

Digital Cinema Equipment Storage Recommendations for Maintenance

Introduction

Digital cinema equipment (projectors, servers, and media blocks) are designed with the expectation that they will be powered up and in use as they would be in a typical movie theater, i.e. for around 10 to 12 hours a day, seven days a week.

In situations when this is not the case, or if a theater is closed for a prolonged period, attention must be paid to some maintenance issues, to ensure that the equipment will work without faults when it is needed again.

This maintenance essentially falls into two categories: mitigating the effects of temperature and humidity when equipment is stored with no HVAC running, and preventing the batteries that maintain security certificates in DCI-compliant components from discharging completely.

Shutdown Procedures

Projectors and IMSs

1. Turn off the lamp and let it cool for the manufacturer's recommended period.
2. Ideally, download a settings and configuration backup, just in case a board goes bad during the shutdown and needs to be replaced.
3. If an IMS is installed in the projector, shut it down per the manufacturer's recommended procedure.
4. Put the projector into standby mode.
5. Disconnect the projector (and, if separate, the lamp power supply unit) from AC power.
6. Put the lens cap on, if you have it. Place a note in an easily visible place reminding you of this, to prevent the risk of causing damage by starting the lamp with the lens cap still on.
7. If the projector has external air extraction, disconnect the duct, and cover the flue in the top of the projector with a plastic sheet and duct tape (roof leaks into lamphouse vents have caused water damage to projectors in the past).
8. Make a note of the date on which the projector was last powered.

Rack Mount DCP Servers

Shutdown the server using the manufacturer's recommended method – *do not* just pull the AC power from it. Note the date on which the equipment was last powered.

Special note for Dolby DSS100, DSS200, and DSS220 servers, and DSL100 and DSL200 TMS systems:

Dolby recommends that they be left running 24/7, and that if it is necessary to power them down, that this can safely be done simply by pulling the AC cord(s) from the back. However, our experience is that this can cause RAID drive corruption. A safer way to power them down is as follows:

- Using a locally connected keyboard and mouse, press Ctrl, Alt, and F1 simultaneously.
- The screen will go black, and you will see a login prompt. Now press Ctrl, Alt, and Delete simultaneously.
- The shutdown procedure will begin. When it says "The system will now restart" and you hear the fans surge shortly afterwards, pull the power at this point.

TMS/LMS Systems

Consideration should be given to leaving these powered up throughout the closure period, especially if you receive digital cinema content online using an automated system (e.g. Screenvision, EclairPlay, or CineSend). This will minimize the risk of you not having the content you need when the site re-opens. However, if you do decide to shut them down, the advice is the same as for servers: do the shutdown procedure for whatever operating system they use, and don't just pull the plug.

Restarting your Equipment

Temperature and Humidity

Extremes of temperature can cause expansion and contraction of chassis components and fasteners, known as "heat cycling." Over repeated time and/or cycles, this can cause boards to work loose in their connectors, resulting in malfunctions and error reports when the equipment is next powered up. If equipment is stored in a booth for prolonged periods in an unusually hot or cold climate with the HVAC shut down, this could potentially cause problems when it is powered up again.

Extremely high humidity carries a specific risk for digital projectors illuminated with xenon arc lamps. If condensation forms on the envelope of the bulb, it can cause the bulb to explode shortly after it is next lit. Laser diodes will also not work in an extremely humid environment, but laser-illuminated digital cinema projectors have built-in humidity sensors that will prevent the lasers from being powered up if the ambient humidity is not within permitted limits (typically, below 70 to 75% RH).

In the case of projectors that have not been powered up for a month or more, we would recommend the following procedure for recommissioning them.

1. Place a humidity meter (a very basic one, for example - <https://www.amazon.com/ThermoPro-TP49-Hygrometer-Thermometer-Temperature/dp/B07WCR5Y4B/> - will do fine) in proximity to the projector. If you see a reading that is near or outside the manufacturer's specified maximum, run your building's HVAC until the relative humidity is back within spec. If you don't know what that maximum is, use 60% as a rule of thumb.

2. Clean (or, if the projector uses one-time air filters, replace) the air filters, regardless of when they were last done. If they got damp during the shutdown, significant damage could result when the projector is powered up.
3. Check the faceplate screws of all the cards in the cage, and tighten where necessary. Also check the seating of all the power and signal connections to the projector.
4. If your projector uses xenon arc bulbs, then, *wearing full protective gear*, open the lamphouse, and, with a hairdryer *on a barely warm setting (NOT full heat)*, gently blow the surface of the bulb envelope for five minutes. Run your finger along the interior surfaces of the lamphouse chassis, to ensure that they feel bone dry, but *do not touch the bulb with your fingers*.
5. Power up the projector's card cage, and take it from standby into on, but then leave it for an hour before turning on the light source.
6. (less urgent, but should still be done) – Check for software/firmware updates that were published by the manufacturer during the shutdown period, and download and install them.

Certificate Batteries

Every component within a DCI-compliant digital cinema system that processes encrypted image data (known as a “media block”), has what is known as a “private key certificate,” which is a decryption key to enable this processing. Per DCI anti-piracy rules, this key has to be stored in volatile memory – memory that will be erased if it loses power. Also per DCI rules, if this certificate is lost, the component has to be returned to the manufacturer to have it restored: this cannot be done in the field. When such equipment is unpowered, the certificate memory is maintained by a battery in the component. Different manufacturers take different approaches to this: some use one-time batteries that have to be replaced periodically in the field, while others build rechargeable batteries in, which are charged while the unit has power, and discharge to maintain the memory while it is powered down.

It is important not to let these batteries discharge completely. If they do, you will be faced with a delay of up to a week or two for a repair or replacement, and the cost of this can be significant. These systems are designed such that in a normal operational pattern (powered up 10-12 hours a day, seven days a week), you don't have to worry about this, as long as the recommended planned maintenance is being done. But during a prolonged shutdown, certificate battery loss is a significant risk that you have to mitigate.

Media Block Battery Replacement Information

Below is a table of DCI equipment models in widespread use, the certificate battery models that they take, and the recommended replacement and recharging intervals.

Please note that the replacement of one-time batteries is a procedure that has to be done carefully, and following precise steps, in order to avoid accidentally losing the certificate in the process. The

manufacturer's recommended procedure and documentation should be consulted before attempting a battery swapout.

If you are in any doubt as to your ability to do this, we suggest that you book a call from a qualified service tech. The table may assist in determining if the procedure is due. If you would like to schedule an MiT tech to visit your facility and assess your battery maintenance needs, please contact Jim Stewart (714-751-7998, ext. 228, or jim.stewart@movingimagetech.com).

Barco

Cinionic (Barco) information sheet - <https://www.cinionic.com/news/what-to-do-if-you-need-to-switch-off-for-a-bit/>

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|-----------------------------------|--------------|--|---|
| Barco Alchemy ICMP (all variants) | CR2477N | Cinionic advises replacement every five years. | Software will display a nag warning based on voltage. |
| Barco Series 1 projectors | Rechargeable | Cinionic advises that these projectors be booted up once a month for a minimum of 12 hours continuously, to preserve the link decryption certificate on the TI Cinema Interface Board. | |
| Barco Series 2 projectors | Various | Cinionic advises that all field replaceable batteries on the option cards be replaced every five years. | |

Christie

Christie information sheet -

[https://info.christiedigital.com/web_files/378/PDFs/cinema/Temporary Suspension of your theatre - Recommendations by Christie.pdf](https://info.christiedigital.com/web_files/378/PDFs/cinema/Temporary_Suspension_of_your_theatre_-_Recommendations_by_Christie.pdf)

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|---|--------------|--|---|
| IMB-S2 and CMB | Rechargeable | If leaving in standby, select the "IMB powered in standby mode" in the GUI. If powering down completely, the projector needs to be powered up for three hours every three days to prevent the risk of battery drain. | If the battery is allowed to drain, a FIPS tamper event will be registered, and the board must be replaced. Instructions and information here . |
| Projector Control Module CP2000-M and CP2000-ZX | CR2032 | Not stated. If the battery dies, extensive reconfiguration is needed after replacement, but the board will not be bricked. | Instructions here . |
| Projector Intelligence Board (PIB) | | Every five years. USB flash drive with 8GB capacity needed for replacement procedure. PIB will require replacement if the battery is allowed to die. | Projectors affected: CP2210, CP2215, CP2220, CP2230, CP4220, CP430, Solaria One. Instructions here . |

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|--------------------------------------|-----------------|--|--|
| Touch Panel Controller (TPC) battery | BR2032 (not CR) | Not stated. USB flash drive with 8GB capacity needed for replacement procedure. If the battery is allowed to die, automated events will not run as expected. | Projectors affected: CP2210, CP2215, CP2220, CP2230, CP4220, CP430, Solaria One. Instructions here . |

Dolby

Dolby information sheet - <https://dolby.app.box.com/v/Dolby-Products-During-Shutdown>

Special Note on Dolby Media Blocks

If a Dolby media block loses its certificate and has to be returned for repair, the certificate itself will change, but the media block's serial number will not. After reinstallation, therefore, it will be necessary for studios and distributors to obtain a new public key certificate (.pem) file in order to make KDMs for DCPs to play through these media blocks: the existing ones they have on file will produce KDMs that won't work. After reinstallation, the new certificates can be obtained from <http://www.dolbycustomer.com/cinema/Certificates>.

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|---|----------------------------------|---|--|
| Dolby DSP100 (external media block used with DSS100 server) | Rechargeable | Dolby advises that the media block is good for 1 to 3 years without power before the risk exists of certificate loss, and that it should be powered up for one day every month. | Battery is on the board; not field replaceable. No software nag. |
| Dolby cat862 (built-in media block inside DSS200 servers) | | | |
| Dolby cat745 IMB (IMB used with DSS200 and DSS220 servers) | One-time; not field replaceable. | Dolby advises that in the original battery configuration, the IMB is good for 1 to 3 years without power before the risk exists of certificate loss. Dolby advises against attempting field replacement of the batteries in unmodified units. All cat745s should be returned to Dolby in the event of certificate loss. | Unmodified cat745s have battery holders for CR2477N and CR2032 cells on the board. Units that have been serviced by Dolby recently will have a cylindrical li-ion battery soldered onto the board. Accurate software nag on Show Manager version 4.9.0.96 or later, based on voltage. Systems on earlier versions should be upgraded ASAP. |
| Dolby IMS1000/2000/3000 | Rechargeable | Dolby advises that the IMS is good for nine months before the risk exists of certificate loss, and that it should be powered | Battery is on the board; not field replaceable. |

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|--|---|--|---|
| | | up for one day every two months. | |
| Dolby CP650 audio processor | Rechargeable | Dolby advises that the CP650 is good for six months before the risk exists of data loss, and that it should be powered up for one day every four months. | Battery is on the board; not field replaceable. The battery maintains configuration settings, but not a security certificate. If it drains, you will need to reconfigure and retune the CP650, but it won't be bricked. |
| Dolby cat1600 (built-in media block inside CP850 audio processors, for Atmos decryption) | Tadiran TLH-5902 for field-replaceable units. | Dolby advises every 3 years for field replaceable batteries. No powerup recommendation for built-in ones. Instructional video here . | Cat1600s with serial numbers F4940714 and higher have field replaceable batteries. F1600051 to F4940713 do not. There is a software nag – unknown if based on time or voltage. |

Doremi (now supported by Dolby)

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|---|--------------|--|---|
| Doremi Dolphin (built-in media block inside DCP2000 and DCP2K4 servers) | CR1220 | Dolby advises replacement every four years, assuming a normal usage pattern. The battery life will be shorter if the unit is powered down for long periods. If in doubt, replace it. | Software nag every four years, but this will only be accurate if the last battery swapout was entered into the log at the correct time. |
| Doremi IMB | BR3032 | | |

GDC

GDC information sheet - <http://www.film-tech.com/vbb/filedata/fetch?id=1747> (requires registration on www.film-tech.com).

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|-----------------------------|-----------------|--|---|
| Non-IMB media block servers | 2 x AAA lithium | Manufacturer recommends every 2½ years if the server is unpowered. | You need a temporary battery holder to connect while the permanent batteries are being replaced. GDC can supply this, and will do free of charge if the unit is in warranty. No software nag. |

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|------------------------|---------------------------|---|--|
| IMB-based rack servers | Tadiran TL-2450 or CR2354 | Manufacturer recommends every 18 months, if the IMB is unpowered. | GDC will ship you a battery set free of charge on request if the unit is in warranty. No software nag. |
| GDC SX-3000 & 4000 | 2 x Tadiran TL-2450 | | |
| GDC SR-1000 | 2 x Tadiran TL-5934 | | |

Miscellaneous

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|---------------------------------------|------------------|---|-------|
| Rack-mounted DCP servers, most models | BR2032 or CR2032 | They last about 1-2 years without power. If the batteries drain, the server may give you an error message on bootup, but this usually will not prevent them from booting normally thereafter. | |

NEC

NEC information sheet - <http://www.film-tech.com/vbb/filedata/fetch?id=1828> (requires registration on www.film-tech.com).

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|---|--------------|---|---|
| Series 1 projectors, including NC-80LB01 option card. | Rechargeable | Power up for 48 hours every six months | |
| All Series 2 and later projectors | Rechargeable | The CPU board has a supercapacitor that maintains settings. The projector should be powered up every two weeks to recharge this. See also notes for TI Enigma and ICP RTC, as applicable. | |
| NP-90MS02 (NEC-badged Dolby IMS2000) | Rechargeable | Battery is on the board; not field replaceable. | Follow Dolby advice that the IMS is good for nine months before the risk exists of certificate loss, and that it should be powered up for one day every two months. |

QSC

Source: Information in a circular email from Mark Mayfield to QSC dealers, dated March 20, 2020. This was not available as a web page at the time of writing.

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|----------------------|--------------|--|-------|
| All power amplifiers | N/A | Power down amplifiers before audio processor or Q-Sys core. | |
| Q-Sys components | | Cores can be powered down simply by cutting the power while the design is running. When restarting, do not power | |

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|------------------|--------------|---|-------|
| | | up amplifiers until after the core(s) have fully booted and are running the design. | |
| Basis processors | Unknown | DO NOT POWER DOWN. Most of these processors still in service are many years old, and the batteries that maintain their settings may already be unserviceable. As a result, if these units lose power, they may not be usable when power is restored. | |

Qube

Qube information sheet - <http://www.film-tech.com/vbb/filedata/fetch?id=1890> (requires registration on www.film-tech.com). Contact support@qubecinema.com for battery replacement support.

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|-----------------|------------------------------------|---|---|
| Qube XPD | One-time; not field replaceable | Battery life is said to be 7 years. If the battery was replaced more than five years ago and is to be powered down for a month or more, immediate replacement is recommended. | |
| Qube Xi and XPI | One-time; not field replaceable | Battery life is said to be 7 years. If the battery was replaced more than six years ago and is to be powered down for a month or more, immediate replacement is recommended. | These units have a supercapacitor as well as the battery. Powering them up for one hour every month should be sufficient to keep the supercapacitor charged and prevent the battery from being drained. |

Texas Instruments (components used in Barco, Christie, and NEC Series 1 and 2 Projectors)

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|--|--------------|---|---|
| Enigma board | Rechargeable | Manufacturer recommendation unknown; recommend powering up for 24 hours monthly | Battery is on the board; not field replaceable. No software nag. |
| Series 1 projectors – TI interface board | Rechargeable | Cinionic advises that the projector be booted up monthly for at least 12 hours. | Battery is on the board; not field replaceable. No software nag. |
| Series 2 ICP Real Time Clock | BR2330 | TI recommends every five years. So does Christie . The ICP will not be bricked if it dies, but you will not be able to play DCI content until you replace it and reset the clock. | The certificate battery has a design life of 10 years and is not field replaceable. When it dies, you need a new ICP. |

USL (now supported by QSC)

| Make and model | Battery Type | Charge / Replacement Interval | Notes |
|------------------|--------------------|---|---------------------------------------|
| USL CML-2200 IMS | CR2477N and CR2032 | Unknown, but board chassis is the same as Dolby cat745, so the same guideline may apply (safe to leave unpowered for 1-3 years, depending on battery strength at the time of the shutdown). | Unknown if there is any software nag. |

Rack Mount Servers and TMS/LMS Computers

These also have a battery in them, known as the CMOS or BIOS battery. If this goes flat, the computer may give you a message along the lines of “BIOS settings are bad, please press F1 to continue,” when you try to boot it. You can do this and the machine should then boot normally, but in some rare circumstances it may not. The battery should be replaced as soon as possible. Almost all the servers and TMS systems in use take type BR2032 or CR2032 (BR is ideal and will last longer, but the more commonly found CR will work) for this battery.

After a prolonged shutdown, Windows-based TMS computers may want to download a bunch of updates and then restart themselves, possibly several times. You may wish to do a forced update straightaway, in order to avoid being bugged by this while trying to ingest and make up shows.

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Version 3 – March 30, 2020