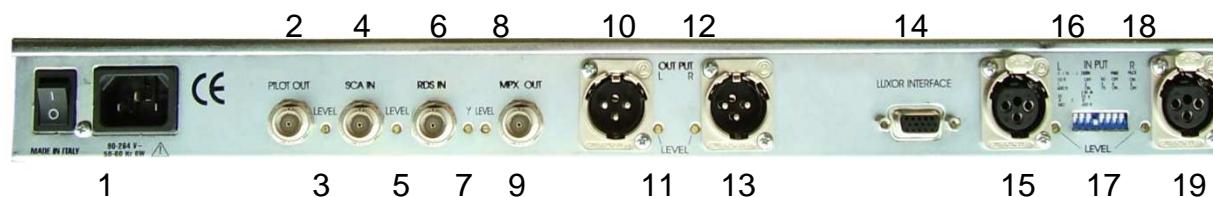
Command description



1 2 3 4 5 6 7 8 9 10 11

Front Panel

1. Led bar display for AGC control and led indicator for GATE status
2. Potentiometer for adjustment of AGC GATE THRESHOLD
3. AGC DRIVE adjustment potentiometer
4. AGC RELEASE adjustment potentiometer
5. BASS adjustment potentiometer
6. PRESENCE adjustment potentiometer
7. BRILLIANCE adjustment potentiometer
8. DENSITY adjustment potentiometer
9. OPERATE/BY-PASS switch and led indicator
10. Led bar display for channels output
11. Led indicator power On/Off



1 2 3 4 5 7 8 9 10 11 12 13 14 15 16 17 18 19

Rear Panel

1. MAIN line input socket and power On/Off switch
 2. PILOT SYNC OUT * 19 KHz output signal for synchronization of external systems
 3. SCA signal level trimmer*
 4. SCA signal input *
 5. RDS signal level trimmer *
 6. RDS signal input *
 7. Trimmer for control of pilote phase *
 8. MPX composite signal output level trimmer *
 9. MPX composite signal output *
 10. Left channel output
 11. Left channel output signal level trimmer
 12. Trimmer for control of Right channel output signal
 13. Right channel output
 14. 15-way connector for connection to LUXOR
 15. Left channel input
 16. Left channel adjustment trimmer
 17. Set Dip-switch
 18. Right channel adjustment trimmer
 19. Right channel input
- * PRESENT ONLY ON MIRAGE FM MPX

Processor adjustments

Operate / By-Pass operation

This function is situated on the front panel (switch no. 9). The status of the unit is displayed by indicator leds on the front panel.

OPERATE mode indicates that the MIRAGE is enabled to process signals, BY-PASS mode indicates that the MIRAGE will not perform any operation on the signal (apart from that of 10 KHz filtering).

The IN/OUT level controls remain active.

Bass

This control determines the gain applied to low frequency signals upto a maximum of +10 dB.

The center frequency of the filter is at 65 Hz.

This adjustment can be used to make the sound "deeper".

Presence

This control determines the average frequency expansion gain upto a maximum of +6dB.

The control is effective over the band 300-3300 Hz.

This adjustment can be used to make the sound more "immediate".

Brilliance

This control determines the amount of expansion applied to higher frequencies upto a maximum of + 6dB.

The control is effective over the band 3300-15,000 Hz.

This adjustment can be used to make the sound more "brilliant".

Density

This control determines the amount of expansion applied to the signal before compression upto a maximum of +10 dB. It is active over the entire audio spectrum.

With the control set at 0 no change to the sound takes place; at +10 dB the dynamic range is reduced making the output sound more "aggressive".

It is recommended that this control is used in moderation since a large reduction of the dynamic range will result in a "closing down" of the stereophonic signal.

AGC Drive and Release

AGC stands for Automatic Gain Control and automatically controls the gain applied to the input signal.

Control is applied over the range -10 to +10 dB.

The user may vary attack time (DRIVE) and release time (RELEASE).

The speed of control is adjustable from 0.5 to 8db/sec (0.5 dB/sec is slow and 8 db/sec is fast).

This circuit maintains the filter input levels more or less constant, within the limits of correction; furthermore it will optimize input signals that have incorrect levels as a result of a faulty source or operator error by automatically amplifying or attenuating the signal accordingly.

It should be noted that fast attack and release times can result in undesirable "pumping" effects.

It is generally speaking good practice to adjust AGC REL to be faster or equal to the AGC DRIVE time (e.g. DRIVE from 2 to 4 dB/sec, REL at 4 dB/sec).

Gate Threshold

This control determines the threshold at which the processor becomes active. This is adjustable from -10 to -10 dB. If the input signal level is less than the selected threshold, both AGC DRIVE and RELEASE are disabled. This situation is indicated by the GATE led.

Input Level

INPUT LEVEL is the input signal adjustment, made by two multiturn trimmers. The input accepts signals from -20 to +10 dBm. The level is correctly set when the AGC level, as displayed on the led bar (rear panel no. 1), averages a value of 0.

Output Level

OUTPUT LEVEL is the adjustment of the output signal; the level is varied by the two multiturn trimmers. The output is adjustable from 0 to +12 dBm. The output should be adjusted for maximum allowable deviation at the transmitter

Pre-Emphasis and De-Emphasis

Before enabling pre-emphasis, the chapter entitled "Optimum control of the level of peak modulation" should be read. **Attention Setup can be made by authorize personnel only.** MIRAGE features a dynamic pre-emphasis circuit. The configuration for pre-emphasis and deemphasis is selectable with Dip-switch located in the rear panel. De-emphasis need only be selected in those states that have a legal requirement for de-emphasis at the transmitter.

ENCODER adjustment (*)

ONLY FOR MIRAGE FM MPX)

Pilot Level

This is the pilot signal level control which adjusts the level relative to the amplitude of the MPX output signal. It can be adjusted via a trimmer.

Attention Setup can be made by authorize personnel only. The signal excursion can vary between 4 and 12% of the optimum level (-20 dB with respect to 0 dBm of the MPX signal and is 10% of the signal that produces ± 75 KHz deviation).

Pilot Phase

This controls the phase of the 19 KHz pilot signal and allows the stereo separation to be optimized by correcting the phase shift produced by the transmission chain.

To optimize the separation it is necessary to use a professional measurement decoder.

MPX Mode

This control enables the encoder modulator. Set the STEREO switch to change between MONO and STEREO operation. In the mono position the 19 KHz subcarrier is automatically disabled.

Composite Out

This control adjusts the level of the MPX signal. The level may be varied between 0 dBm and +12 dBm by adjusting the multiturn trimmer situated on the rear panel.

SCA Input Level

This control operates rather like that of RDS described above except that the range is from +6 dB to -14 dBm.

Configuration and in/ out connections

MIRAGE has been designed to offer the following features:

1. analog inputs and outputs.
2. composite stereo output (MPX)
3. user input/output for addition external audio effects.

The construction of the MIRAGE allows optional boards to be inserted in a card frame within the unit. The configuration ordered by the user will determine which boards are fitted.

Connections

It is recommended that input/output connections be made with high quality, flexible cable, incorporating a good screen.

Special attention should be paid to the grounding of the unit and the quality of the line supply ground connections. GROUND and CHASSIS connections between units should be kept separate in order to avoid interference caused by earth loops.

Inputs / Outputs

The female XLR inputs have an impedance selectable between 600 Ω and 10 k Ω .

The range of input levels is from -20 dBm to +10 dBm.

The male XLR outputs are active balanced with an impedance of 100 Ω .

The range of output levels is from 0 dBm to +12 dBm.

The adjustment of input and output levels is made with trimmers situated on the rear panel.

Encoder board inputs / outputs (*)

The stereo encoder features an unbalanced output on a BNC connector situated on the rear panel. This output can drive an impedance of 50 or 75 Ω at a distance of upto 10m via RG 58 cable without noticeable degradation of the MPX signal.

Also present are two inputs that can accept SCA and RDS signals which can be adjusted with trimmers and are added to the MPX output signal.

Furthermore an output provide synchronization to an external systems: SYNC 19 KHz OUT 1 Vpp SW for the synchronizing of external encoders.

Positioning the MIRAGE

The audio processing circuits of the MIRAGE produce a signal that is pre-emphasized with curves of 50 μ s or 75 μ s and processed in a precise manner to avoid overmodulation; the signal is then filtered at 15 KHz to protect the 19 KHz pilot tone.

If the two-channel output signal of the processor is input to an external stereo encoder, it is advisable not to introduce any other apparatus that could alter the bandwidth and increase modulation peaks with respect to the average value.

Frequency response errors and variable delays are introduced typically by equalizers, line transformers, low-pass 15 KHz filters and pre-emphasis networks in stereo encoders.

It is advisable, therefore, first of all, to by-pass all low-pass filters and pre-emphasis circuits present in normal stereophonic encoders.

Low-pass filters, high-pass filters, transformers, distribution amplifiers and long transmission lines can all alter the signal with the consequences outlined above.

It is clear then that the criteria for the optimum level of peak modulation outlined above, can be most easily met when the audio processor feeds directly an internal stereo encoder.

In the MIRAGE there are no active circuits or components between the audio processor and the internal stereo encoder that could distort the waveform. It is thus strongly recommended that the MIRAGE is used with its own internal stereo encoder wherever possible.

Best location for MIRAGE

The best location to install MIRAGE is as close as possible to the transmitter, in such a way that the stereo encoder output can be routed to the transmitter.

The buffered outputs of the MIRAGE can drive an encoder via upto 10m of cable without causing any appreciable degradation to the signal.

Should the output of the MIRAGE require a cable longer than the one that is recommended, the best solution is to install an external encoder close to the exciter of the transmitter and feed it directly from the Left and Right analog outputs of the MIRAGE.

To guarantee the maximum transmission quality, all apparatus used downstream of the STUDIO should be carefully aligned and should conform to appropriate standards for bandwidth, distortion, signal path delays and gain stability.

Such equipment should be re-calibrated at regular intervals; the signal source should be lownoise, have as flat a frequency response as possible from 30 - 15,000 Hz and have a low content of non-linear distortion.

Technical Specification

Frequency response:	30 Hz ÷ 15 KHz ± 0,3 dB (By-pass)
AGC Control:	± 10 dB
Stop Band Rejection:	> 90 dB above 75 KHz
Noise:	Output noise depends by processing parameters; AGC, threshold, gain and density Greater than 84 dB Din Audio (By-pass).
Total distortion @ 1 KHz:	Than less 0,05%
Crosstalk L/R R/L:	Greater than 60 dB Din Audio (90 dB @ 3 KHz).

AUDIO INPUT

Configuration:	Left and Right
Impedance:	10 KΩ electronically balanced
Input level:	- 20 ÷ +10 dBm
Common-mode rejection:	Greater than 50 dB, (30 ÷ 15.000 Hz)
CONNECTORS:	XLR TYPE-FEMALE PIN 1 GND, PIN 2 INPHASE, PIN 3 RETURN PIN 2 AND 3 ELECTRONICALLY BALANCED

Attention All cables should not be more than 3 meters length

AUDIO OUTPUT

Configuration:	Left and Right, Flat, Pre-emphasized or De-emphasized (50 o75mS).
Impedance:	100 Ω electronically balanced
Output level:	0 ÷ +12 dBm
CONNECTORS:	XLR TYPE-FEMALE PIN 1 GND, PIN 2 INPHASE, PIN 3 RETURN PIN 2 AND 3 ELECTRONICALLY BALANCED

STEREO ENCODER (*)

Configuration:	1 Output with level control
Pilot frequency:	19 KHz ± 0,001 % max over temp.
Pilot injection:	4 ÷ 12 % adjustable
Distortion @ 1 KHz:	Less 0,005 %
Signal-to-Noise ratio:	Greater than 92 dB DIN AUDIO
Stereo separation:	Greater than 60 dB 30 ÷ 15 KHz (70 dB @ 1 KHz)
Crosstalk Main to Sub:	Greater than 45 dB 30 ÷ 15 KHz (75 dB @ 1 KHz)
Crosstalk Sub to Main:	Greater than 40 dB 30 ÷ 15 KHz (75 dB @ 1 KHz)
38 KHz subcarrier suppression:	Greater than 80 dB
76 KHz and sideband suppression:	Greater than 90 dB
Composite output level:	0 ÷ + 12 dBm

Impedance:	50 Ω
Connector:	BNC floating
Max cable length:	10 mt. RG58 A/U
Pilot reference output:	1 Vpp sq. wave
Impedance:	600 Ω
Connector:	BNC floating over chassis
SCA input:	-14 ÷ + 6 dBm for 10% modulation of main carrier
Input impedance:	10 K Ω
Connector:	BNC floating over chassis
RDS level:	-24 ÷ 0 dBm for \pm 2 KHz of main carrier
Input impedance:	10 K Ω
Connector:	BNC floating over chassis

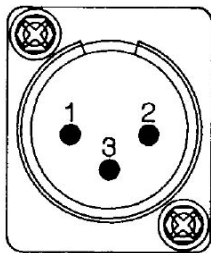
GENERAL DATA

Power supply:	87 ÷ 265 VAC 50-60 Hz
Power consumption:	8 VA
Dimensions:	(19"x 9.4"x 1.7") 48,3 x 24,0 x 4,4 cm 1 rack unit
Weight:	8.4 Lbs (3,8 Kg)
Operating temperature:	0 ÷ 50 °C

Pin OUT I/O audio interface

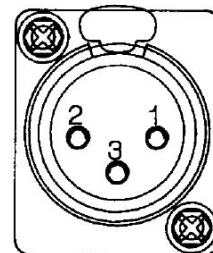


1. Right return output
2. Right inphase output
3. GND
4. Left return output
5. Left inphase output
6. GND
7. GND
8. GND
9. GND
10. GND
11. Right return input
12. Right inphase input
13. GND
14. Left inphase input
15. Left return input



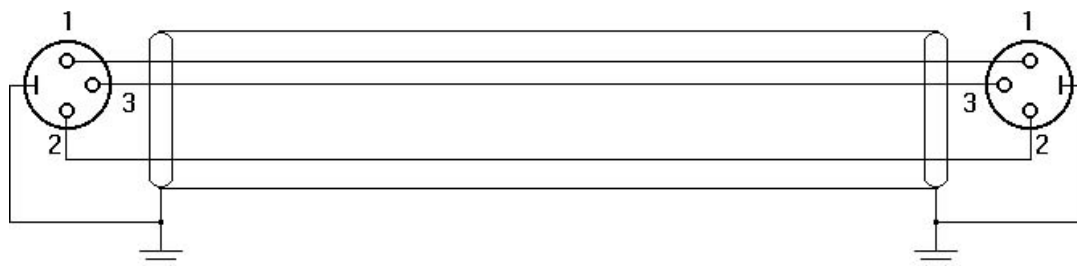
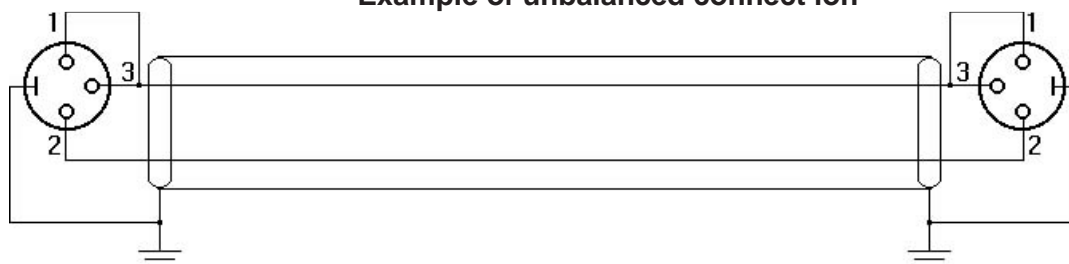
OUTPUT

- 1 = GROUND
- 2 = INPHASE
- 3 = RETURN



INPUT

- 1 = GROUND
- 2 = INPHASE
- 3 = RETURN

Example of balanced connection

Example of unbalanced connection

DIP SWITCH


DIP	MODE	ON	OFF
1	Z in left	600 Ω	10 K Ω
2	Deenphasys	ON	OFF
3	Sel. 50/75 μ sec	75 μ sec	50 μ sec
4	Preenphasys	ON	OFF
5	Pilot (19KHz)	OFF	ON
6	Stereo/Mono	Mono	Stereo
7	n.c.	n.c.	-
8	Z in right	600 Ω	10 K Ω