



# Owner's Manual

# 10M

Rubidium Atomic Clock



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# SAFETY NOTES

*To reduce the risk of electrical shocks, fire, and related hazards:*

- Do not remove screws, cover, or cabinet. There are no user serviceable parts inside. Refer servicing to qualified service personnel.
- Do not expose this device to rain, moisture or spillover of liquid of any kind.
- Do not insert foreign objects into the ventilation outlets of the cabinet.
- Should any form of liquid or a foreign object enter the device, do not use it. Switch off the device and then unplug it from the power source. Do not operate the device again until the foreign object is removed or the liquid has completely dried and its residues fully cleaned up. If in doubt, please consult the authorized repair service.
- Do not handle the power cords with wet hands!
- Make sure the device is switched off when plugging/unplugging it to/from the power source.
- When unplugging from the wall outlet always pull the plug, not the power cord.
- Make sure ventilation outlets are not obstructed: putting things on the cabinet or using the device in a narrow and poorly ventilated place may result in the temperature rising which could affect its operation or the operation of other closely located components.
- If anything goes wrong, turn off the device first and then unplug the power cords. Do not attempt to repair the device yourself: consult the authorized service personnel or your dealer.

## Important

*About the 12V  $\overline{\text{---}}$  power supply option, please note the following:*

Improper application of the 12V  $\overline{\text{---}}$  power supply may damage the device. When connecting the 12V  $\overline{\text{---}}$  power cord to the power source, make sure to comply with the circuit diagram given in this manual so that the correct polarity is applied. If in doubt - consult a competent electronics technician.

Make sure the power supply source is capable of producing enough power to meet the requirements of the device during its peak consumption period (the warm-up) when 40 Watts of power are required.

# INTRODUCTION


Thank you for purchasing this 10M Rubidium Atomic Clock the foremost device in the Antelope's ISOCHRONE product line specifically designed for the most discerning audio professionals. Before you begin operating this unit, please read the instructions carefully to make sure you handle the device properly and get the best possible performance.

## PRODUCT OVERVIEW

ISOCHRONE 10M is a laboratory-grade atomic master clock for audio/video equipment and for other uses for which ultra-high clocking precision is required. In audio, it virtually eliminates jitter by providing your gear with clocking reference which is so stable that some testing instruments cannot even measure it: 0.03 PPB (parts per BILLION), that is, deviation of 1 second in 1,000 years! As a result, staging, transparency, imaging, separation, and depth are vastly improved and render the warmth and fullness typically associated with analog sound.

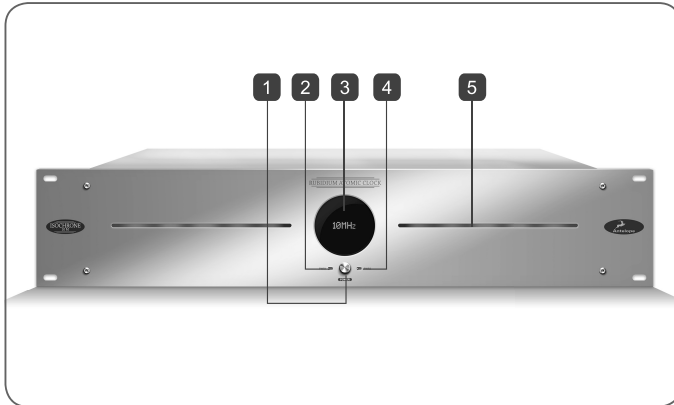
The heart of the ISOCHRONE 10M is a Swiss-made high precision sub-miniature Rubidium oscillator, which is 100,000 times more stable than the typical crystal oscillator. Rubidium is a very soft and highly reactive element forming alloys even with gold, but it is best known for its capacity to produce extremely stable sinusoidal frequencies. In this device, it generates a frequency of 10 MHz, hence the name "10M".

You can use your ISOCHRONE 10M with any device that supports 10MHz (BNC) input clock. The ISOCHRONE 10M can clock up to 8 devices simultaneously.

ISOCHRONE 10M has dual redundant power supply (100-240V~ and 12V ) , which eliminates downtime in case of power failure.

**Note:** *Even though the device is an atomic clock, there are no radioactive components inside ISOCHRONE 10M.*

# FRONT PANEL



## 1. Power Switch

When depressed, the device is on, which is signaled by indicators (2) and/or (3) and the Information Display (4).

## 2. AC Power Supply Indicator

When on, indicates the device is connected to a 90-240V~ power supply source.

## 3. DC Power Supply Indicator

When on, indicates the device is connected to a 12V  power supply source.

## 4. Information Display

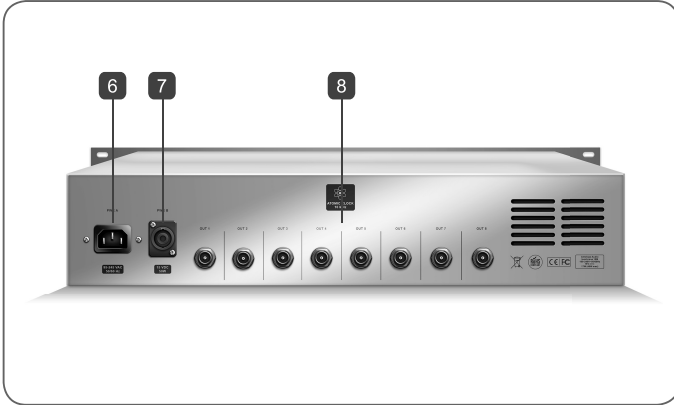
During the warm-up period (just after the device has been switched on) displays the following message: "Please wait, the rubidium generator is warming up". The device is operable in this state, but the clock frequency has not yet reached its specified ultimate stability.

Once the device is fully warmed up, the message is replaced by "10M" which means maximum stability has now been achieved (the clock frequency stability meets specifications) and the device is ready for use.

## 5. Warm-Up Indicator

When the device is first powered, these LEDs pulsate during the device's warm-up period as the Rubidium oscillator is heating up. When the device is fully warmed up, the LEDs glow with steady red light.

# REAR PANEL



## 6. AC Power Connection

This IES AC connection supports inputs of 100-240V~. This enables the device to automatically accommodate mains voltages in any country.

## 7. DC Power Connection

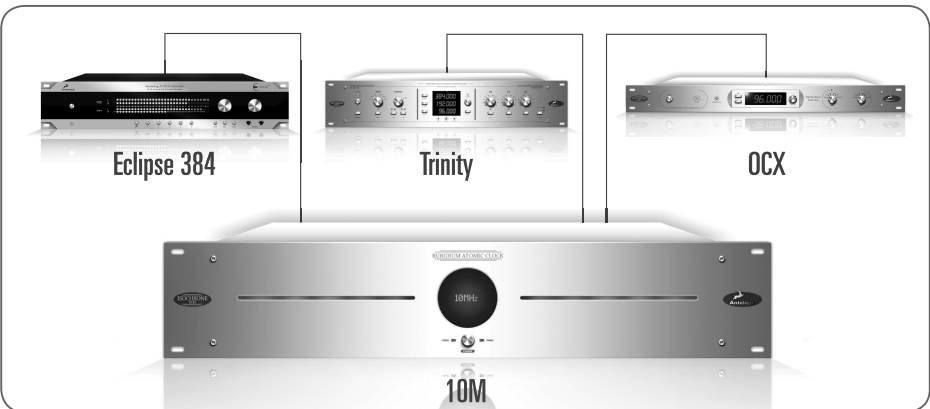
Speakon NL4FX socket for 12V  $\text{---}$  power supply. The power source should be capable of producing enough power to meet the requirements of the device during its peak consumption period (the warm up), when 40 Watts of power are required. The 12V power supply units designed for telecommunication devices typically meet this power output requirement.

## 8. Atomic Clock Outputs 1-8

BNC outlets for the 10 MHz atomic clock signal. For best results, the cables should not exceed 6 meters (20 feet) in length. Longer cable runs result in increased jitter and other clock errors.

# WIRING DIAGRAM

Example connection schematics of the ISOCHROME 10M.



# INSTALLATION AND CONNECTION

1. Before placing the device into its operating location, consider the following:
  - The device's ventilation outlets should not be obstructed by other devices and objects and enough space for air circulation should be provided.
  - The device should not be placed next to any heat-sensitive piece of equipment. (The surface of ISOCHROME 10M may reach a temperature of 55°C (140°F) during operation.)
  - To minimize frequency instabilities, the device should not be placed near equipment generating strong magnetic fields, such as generators, transformers, etc.
  - To prevent possible interference, observe a minimum distance of 5 centimeters (2 inches) between the cables of this device and any non-coaxial audio cables.
  - It is OK to use the device unmounted (i.e. not in a rack) as long as the above conditions are met. There is no requirement for the device to be leveled horizontally.
2. If the DC Power Connection (7) is to be used, make sure the power cord is wired properly, because reversed polarity may damage the device. Refer to the illustration and the table below for information on how to make the connection. If in doubt consult a competent technician.

If the mark on the Speakon NL4FX plug is...	...connect to the following mark on the power supply unit circuit board/terminal:
1+	+12 V
2-	Ground
1-	Earth (optional, use it if available on the power supply unit)

3. Mount the device on its operating place in the rack and secure it with the screws.
4. Connect the AC Power Connection (6) and/or the DC Power Connection (7) to the respective power outlet(s).
5. Connect the devices you would like clocked to the Atomic Clock Outputs 1-8 (8) on the rear panel. (These devices must support 10 MHz atomic clock signal input.)


**Note:** *When connecting the devices, do so with the studio volume turned down. Some devices may emit unpleasant sound until properly configured to accept incoming clock.*

## OPERATION

1. Power the device on by depressing the Power Switch (1) on the front panel. Depending on the connected power sources, the Power Supply Indicator(s) (2) and/or (3) will go up.
2. If the connected slave devices are off, power them on.
3. Make sure the atomic clock indicators of the slave devices show that the 10 Mz clocking signal is received properly. Some devices will automatically synch to the incoming clock from the ISOCHROME 10M when connected; others may require additional configuration in order to utilize 10 MHz clock.



# TECHNICAL SPECIFICATIONS

<b>Atomic Reference Type:</b>	Rubidium Ultra-Stable Resonance-Controlled Master Oscillator
<b>Frequency:</b>	10 MHz
<b>Frequency Accuracy:</b>	Better than 0.03 PPB (parts per BILLION)
<b>Long-Term Stability:</b>	Better than 0.02 PPB Typical: 0.05 PPB per month (measured after 6 months of continuous operation) First Year < 2 PPB
<b>Short-Term Stability:</b>	Standard 0.03 PPB per second 0.01 PPB per 10 seconds 0.003 PPB per 100 seconds
<b>Phase noise (10 MHz):</b>	Standard -140 dBc per Hz at 10 kHz
<b>Warm-Up Time:</b>	8-10 minutes (depends on ambient temperature)
<b>Power Supply Type:</b>	AC and DC, Dual Redundant
<b>Power Supply Input:</b>	100-240V- 50/60 Hz 12V 
<b>Power Consumption:</b>	40 W during the warm-up 17 W at standard operation (after the warm-up)
<b>Inrush Current:</b>	Maximum 50A at 264 V AC
<b>Atomic Clock Output:</b>	8 x BNC Sinusoidal, 10 MHz, 75 Ohm, 1Vpp typical (unload)
<b>Operating Temperature:</b>	0÷45°C 32÷113°F
<b>Storage Temperature:</b>	-20÷85°C -4÷185°F
<b>Humidity:</b>	Maximum 80%
<b>Dimensions:</b>	434 mm (W) x 81 mm (H) x 205 mm (D) 17" (W) x 3.2" (H) x 8" (D)
<b>Weight:</b>	5.7 kg / 12.9 lb.

# NOTES

A series of horizontal dotted lines for writing notes.



