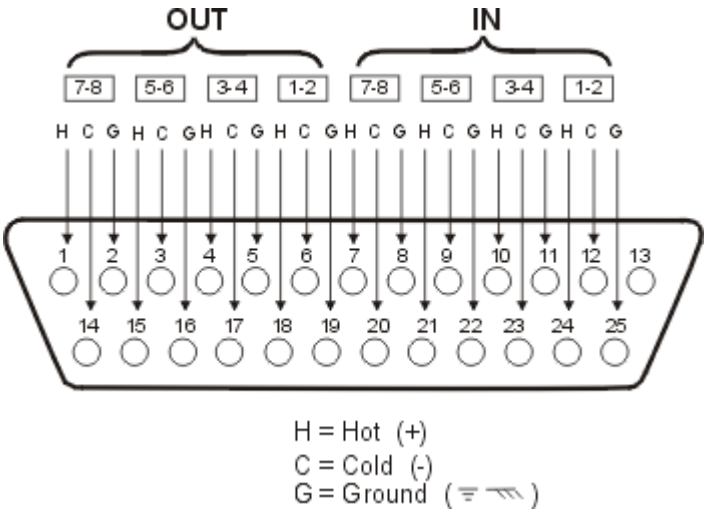
# AES Multi-Channel Card

### DESCRIPTION

AES is an interface card for RADAR that provides 24 tracks of 24-bit digital audio input and output. The digital audio is divided into three DBLS connectors of 8 tracks each. The AES Multi-Channel card Supports up to 96 kHz Single wire and 192 kHz Dual wire.

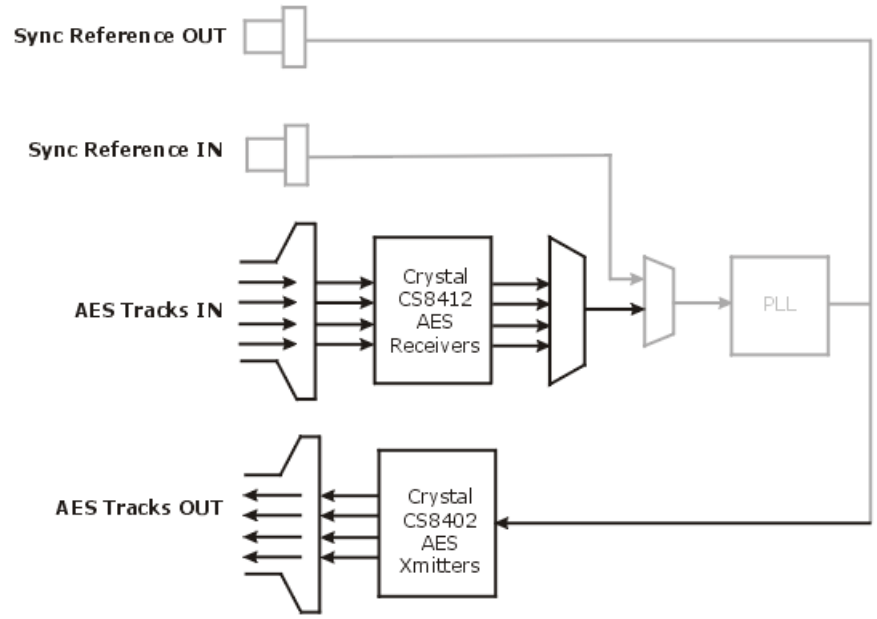
## AES Card Pinouts



## BLOCK DIAGRAMS

Only tracks 1-8 of the 24 track AES card are shown in the clock diagram below. Tracks 9-16 and 17-24 are identical in operation. Functional blocks located on the AES card are darkened in the diagram.

### CLOCK DIAGRAM




### DIGITAL AUDIO DIAGRAM

# USING THE AES DIGITAL INTERFACE CARD

## AES OUTPUT

With RADAR as a master, transferring digital audio from RADAR to an external box is quite straight forward. When playing, RADAR is always outputting AES digital audio and the Sync Ref outputs.

Just plug in the required cables and perform the transfer.

## AES INPUT

### Syncing

Who is the clock master? It will either be the RADAR or an external box.

### Framing

How does the input AES circuit frame the input audio data? Unlike the TDIF's framing, AES framing is transparent to the user. The Crystal CS8412 AES chips automatically find the start of each input audio sample.

Configuring RADAR for an AES Transfer

**Step 1 – Set the syncing details in RADAR.**

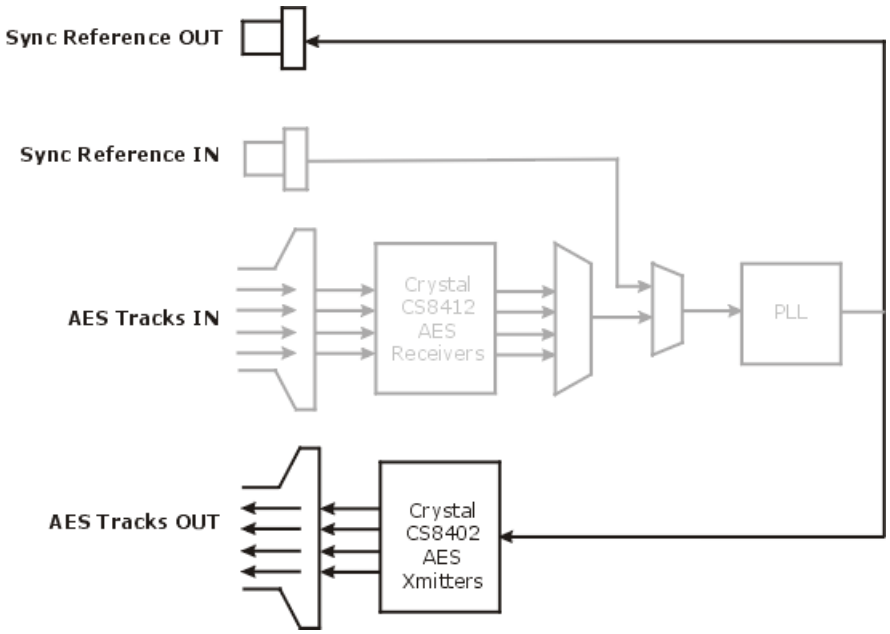
This step is required only if the user intends to sync the RADAR directly to one of the AES input channel pairs:

1. Press **DIG IN**.
2. Select ***DIG IN FORMAT:*** **AES MULTI-CHANNEL**.

**Step 2 – Sync up the RADAR.**

1. Press **SYNC**.
2. Select ***SYNC REFERENCE:*** **AES MULTI-CHANNEL**.
3. Select the desired AES channel pair from which the RADAR's clock will be sourced.

## EXAMPLE 1 - RADAR AS CLOCK MASTER




*Functional blocks are darkened in diagram*

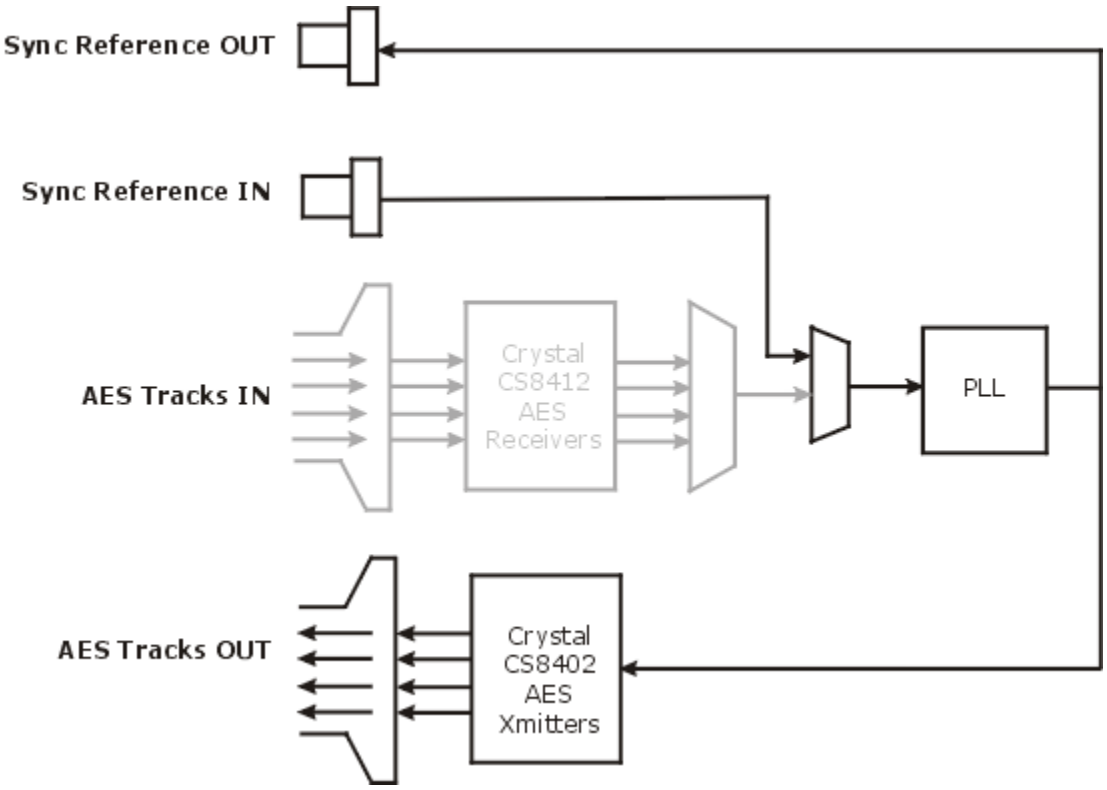

**Who is the clock master?**

RADAR generates a clock from its internal sync reference, or may be locked to externally generated SMPTE, MIDI, etc.

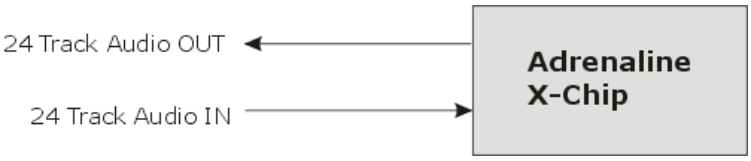
**When is this configuration used?**

This is a typical configuration when a simple AES digital audio transfer is required between the RADAR and a single external box. The external box locks to RADAR, via RADAR's AES output or sync reference output, so the AES running into RADAR will be in sync with RADAR's PLL.

## EXAMPLE 2 - EXTERNAL BOX AS CLOCK MASTER VIA WORDCLOCK




*Functional blocks are darkened in diagram*



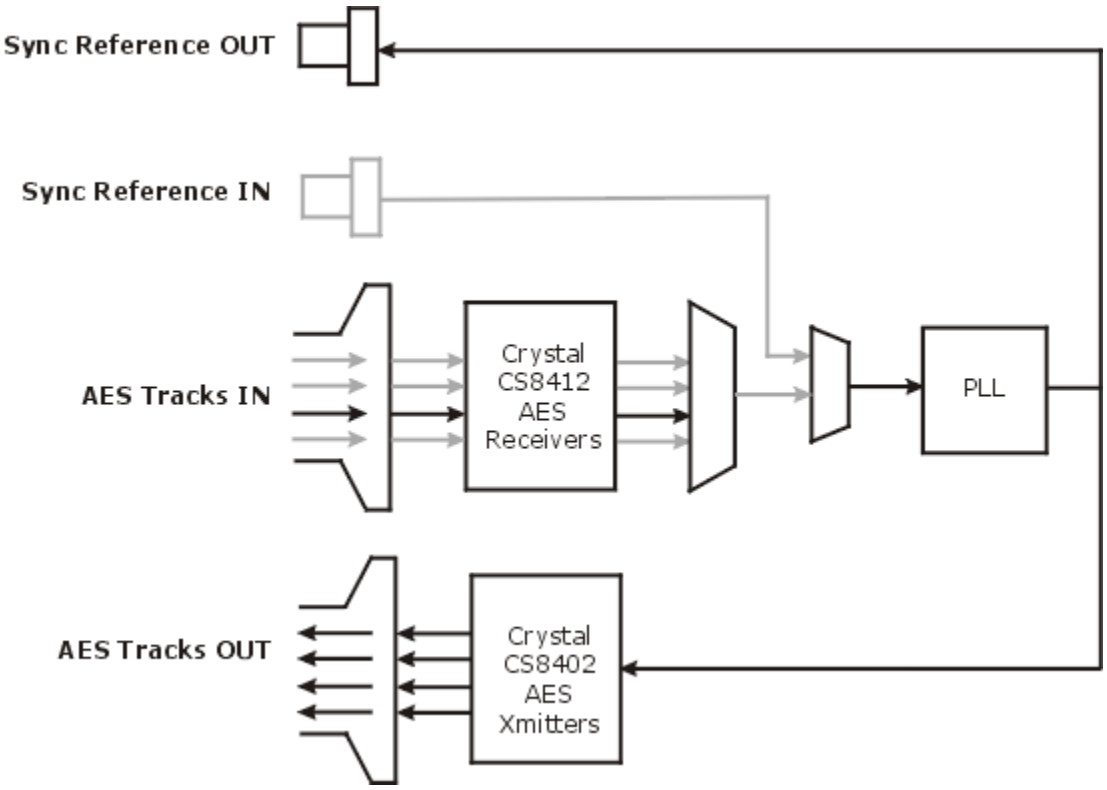

**Who is the clock master?**

An external box, which may be a clean house clock source. The RADAR generates a clock from the external sync reference input.

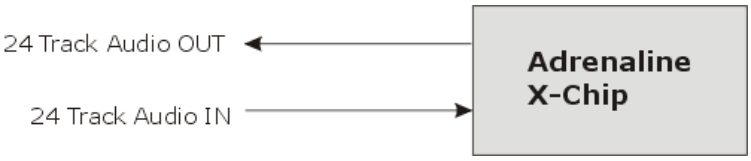
**When is this configuration used?**

This is a reliable configuration when several digital boxes are used in a studio. All boxes are synced to a single, clean house clock. In this case, jitter in one PLL does not propagate to the next PLL in the daisy-chain of boxes.

## EXAMPLE 3 - EXTERNAL BOX AS CLOCK MASTER VIA AES PAIR




*Functional blocks are darkened in diagram*




**Who is the clock master?**

An external AES box. The RADAR generates a clock from the selected input AES channel pair. In this case, the clock is sourced from tracks 5/6.

**When is this configuration used?**

This is a typical configuration when a simple AES digital audio transfer is required between the RADAR and an external box, and the RADAR is a slave. The RADAR locks to the external box via the MCLK derived from the selected AES channel pair. Note that Example 2 does a better job of minimizing noise problems, in most cases.

# AES SETTINGS MENU

Several parameters of the AES digital audio interface can be set in the **AES SETTINGS** menu.

### SAMPLE RATE IN AND EMPHASIS IN

Each AES channel pair contains input sample rate indicator and emphasis indicator bits. These bits do not necessarily reflect the actual sample rate or emphasis of the input audio data. Some boxes ignore these signals, while others do not. RADAR provides the user with this information in the **DIAGNOSTICS MENU**.

The four possible sample rates are 48 kHz, 44.1 kHz, 32 kHz, and no connect. No connect is indicated when the cable is not plugged in.

The four possible emphasis values are none, 50/15 uS, J.17, and other.

### SAMPLE RATE OUT AND EMPHASIS OUT

Each AES channel pair contains sample rate and emphasis indicator signals. The output sample rate is set automatically by RADAR and matches the sample rate of the box. The four possible sample rates are 48 kHz, 44.1 kHz, 32 kHz, and not indicated.

The value of the emphasis out is set by the user in the **DIAGNOSTICS MENU**.

Note that all output tracks always output the same sample rate and emphasis indicator values.