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PARALLEL AV

Discrete IR Code Integration Guide

Programming Discrete IR Commands into Third-Party Home Automation & Control Systems

For Certified Installers & Custom Integration Professionals

Applies to AVEL / Parallel AV Smart Televisions — Mirror, Sauna, Bathroom, Kitchen Cabinet, and Custom-Built models

> *Revision note: this edition adds Section 5.1 (Rear IR Pass-Through Jack), a hard-wired alternative to the front-mounted emitter, with a confirmed connector spec and pinout. Existing code data, platform import steps, and best practices are unchanged from the prior edition.*

1. Introduction & Purpose

This guide is written for AV integrators and installers programming Parallel AV / AVEL televisions into third-party home automation and control systems (Control4, Crestron, RTI, URC, Savant, and IP-to-IR bridges such as Global Caché). It documents the full set of discrete IR commands available for AVEL Smart TVs and explains how to bring them into a control system so the TV behaves as a fully-controllable, state-aware source — not just a device that responds to a remote.

The commands in this guide were captured directly from the AVEL factory remote and are provided in Pronto Hex format, the de facto standard accepted natively or via import by every major control platform.

> *This guide assumes you already have a licensed programming account for your chosen control platform (Composer Pro, SIMPL/Toolbox, Integration Designer, etc.) and basic familiarity with IR driver creation.*

2. Why Discrete Codes Matter

Most consumer remotes rely heavily on toggle commands — a single “Power” button that switches the TV between on and off depending on its current state. Toggle commands work fine for a human with eyes on the screen, but they break state-based automation: if a control processor sends “Power Toggle” while the TV is already on, it will turn the TV off instead of confirming it is on.

AVEL TVs expose separate discrete commands for the states that matter most in an automation scenario:

- Power ON and Power OFF as independent commands (in addition to Power Toggle)
- Direct, discrete Input/Source selections — HDMI1, HDMI2, HDMI3, DVB-T/TV, DVB-C, DVB-S, ATV, AV, and USB/Media — rather than a single input-cycling button
- A dedicated Mute Toggle and independent Volume Up / Volume Down commands for reliable ramping in volume macros

> *Always program Power ON and Power OFF (not Power Toggle) into any macro, scene, or scheduled event. Toggle commands should only be exposed on physical remote button mimics where a person is present to confirm the result.*

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3. Understanding the Code Format

Every command in the accompanying spreadsheet (AVEL Discrete code.xlsx) is provided as a Pronto Hex string — the industry-standard format originally defined for Philips Pronto remotes and now accepted by virtually every professional control system as a native or importable IR format.

Anatomy of a Pronto Hex string

A Pronto Hex code is a space-delimited series of 4-digit hexadecimal values. Using the Power ON command as an example:

```
0000 006D 0022 0002 0155 00AA 0015 0040 0015 0015 … 05ED 0155 0055 0015 0E47
```

- Field 1 (0000): Format type — identifies this as a "learned" IR code rather than a raw or preset code.
- Field 2 (006D): Carrier frequency divisor. 006D (109 decimal) resolves to a ~38.0 kHz carrier — standard for NEC-family protocols, which is the protocol family AVEL TVs use.
- Field 3 (0022): Number of burst pairs in the first (main) code sequence.
- Field 4 (0002): Number of burst pairs in the second (trailing) sequence, typically the code's stop/gap pattern.
- Remaining fields: The actual on/off burst-pair timing data that forms the command itself.

You do not need to hand-decode these values — the full string is pasted directly into your control system's IR programming field. The breakdown above is provided so you can sanity-check that a code was pasted correctly (correct field count, correct carrier divisor) if a command fails to fire.

The "Hex ID" reference column

Alongside each Pronto Hex string, the spreadsheet lists a short Hex ID (for example, 41FB 1A for Power ON). This is a human-readable device/command reference pair used internally to identify each function at a glance and to cross-check codes against the AVEL command set — it is not itself sent to the TV. Always program using the full Pronto Hex string, not the short Hex ID.

4. Applicable Products

This discrete code set applies to the AVEL Smart TV platform used across the Parallel AV product line, including:

- Magic Mirror TVs (e.g., AVS240SM, AVS320SM, AVS430SM)
- Sauna TVs
- Bathroom / shower TVs (IPX4-rated in-wall models)
- Kitchen Cabinet TVs (e.g., AVS325KS)
- Custom-built AVEL televisions ordered through the Parallel AV custom shop

All current AVEL Smart TV models share the same IR receiver command set and NEC-family protocol described in Section 3, and — per Parallel AV's spec sheets — the same rear IR pass-through port described in Section 5.1 below. If you are programming a legacy or non-AVEL-sourced Parallel AV unit, confirm the model's IR compatibility with Parallel AV support before deploying these codes at scale.

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5. Hardware & IR Emitter Placement

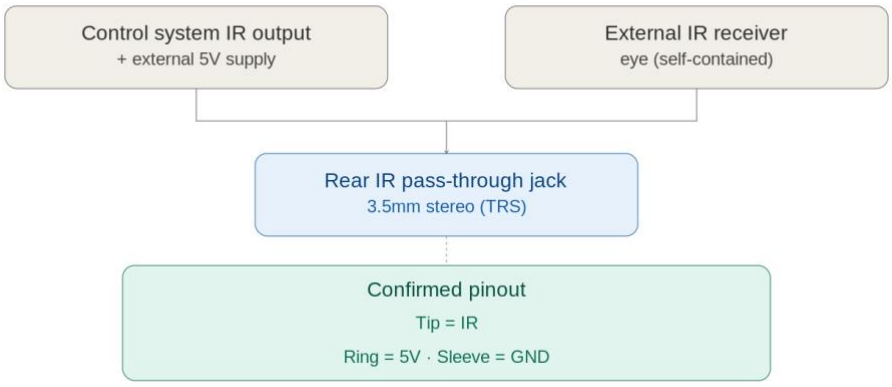
AVEL TVs support two wiring methods for getting IR commands from the control processor to the TV: a rear pass-through jack (preferred) and a front-mounted stick-on emitter (fallback). Both use the same discrete code set from Section 3 — only the physical landing point of the signal changes.

5.1 Rear IR Pass-Through Jack (Preferred Method)

Every current AVEL / Parallel AV Smart TV model — including Mirror, Sauna, Bathroom, and Kitchen Cabinet units — has a dedicated IR pass-through port in the connection box on the back of the unit, alongside the HDMI, RJ45, and USB connections. This lets the control system's IR signal land inside the enclosure instead of relying on a stick-on emitter over the front glass — cleaner for the install and more resilient for high-heat environments like saunas.

Connector spec: 3.5mm stereo mini-jack (TRS), carrying three conductors — 5V, IR, and GND. Use a stereo mini-jack cable; a standard mono 2-conductor IR flasher cable will not carry all three signals correctly.

Confirmed pinout — Tip = IR, Ring = 5V, Sleeve = GND.



Verify on the bench before final wiring:

- That the IR pin expects the same signal type your emitter is sending — most jacks of this kind are wired to accept the raw modulated signal directly from a control-system blaster/flasher output, but confirm with a live test (send a command, confirm the TV responds) before finalizing the install.
- For the "control system IR output + external 5V supply" wiring path (Control4, Crestron, RTI, URC, Savant, or Global Caché alike), tie the 5V supply's ground to the same GND (sleeve) as the emitter — a floating or separate ground reference can cause erratic behavior even with the pinout correct.

1. Wire the control system's IR emitter output into the rear jack using a stereo (TRS) 3.5mm cable: emitter signal to tip (IR), external 5V to ring, common ground to sleeve.
2. Bench test each discrete command against the rear jack the same way you would test a front-mounted emitter.
3. For sauna and high-heat enclosures, route the mini-jack cable away from the TV's power supply and any RF/Wi-Fi antennas to minimize interference, and keep the termination inside the connection box rather than exposed to the enclosure's heat cycling.

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5.2 Front-of-Glass Emitter (Fallback Method)

Use this method only where a rear pass-through connection isn't practical — for example, older units without a wired jack, or where a live bench test of the rear jack doesn't produce reliable results.

Locating the IR receiver window

- On framed models, the IR window sits in the front bezel, typically near the status LED — confirm the exact location on the model's spec sheet or by testing with the factory remote before mounting.
- On Magic Mirror models, the IR receiver is behind the mirrored glass. The receiver is sensitive enough to accept a signal through the glass, but a stick-on IR emitter should still be placed as close to the receiver location as possible for reliable operation.
- On kitchen cabinet and in-wall units, confirm receiver placement against the installed orientation — units are sometimes rotated 90° or 180° relative to the panel used during bench testing.

Emitter recommendations

- Use a single-eye stick-on IR flasher rated for the connected system's output voltage; avoid dual-eye flashers pointed at a single receiver, which can cause signal doubling and missed commands.
- For sauna and high-heat installs, confirm the emitter and its adhesive are rated for the enclosure's operating temperature (AVEL TVs are certified to 175°F); standard consumer-grade emitters may fail at sustained sauna temperatures.
- Keep IR emitter wiring away from the TV's power supply and any RF/Wi-Fi antennas to minimize interference.

> *AVEL TVs also support HDMI-CEC. Where the connected source and control processor support CEC pass-through, CEC can supplement IR for basic power state signaling, but IR (via either method above) remains the primary and most reliable path for full discrete control (inputs, volume, navigation).*

6. Importing Codes into Your Control System

Every platform listed below accepts Pronto Hex directly or via a straightforward import step, regardless of whether you're wiring to the rear pass-through jack or a front-mounted emitter — the codes and import steps don't change based on wiring method. The table summarizes the method; detailed steps follow.

Platform	Native Pronto Hex Support	Import Method
Control4	Yes (via IR Learning / Driver Editor)	Paste Pronto Hex per command in Composer Pro IR driver, or submit to Control4 Driver Database
Crestron	Yes (Toolbox IR Database Manager)	Add commands manually as Pronto Hex in the .ir file, or via SIMPL Windows IR cross-point
RTI	Yes (Integration Designer)	Create driver > IR/Serial > paste Pronto Hex per button in the Command Editor
URC (Total / Complete Control)	Yes	Add codes in the Global File / Device Editor as Pronto Hex entries
Savant	Yes (via IR Learning tool or manual entry)	Enter Pronto Hex in the Savant Device Builder IR command fields
Global Caché iTach / GC-100	Native (Pronto is its native format)	Send directly over TCP/IP using the sendir command, no conversion needed

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6.1 Control4

Composer Pro — custom IR driver

1. In Composer Pro, open Driver Editor and create a new driver (or edit an existing generic IR driver) for the AVEL TV.
2. Add a command for each function in Section 9 (Power ON, Power OFF, HDMI1, etc.).
3. For each command, choose “Set IR Code” and paste the full Pronto Hex string from the spreadsheet — Control4 accepts Pronto Hex natively in the IR code field.
4. Map Power ON and Power OFF to the driver's discrete ON_COMMAND / OFF_COMMAND properties so Control4's power-state tracking stays accurate; do not map Power Toggle to these properties.
5. Map HDMI1–HDMI3, DVB-T/TV, DVB-C, DVB-S, ATV, AV, and USB/Media to discrete input properties so the Navigator input list reflects true source state.
6. Save and test each command from the driver's Actions tab before deploying to a project.

> *If you support multiple installs, publish the finished driver to your Control4 Driver Database account so it can be reused without re-entering codes.*

6.2 Crestron

Toolbox IR Database Manager or SIMPL Windows

1. Open Crestron Toolbox and launch the IR Database Manager (or create a new .ir file if building a standalone driver).
2. Create a new device entry for the AVEL TV.
3. For each function, add a new command and select the option to enter a Pronto Hex code directly (Crestron's IR editor accepts pasted Pronto Hex and converts it internally to its own IR table format).
4. Name commands to match the function names in Section 9 exactly, so downstream SIMPL or module logic references them predictably (e.g., PowerOn, PowerOff, InputHDMI1).
5. Compile/save the .ir file and load it to the IR output port assigned to the AVEL TV's emitter — whether wired to the rear pass-through jack (Section 5.1) or a front-mounted emitter (Section 5.2).
6. In your SIMPL program, drive PowerOn/PowerOff from discrete logic (not a single toggle join) to preserve two-way state accuracy in touch panel UI.

6.3 RTI

Integration Designer — IR driver Command Editor

1. In Integration Designer, add a new IR device or open the AVEL TV driver if one already exists in your library.
2. Open the Command Editor for the device and create an entry for each function listed in Section 9.
3. Select Pronto as the code type and paste the Pronto Hex string for that command.
4. Assign Power ON and Power OFF to the driver's discrete power commands (not the toggle command) so RTI panels display accurate power state.
5. Assign the HDMI/DVB/ATV/AV/USB input commands to discrete source buttons for accurate input state on RTI touch panels.

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6. Test each button live from the Integration Designer emulator, then deploy to the processor.

6.4 URC (Total Control / Complete Control)

Global File / Device Editor

1. Open the Device Editor for a new or existing AVEL TV device profile.
2. For each button/command, choose the manual code-entry option and select Pronto Hex as the format.
3. Paste each Pronto Hex string from Section 9 into its corresponding command.
4. Assign discrete Power ON / Power OFF to the appropriate macro triggers and system-check events rather than Power Toggle.
5. Save the device to your Global File / MyURC account so it is available across future URC projects.

6.5 Savant

Device Builder — IR command entry

1. In Savant's Device Builder (or TrueControl authoring tool, depending on your Savant version), create a new IR device for the AVEL TV.
2. For each function, use the manual/raw code entry option and paste the Pronto Hex string.
3. Confirm the emitter output assigned to the device matches the physical IR connection wired to the TV.
4. Map discrete Power ON/OFF and Input commands to Savant's service-level state objects so Scenes and the Savant app reflect true TV state.

6.6 Global Caché (iTach / GC-100) & Generic IP-to-IR

Direct TCP send — no conversion required

1. Confirm the iTach/GC-100 IR output port wired to the AVEL TV (e.g., module 1, port 3).
2. Because Pronto Hex is Global Caché's native format, no conversion is needed — send the string directly using the sendir command over TCP port 4998, e.g.: sendir,1:1,1,38028,1,1,<pronto data>
3. Increment the third field (ID) with each unique command sent in a session if your driver expects acknowledgement tracking; otherwise a static ID is acceptable for one-off sends.
4. For central controllers that call Global Caché devices as a driver (e.g., inside Control4 or a custom script), store the Pronto Hex strings as constants and reference them from your integration logic rather than re-typing per project.

> *Test connectivity first with the iTach's built-in iHelp/iTest utility before wiring the final driver logic, to isolate network issues from code issues.*

7. Best Practice Programming Guidelines

- Use discrete Power ON / Power OFF for all automated events (scenes, schedules, macros, “All Off” buttons). Reserve Power Toggle only for a manual remote-mimic button used by a person watching the screen.

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- Insert a 200–300 ms delay between consecutive IR sends to the same TV. AVEL TVs use an NEC-family protocol that expects a clean gap between frames; sending commands back-to-back without a delay can cause dropped or misread commands.
- Use discrete input commands (HDMI1–HDMI3, DVB-T/TV, DVB-C, DVB-S, ATV, AV, USB/Media) in source-selection macros instead of an input-cycling toggle, so a macro reaches the correct input in one command regardless of the TV's current input.
- Power-on settle time: allow 3–5 seconds after Power ON before sending an input-change command, giving the TV's Android OS time to finish booting the video pipeline.
- Because IR is one-way, control systems cannot query true power/input state directly from the TV. Where possible, pair IR control with the TV's HDMI-CEC support for basic status feedback, or rely on driver-side state tracking (Control4, RTI, and Crestron all support this) seeded by the discrete commands you send.
- Label driver commands to match the function names in Section 9 exactly across all platforms on a given job. This keeps macros and voice-control phrase mapping (e.g., Control4 “Watch TV” activities) consistent if the project changes control platforms later.
- Keep a copy of the AVEL Discrete code.xlsx spreadsheet with the project's as-built documentation so future service visits don't require re-learning codes from a physical remote.
- If wiring to the rear pass-through jack (Section 5.1), bench-test each discrete command against that connection the same way you would test a front-mounted emitter before calling the install complete.

8. Troubleshooting

Command does nothing

- Confirm the IR path has continuity: for a front-mounted emitter, line of sight to (or placement directly over) the receiver window in Section 5.2; for the rear jack, confirm wiring against the Tip=IR / Ring=5V / Sleeve=GND pinout and signal type per Section 5.1.
- Re-check that the full Pronto Hex string was pasted without truncation — a cut-off string is the most common cause of a “dead” command. Each string in Section 9's source spreadsheet is 76 space-delimited fields long.
- Verify the control system's IR output is configured for the correct carrier frequency (~38 kHz) if your platform requires manual carrier entry outside the Pronto string.

Power turns the TV off instead of on (or vice versa)

- You are almost certainly using Power Toggle where a discrete Power ON or Power OFF command belongs. Swap the mapped command.

Commands work intermittently

- Add or increase the inter-command delay (see Section 7) — this is the most common cause of intermittent misses, especially in fast macros that fire several commands in immediate succession.
- Check for a second IR source pointed at the same receiver (e.g., a nearby device's emitter or another remote) causing signal collisions, or — for the rear jack — confirm the 5V/GND wiring is stable and not intermittent.

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Input command selects the wrong source

- Confirm the physical HDMI/AV wiring matches the labeled input command — HDMI1/2/3 command names refer to the TV's own input numbering, not the control system's port numbering.

Still stuck? Contact Parallel AV support with your TV model number, control platform, and the specific command(s) affected:

- Email: contact@parallelav.com or sales@parallelav.com
- Phone: +1 858 252 3665

9. Appendix A — Full Discrete Code Reference

The table below lists every discrete function available for AVEL TVs.— copy the IR code column value directly into your control system as described in Section 6.

Total discrete functions: 41

Function	Hex ID (reference only)	Category
Power Toggle	41FB 82	Power
Power ON	41FB 1A	Power
Power OFF	41FB 1B	Power
Menu	41FB 97	Navigation
Up	41FB 99	Navigation
Down	41FB 9D	Navigation
Left	41FB 9C	Navigation
Right	41FB 9E	Navigation
Enter	41FB 9A	Navigation
Exit	41FB CC	Navigation
Mute Toggle	41FB D0	TV Control
Channel Up	41FB 9B	TV Control
Channel Down	41FB 8F	TV Control
Last Channel (Recall)	41FB 1C	TV Control
Volume Up	41FB 9F	TV Control
Volume Down	41FB 8B	TV Control
Number 1	41FB 88	Numeric Entry
Number 2	41FB 89	Numeric Entry
Number 3	41FB 8A	Numeric Entry
Number 4	41FB 8C	Numeric Entry
Number 5	41FB 8D	Numeric Entry
Number 6	41FB 8E	Numeric Entry
Number 7	41FB 90	Numeric Entry
Number 8	41FB 91	Numeric Entry
Number 9	41FB 92	Numeric Entry
Number 0	41FB 95	Numeric Entry
-/--	41FB 94	Numeric Entry
Input Toggle	41FB 93	Input / Source
HDMI1	41FB 1D	Input / Source
HDMI2	41FB 1E	Input / Source
HDMI3	41FB 1F	Input / Source
DVB-T/TV	41FB 2A	Input / Source

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Function	Hex ID (reference only)	Category
DVB-C	41FB 2B	Input / Source
DVB-S	41FB 2C	Input / Source
ATV	41FB 2D	Input / Source
AV	41FB 2E	Input / Source
USB / Media	41FB 2F	Input / Source
Display	41FB 98	Navigation
Sleep	41FB D1	Display / Utility
Zoom (Aspect Ratio)	41FB C3	Display / Utility
Closed Captions (Subtitle)	41FB 3A	Display / Utility