QSC CINEMA

Application Note

UPC-28C-N Narrow Beam LED Emitter

The UPC-28C-N is a version of the UPC-28C that uses “narrow beam” IR LEDs. The UPC-28C-N is the complete system (including mounting brackets and power supply), while the IRC-28C-N is the actual IR emitter.

The UPC-28C and UPC-28C-N transmit two audio channels and closed captions over infrared (IR). The emitter is normally mounted on the back wall of the auditorium and aimed towards the screen. Receivers receive a combination of IR direct from the emitter and IR reflected by the screen. In large auditoriums where there is an obstruction between the emitter and the receiver, reception is entirely from screen reflection.

The UPC-28C uses LEDs with a half-power beamwidth of +/- 22 degrees. The UPC-28C-N uses LEDs with a half-power beamwidth of +/- 3 degrees. The goal of the UPC-28C-N is to have a larger portion of IR emitted by the panel hit the screen and be reflected.

A typical auditorium with a screen width of 58 feet and a throw distance of 106 feet spans +/- 15 degrees horizontally. With a screen height of 24 feet, the screen spans +/-6.5 degrees vertically. In both dimensions, a large portion of the +/- 22 degree beamwidth of the UPC-28C misses the screen (Figs. 1 and 2). In many auditoriums, this is not an issue, since IR can reach the receivers both directly from behind and also reflected from the screen. But in applications where obstructions (such as “pony wall” dividers) block direct IR reception from the emitter, the IRC-28C-N directs a narrower, more “focused” +/- 3 degree IR beam to the screen, thus allowing more energy to be fully reflected back toward the listener’s receivers (see Figs. 3 and 4).

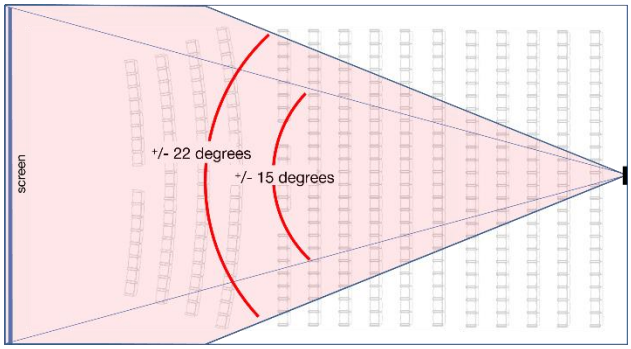


Fig. 1. Plan view. Horizontal coverage overshoots the screen.

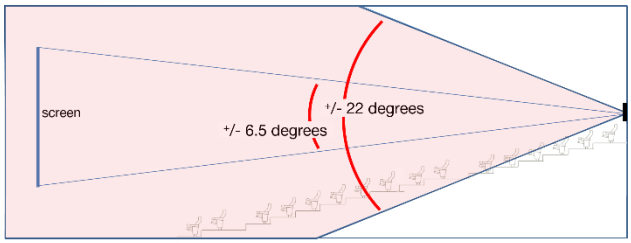


Fig. 2. Elevation. Vertical coverage overshoots the screen by an even wider margin.

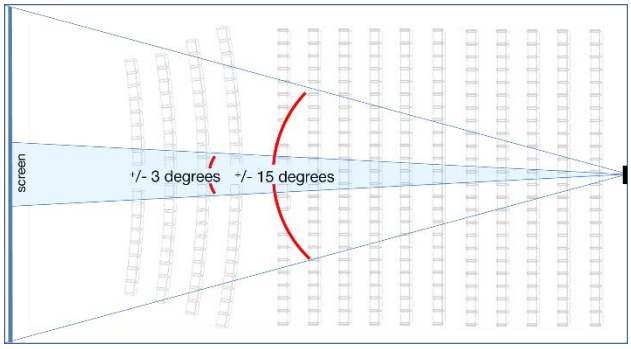


Fig. 3. Plan view, showing +/- 3 degree coverage.

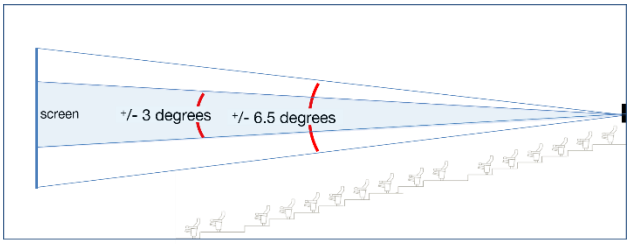


Fig. 4. Elevation view showing +/- 3 degree coverage. All of the energy hits the screen directly, and is reflected back to seating area.

Field measurements indicate that reflected screen energy with the UPC-28C-N is **10 to 38 times** that with the UPC-28C.

Installation

The installation of the UPC-28C-N is the same as that of the UPC-28C with one important exception. Due to the narrow beamwidth of the UPC-28C-N, aiming the panel towards the screen is critical. Moving the panel 3 degrees can drop the reflected IR energy by half or more.

The use of the QSC LSS-100P or LSS-200 Light and Sound Sensor is recommended. The LSS-100P has an IR sensor that can be used to read the relative IR level reflected by the screen. The LSS-200 has a "visible light sensor" (used in the audio/video sync test) that is also sensitive to IR.

If the LSS is not already installed in the auditorium, mount one on a tripod. If a port window can be opened into the auditorium, the LSS can be in the booth. Otherwise, place it in the back of the auditorium.

Connect the LSS to a computer using an Ethernet cable. Use a USB cable (with a mini-B connector for the LSS) between the computer and the LSS to power the LSS.

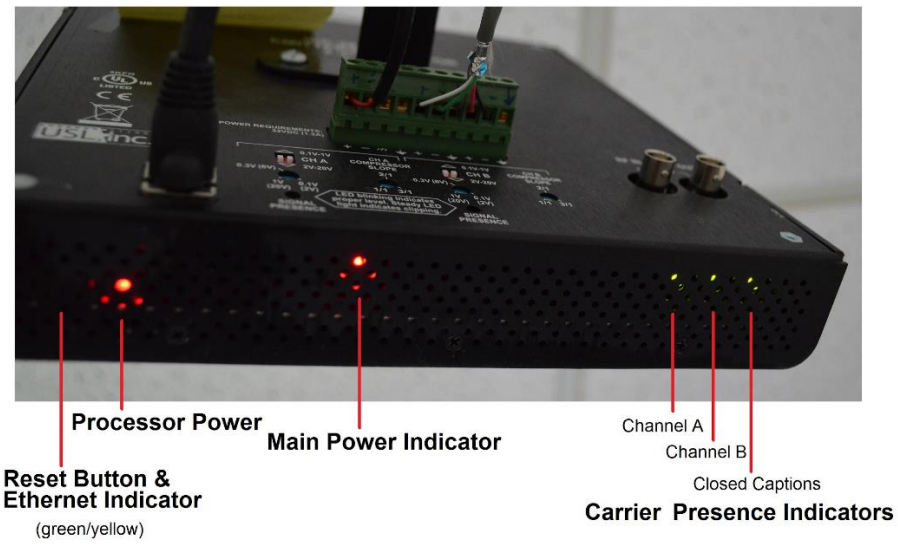
Turn ON the LSS aiming LED lights. Aim the LSS such that the two spots it puts on the screen are centered both horizontally and vertically. Adjust the focus on the LSS to make the spots sharp. Once the LSS is aimed and focused, turn the aiming LED lights OFF. Failure to do so will result in incorrect readings.

Open a web browser on the computer and enter the address of the LSS (default address is 169.254.1.6). It may be necessary to change the IP address of the computer to be in the same subnet as the LSS.

Add "/protect/cal.html" (without quotes) to the address on the web browser. The computer will ask for a username and password. The default username is **admin**. The default password is **ultra**. This should bring up a hidden calibration page. Do not press any of the buttons on this page, as that could destroy the calibration of the LSS.

Scroll down the calibration page until sensor values are visible. For the LSS-100P, we want to watch the IR sensor. For the LSS-200, we want to watch the visible light sensor.

Play HI/VI-N content[1] so the two audio channels and the caption channel carriers are brought up. The carrier presence is indicated by green LEDs visible through the bottom of the emitter as shown in the photo below.



[1] Be sure that your test DCP is in fact encoded with HI/VI-N content.

Adjust the aiming of the IR panel to yield the highest sensor value (IR on the LSS-100P, visible on the LSS-200). Note that the panel aiming has to be adjusted both horizontally and vertically (by bending the metal “J-hook”).

Verify proper operation by walking around the auditorium while listening to the IRH headphones and watching the CCR-100 closed caption receiver. Check especially the corners of the room and directly in front of any pony walls or other obstructions where direct radiation is blocked.

Dual Panels

In some auditoriums, additional IR power is required. This is accomplished by installing a UPC-28C-N-D. The UPC-28C-N-D has two IRC-28C-N emitters. They are mounted as a pair on a dual panel bracket. One of the IRC-28C-N units acts as the master. It generates the RF carriers that modulate the IR. The other IRC-28C-N panel acts as a slave. It receives the RF over a coaxial cable and does not generate any RF signals on its own. It is important that the slave panel not generate any RF signal, as this would interfere with the signal from the master panel. Since the audio carriers are brought up with audio presence, there is no danger of an audio carrier being brought up on the slave panel, since there is no audio connection to the slave panel. However, the default setting for the caption carrier is “always on.” This *will* result in interference. To turn off the caption carrier on the slave panel, connect a computer to the slave panel using an Ethernet cable. Put the IRC-28C-N default IP address in the browser (169.254.1.1). Again, it may be necessary to change the IP address of the computer to be on the same subnet as the IRC-28C-N. You should see the IRC-28C-N home page (titled “Caption Encoder”). Click the link to the config page. Enter the username and password (admin, ultra). Set the caption carrier to “off”, and save the settings.