Conventions and Implementation Classes

Describes the CI-V remote-control interface of the G7250 for third-party application developers. Command encodings follow the official IC-7300 CI-V commands; actual capability and safety conditions are those of the G7250. This is not a complete emulation of any other transceiver.

Class	Description
[Real] native	Reads/writes native parameters, control logic or telemetry. FB means the request was accepted, not that the hardware action has completed.
[Norm] normalized	The full protocol range is mapped onto the full native range and quantized to the native step. A narrower or different native range never causes FA. Read-back reflects the quantized native value.
[Compat] compatibility only	For capabilities the G7250 lacks, the written value is only stored and any legal value reads back unchanged. Lost on power-off or reset, and never drives hardware. Unwritten items return their private default.

All bytes are hexadecimal; physical quantities and “index numbers” are explicitly marked as decimal. “—” means no field. `F[5]` is frequency BCD, `N[2]` is level BCD, `M` mode, `D` DATA, `K` filter group FIL1–FIL3. Detailed encodings are on pages 2, 4, 7 and 10; the unimplemented list is on page 13 and hardware verification results on pages 13–14.

Table 1-1 Frequency

CMD	Sub-CMD	DATA	Description
`0x00`	–	`F[5]`	[Real] Transceive input: sets the selected frequency. No FB/FA, even on format or safety failure. Also used to report native frequency changes.
`0x02`	–	–	[Real] Read band edges: `02 L[5] 2D H[5]`.
`0x03`	–	–	[Real] Read selected frequency: `03 F[5]`.
`0x05`	–	`F[5]`	[Real] Set selected frequency, 500,000–108,000,000 Hz inclusive; FB when legal and control is permitted.
`0x25`	`V=00/01`	`– / F[5]`	[Real] Read/write selected or unselected frequency; read reply `25 V F[5]`; write range as for 05.

5-byte BCD, least significant byte first

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
10 / 1 Hz digits	1k / 100 Hz digits	100k / 10k Hz digits	10M / 1M Hz digits	1G / 100M Hz digits

Each cell is high / low nibble. 7.100000 MHz → `00 00 10 07 00`; 14.074000 MHz → `00 40 07 14 00`. Every nibble must be 0–9 and encodings above 4,294,967,295 Hz are rejected; invalid BCD or out-of-range frequency on 05/25 returns FA. Frequency is a hard native operating limit and is not scaled like level parameters.

Band-edge reply body: `02 00 00 50 00 00 2D 00 00 00 08 01` (500 kHz–108 MHz).

Table 1-2 Mode: selected and unselected VFO

V=00 is the selected VFO and V=01 the unselected VFO, not fixed A/B. After 07 01, 00 in 25/26 refers to B and 01 to A. K=01/02/03 maps to filter groups FIL1/FIL2/FIL3, not to a bandwidth.

CMD	Sub-CMD	DATA	Description
0x01	–	M / M K	Transceive mode input; no FB/FA. Omitted K selects FIL1. Also used to report mode / group changes.
0x04	–	–	Read the selected CI-V mode view: 04 M K; may be [Real] or [Compat]; no DATA field.
0x06	–	M / M K	Set selected mode. Omitted K selects the target mode's default group rather than the last cached group; in the full form K must be 01–03.
0x26	V=00/01	–	Read target VFO: 26 V M D K.
0x26	V=00/01	M	Set M; DATA is forced OFF (D=00) and the target mode's default filter group is selected.
0x26	V=00/01	M D	Set mode and DATA; omitted K still selects the default group, the previous group is not kept.
0x26	V=00/01	M D K	Set mode, DATA and filter group; the whole request is validated before any change. FB on success, FA on an illegal combination.

Table 2-1 Mode codes and real capability

M	Mode	Description
00 / 01	LSB / USB	[Real] Native LSB/USB; the native lower / upper sideband digital modes read as 00/01 respectively.
02	AM	[Real] Native AM.
03	CW	[Real] Native CW; only D=00 allowed.
05	FM	[Real] Native NFM.
04 / 07 / 08	RTTY / CW-R / RTTY-R	[Compat] M, D and K are stored separately per physical A/B; the actual mode / DATA / filter is unchanged, it does not fall back to LSB and does not switch native CW reverse.
06	No such protocol code	WFM cannot be set with M=06: 06/26 requests return FA, 01 requests are silently rejected.

DATA and panel-native modes

D=01 is allowed only with M=00/01/02/05; CW, RTTY, CW-R and RTTY-R combined with D=01 are illegal. 01/06 keep the current native DATA flag in modes that can express DATA and clear it otherwise; 26 without D explicitly clears it. The 1A 06 DATA encoding is on page 7.

> Panel-native SAM/WFM have no CI-V mode code in this manual. Reads keep the last expressible CI-V state of that A/B (initially LSB, DATA OFF, FIL1), so the actual RF mode cannot be inferred from it. The virtual-mode shadow is cleared after a successful real mode write; other real switches / global parameters do not become virtual.

Table 1-3 VFO, memory, tuning step and SPLIT

CMD	Sub-CMD	DATA	Description
0x07	–	–	[Real] Leave memory mode and restore the A/B and selection saved on entry; idempotent success when already in VFO mode.
0x07	00 / 01	–	[Real] Select A / B as the selected VFO; not equivalent to bare 07 (leave memory).
0x07	A0	–	[Real] Selected → unselected: copies only frequency, mode, DATA and all filter settings, syncing the mode / group, width and PBT 07/08 shadows. AGC, PRE, ATT, NR, notch and other switches / shadows are not copied.
0x07	B0	–	[Real] Toggles only which of A/B is selected; the A/B tuning settings are not exchanged.
0x08	–	–	[Real] Enter memory mode and recall the selected slot; the original VFO state is backed up on first entry. An empty slot still enters successfully, keeps the current tuning and does not apply its zero frequency.
0x08	–	C[2] 00 01–00 99	[Real] 2-byte BCD, high byte first, slots 0001–0099. In VFO mode it only selects the slot for future writes, without recall or entering memory mode; empty slots also succeed. In memory mode it selects and recalls; an empty slot keeps the current tuning.
0x09	–	–	[Real] Save current A/B and selection (frequency, mode, DATA, filter) to the selected slot; an occupied slot is overwritten keeping its name, and repeated saves do not increase the saved-channel count. Synchronous persistence: FB arrives after about 0.7–1.0 s.
0x0A	–	–	[Real] Copy frequency / mode / DATA / filter of the slot's displayed VFO (per the slot's selection) to the original selected VFO; in memory mode the original A/B is restored and memory mode is left first. Empty slot: FB, nothing changed, memory mode not left. A valid copy clears only the target's mode / width overrides.
0x0B	–	–	[Real] Clear the selected slot and update the saved-channel list; synchronous persistence, FB after about 0.4 s.
0x0F	– / 00 / 01	–	[Real] Bare read replies 0F S; 00 SPLIT OFF, 01 ON. Other sub-commands FA.
0x10	–	– / T	Read 10 T; set with a legal single byte T=00–08. Real / compat mapping below.
0x11	–	– / A	[Real] Selected-VFO ATT: read 11 A; write only A=00 OFF or 20 ON; any other non-zero value is FA, not a toggle.

10 / T	Description
00 / 01 / 02 / 05	[Real] Protocol OFF / 100 Hz / 1 kHz / 10 kHz → native 10 Hz / 100 Hz / 1 kHz / 10 kHz. Native 1 Hz and 10 Hz both read as 00.
03 / 04 / 06 / 07 / 08	[Compat] 5 / 9 / 12.5 / 20 / 25 kHz: value reads back, native step unchanged. A later successful real step write clears the override.

> On the reference rig 01 00 / 01 01 are the P1/P2 scan edges; 08 returns FA and never maps them to slot 100. 0000, other out-of-range slots and invalid BCD also FA. 09/0B reply FB only after the storage operation ends, without reporting media errors; hosts need a longer timeout for them (Table 4). Compat shadows are not stored in slots.

Table 1-4 0x14 basic levels

All supported 14 sub-commands share one format: read `14 S` → `14 S N[2]`; write `14 S N[2]` → FB / FA. N is decimal 0–255 as 2-byte BCD, high byte first: 128 → `01 28`, 255 → `02 55`; it is not a binary 16-bit integer.

CMD	Sub-CMD	DATA	Description
0x14	01	– / N[2]	[Norm] AF volume 0–100; adjusts the actual audio output volume, not only the displayed value.
0x14	02	– / N[2]	[Norm] RF gain 0–100.
0x14	03	– / N[2]	[Norm] Squelch threshold 0–100; native NFM/WFM use the FM squelch threshold, other modes the normal squelch threshold.
0x14	06	– / N[2]	[Norm] NR level 0–100, global; NR switch is 16 40.
0x14	0A	– / N[2]	[Norm] RF power control 0–100; not the measured output in watts (read 15 11 for that).
0x14	0B	– / N[2]	[Norm] MIC gain: full protocol range 0–255 → native 0–30.
0x14	0C	– / N[2]	[Norm] CW key speed: full protocol range 0–255 → native 5–50 WPM; IC-7300 is 6–48 WPM, but native values are not rejected against its physical limits.
0x14	12	– / N[2]	[Norm] NB level 1–20; switch is 16 22.

Table 2-2 Write / read quantization of basic levels

N is the protocol value and x the native value; ⌊ ⌋ is non-negative integer truncation, round is round-half-up. Read-back encodes the current native parameter, so not every real write reads back unchanged — unlike [Compat], which stores the raw value.

Parameter	Write N → x	Read x → N
01 AF	round(N × 100 / 255)	round(x × 255 / 100), limited to 0–255
02 RF / 03 SQL 06 NR / 0A Power	⌊N × 100 / 255⌋	⌊x × 255 / 100⌋; RF/SQL/Power take the native integer first
0B MIC	⌊N × 30 / 255⌋	⌊x × 255 / 30⌋
0C WPM	5 + ⌊N × 45 / 255⌋	⌊(⌊x⌋ − 5) × 255 / 45⌋
12 NB	1 + ⌊N × 19 / 255⌋	⌊(x − 1) × 255 / 19⌋

Full protocol range; DATA is never narrowed to the native physical range

For example, the maximum MIC request `14 0B 02 55` sets native MIC gain to 30, and the maximum WPM request `14 0C 02 55` sets native key speed to 50. N must not be treated as a MIC value or WPM and rejected because it exceeds the native physical limit.

Legal N is still subject to the real-control safety lock (scan / calibration). Invalid BCD, N>255, wrong length and sub-commands outside the supported set return FA. All 19 sub-commands of 14 were written and read back for every value 0–255 on hardware. The remaining sub-commands are on the next page.

Table 1-5 0x14 extended levels: PBT, CW, VOX, display

CMD	Sub-CMD	DATA	Description
0x14	05	— / N[2]	[Compat] Legacy compatibility level with no function; raw value stored / read back, private default 0.
0x14	07	— / N[2]	[Norm / Compat] Inner TWIN PBT: executed in real SSB with DATA OFF; otherwise (including virtual modes) stored privately per A/B.
0x14	08	— / N[2]	[Norm / Compat] Outer TWIN PBT: executed in real SSB with DATA OFF; otherwise stored privately per A/B.
0x14	09	— / N[2]	[Norm] CW pitch: native 400–1200 Hz in 10 Hz steps; IC-7300 is 300–900 Hz (5 Hz steps). The full protocol range is scaled; reference physical values are not written directly.
0x14	0D	— / N[2]	[Norm] Selected-VFO manual notch position 50–3000 Hz, 10 Hz steps; in a CI-V virtual mode [Compat] stores the raw value per A/B.
0x14	0E	— / N[2]	[Compat] Continuous COMP level 0–255; the native compressor has only a switch, and the level is never silently turned into COMP ON/OFF.
0x14	0F	— / N[2]	[Norm] Break-in delay / QSK: native 0–130 in 0.1-dot units (0–13 dots); reference is 2–13 dots. 0–255 covers the whole native range.
0x14	15	— / N[2]	[Norm] Monitor level 0–100; monitor switch 16 45 is compat only, so the level does not imply monitoring is really on.
0x14	16	— / N[2]	[Norm] VOX gain mapped to threshold 0 to −100; higher gain gives a lower, more sensitive threshold. VOX switch 16 46 is real.
0x14	17	— / N[2]	[Compat] Anti-VOX gain; reads back raw, does not affect VOX threshold / switch or hardware.
0x14	19	— / N[2]	[Norm] LCD backlight, five steps 0.1 / 0.3 / 0.5 / 0.7 / 0.9; updates the backlight hardware and screen-off timer.

Real PBT mapping: 0 / 128 / 255 = leftmost / centre / rightmost

Executed only in native LSB/USB with DATA OFF. The current passband width b=high−low is kept; with default passband centre fc and adjustable limits Emin / Emax: L=max(Emin, fc−b), H=min(Emax−b, fc), C=fc−b/2. Requires b>0 and L<C<H, otherwise the value is stored as compat.

N≤128: low=L+N(C−L)/128; N>128: low=C+(N−128)(H−C)/127. Quantized to 10 Hz around C and limited to [L,H]; high=low+b. Read-back uses the inverse two-segment mapping with rounding; the group number is unchanged. Both PBT private defaults are 128 (`01 28`).

Other normalized levels

09, 0D, 0F, 15: x=low+step×round[N(high−low)/(255×step)], read-back round[255(x−low)/(high−low)]. 16 uses the same mapping, negated, for the threshold. LCD step j=⌊(4N+127)/255⌋, brightness=0.1+0.2j, read-back 0 / 64 / 128 / 191 / 255.

> Compat defaults are 0 except PBT=128. A valid private write is read back with priority until a later successful real write of that item clears the override; changing panel mode alone never pushes a shadow to hardware.

Table 1-6 0x16 function switches

Read 16 S → 16 S Q; write 16 S Q → FB / FA. Q is a single raw byte, not 2-byte BCD. Every legal missing capability has a defined compat read-back value.

CMD	Sub-CMD	DATA	Description
0x16	02	– / 00–02	[Real] Preamp: 00 OFF, 01 PRE 1, 02 PRE 2; selected VFO.
0x16	12	– / 00–03	[Real] 00 AGC OFF, 01 FAST, 03 SLOW; [Compat] 02 MID stored per A/B, not mapped to native AUTO.
0x16	22	– / 00–01	[Real] NB OFF/ON, global.
0x16	40	– / 00–01	[Real] NR OFF/ON, selected VFO.
0x16	41	– / 00–01	[Real] Auto notch OFF/ON; ON selects the native auto-notch type.
0x16	42	– / 00–01	[Compat] Repeater tone, raw read-back per A/B.
0x16	43	– / 00–01	[Compat] Tone squelch, raw read-back per A/B; does not drive the real squelch.
0x16	44	– / 00–01	[Real / Compat] Speech compressor OFF/ON; with real DATA, ON only writes the global shadow and does not enable the compressor; OFF really disables it.
0x16	45	– / 00–01	[Compat] Monitor OFF/ON, global private switch.
0x16	46	– / 00–01	[Real] VOX OFF/ON, global.
0x16	47	– / 00–02	[Compat] Break-in: 00 OFF, 01 semi, 02 full; global private, native keying mode unchanged.
0x16	48	– / 00–01	[Real] Manual notch OFF/ON; ON selects the native manual-notch type.
0x16	4F	– / 00–01	[Compat] Twin peak filter, stored per A/B.
0x16	50	– / 00–01	[Real] Dial lock OFF/ON, global.
0x16	56	– / 00–01	[Compat] DSP filter shape: 00 SHARP, 01 SOFT; per A/B.
0x16	57	– / 00–02	[Compat] Notch width: 00 WIDE, 01 MID, 02 NAR; per A/B.
0x16	58	– / 00–02	[Compat] SSB TX bandwidth: 00 WIDE, 01 MID, 02 NAR; global private, TX filter unchanged.

AGC and notch

Native AGC AUTO has no direct protocol code: without a valid override it reads as the private default 00, and real OFF/FAST/SLOW writes are still accepted afterwards. 1A 04 is a separate private time-constant code, not the AGC step. Auto notch and manual notch share the native notch type: turning one ON switches the type; turning one OFF clears the switch only when the current type matches.

Compressor save / restore in real DATA

When the selected VFO actually enters DATA, the compressor state is saved and turned off, and restored on exit; A/B selection, memory recall / exit and DATA writes all maintain this transition. In DATA, 16 44 01 only creates a compat read-back and does not change the real compressor or its saved value; a later real compressor write clears the shadow.

Table 1-7 0x1A bandwidth, time constant and DATA

CMD	Sub-CMD	DATA	Description
0x1A	03	– / W	[Norm / Compat] Read / write the current filter-width index; read 1A 03 W. W is single-byte BCD, range depends on the CI-V mode. A real write does not change the filter group.
0x1A	04	– / A	[Compat] AGC time constant, single-byte BCD 00–13, raw code stored per A/B; native AGC, time constant and hardware unchanged. Default 00.
0x1A	06	– / D K	[Real / Compat] Read 1A 06 D K. With D=00, K reads 00 and a write must use K=00; with D=01, K=01–03 and only LSB/USB/AM/FM are allowed.

Table 2-3 Filter-width index w (decimal)

Protocol byte W=BCD(w), e.g. index 40 is sent as 40, not binary 28. W is neither Hz nor filter group K. Limit 31 for RTTY/RTTY-R, 49 for AM, 40 for all other legal modes.

Mode / index	Protocol width P (Hz)	Native execution / read-back
SSB / CW w=0–9	P=(w+1)×50 50–500 Hz	[Norm] The whole P=50–3600 range is mapped linearly: SSB 50–2900 Hz, CW 50–500 Hz; values above the native limit are not clipped to one width.
SSB / CW w=10–40	P=600+(w−10)×100 600–3600 Hz	
AM w=0–49	P=(w+1)×200 200–10000 Hz	[Norm] Full protocol range 200–10000 mapped to native 200–9000 Hz.
FM / virtual modes	Respect the corresponding index limit	[Compat] FM has no native width path; RTTY/CW-R/RTTY-R are mode shadows. A legal W is stored and read back unchanged, native filters untouched.

Real width formula; group unchanged

Native width B=round[Bmin+(P−Pmin)(Bmax−Bmin)/(Pmax−Pmin)], quantized to 1 Hz. The current group has passband limits center−B/2 and center+B/2, with SSB center=1500 Hz and CW / AM center=0. The filter group is unchanged.

Read-back uses the current effective passband width B, limited to the native range, inverse-normalized to P and rounded to the nearest legal index. A standard width reads back the same W; e.g. w=40: SSB 2900 Hz / CW 500 Hz both still read 40, not 33 / 09.

Two ways to read DATA

26 V always reports the group K=01–03 of the actual CI-V view; 1A 06 reports K=00 with DATA OFF per the official encoding, without changing the actual filter group to “group 0”. Only DATA ON selects a group by K; OFF keeps the original group.

> Panel SAM/WFM keep the last CI-V mode view; the legal index limit of 1A 03 follows that view, whether it executes follows the native path. Virtual-mode widths are stored per A/B and reset to index 0 when the virtual mode changes, so CW-R's 40 never leaks into RTTY (limit 31). A successful real mode write, a valid memory recall or a 0A copy to the target clears the override; an empty-slot copy does not. Other 1A sub-commands: see the unimplemented list on page 13.

Table 1-8 0x15 read-only meters

All meters are read-only: request `15 S`. 01/05 return a single status byte; the other supported meters return 2-byte BCD `N[2]`. Any request carrying write data is FA. Telemetry anchors are protocol conversions, not a certification of hardware calibration accuracy.

CMD	Sub-CMD	DATA	Description
0x15	01	–	[Real] Squelch status: `15 01 S`, single byte 00/01; 01 means squelch open (audio passed).
0x15	02	–	[Norm] S-meter: `15 02 N[2]`. −129 / −75 / −15 dBm → 0 / 120 / 241.
0x15	05	–	[Compat] Tone-squelch status: `15 05 S`, single byte; no real telemetry, private default 00, not linked to 16 43 or the squelch.
0x15	11	–	[Norm] PO meter: 0 / 50 / 100 W → 0 / 143 / 213. Uses calibrated output-watt telemetry, not the 14 0A power setting.
0x15	12	–	[Norm] SWR: 1 / 1.5 / 2 / 3 / 25.5 → 0 / 48 / 80 / 120 / 255.
0x15	13	–	[Norm] ALC: 0–100% → 0–120.
0x15	14	–	[Compat] COMP meter: no compression telemetry, returns private default 0; no dB value is faked from the COMP switch / level.
0x15	15	–	[Norm] Vd meter: 0 / 10 / 16 V → 0 / 13 / 241.
0x15	16	–	[Norm] Id meter: 0 / 10 / 15 / 25 A → 0 / 97 / 146 / 241, from native current telemetry.

Table 2-4 Piecewise meter formulas

x is the clamped telemetry value; final N=⌊clamp(m,0,255)+0.5⌋, with linear interpolation between anchors.

Meter	m(x)
S	x≤−75: (x+129)×120/54; otherwise 120+(x+75)×121/60. x limited to [−129,−15].
PO	x≤50: x×143/50; otherwise 143+(x−50)×70/50. x limited to [0,100] W.
SWR	x≤1.5: (x−1)×96; ≤2: 48+(x−1.5)×64; ≤3: 80+(x−2)×40; otherwise 120+(x−3)×135/22.5. x limited to [1,25.5].
ALC	x×1.2. x limited to [0,100]%.
Vd	x≤10: x×1.3; otherwise 13+(x−10)×38. x limited to [0,16] V.
Id	x≤10: x×9.7; ≤15: 97+(x−10)×9.8; otherwise 146+(x−15)×9.5. x limited to [0,25] A.

> NaN / −∞ map to the bottom of the scale and +∞ to the top; inputs below range (including negative power / voltage / current) and above range are clamped, while negative dBm is a normal S-meter input. The final protocol value is also limited to 0–255 and never wraps. Tone-squelch / COMP meters only have read-only defaults; there is no “write meter, read back raw” interface.

Table 1-9 0x1C TX / RX and shared ATU

CMD	Sub-CMD	DATA	Description
0x1C	00	–	[Real] Read actual TX telemetry: `1C 00 S`, 00 RX, 01 TX. Reflects the actual native TX/RX state, not the CI-V request.
0x1C	00	00	[Real] PTT OFF: clears the CI-V request source; always allowed, even during scan / calibration. Other PTT sources are not forcibly cleared.
0x1C	00	01	[Real] PTT ON: sets the CI-V request source; FA during SWR scan / TX calibration or when TX is disabled, leaving no pending request. Whether RF is actually transmitted is still decided by native control logic.
0x1C	01	–	[Real] Read the shared ATU: `1C 01 T`, 00 OFF, 01 ON, 02 tuning (request or telemetry). Not a private shadow.
0x1C	01	00	[Real] ATU OFF: cancels the tune request and turns the ATU off; cancelling remains possible during scan / calibration / TX restrictions.
0x1C	01	01	[Real] ATU ON: enables the ATU and clears the tune request; protected by the scan / calibration lock.
0x1C	01	02	[Real] Start tuning, using the same control flow as the front panel. If tuning is already in progress, FB without restarting or extending the timeout.

Table 3-1 ATU safety decisions and completion

Condition	Description
First ON / TUNE	FA when scan is enabled or calibration blocks local control. A repeated 02 with TUNE already requested returns idempotently without restarting.
Extra checks on first TUNE	FA when TX is disabled, any PTT source other than TUNE is active, or actual TX telemetry is already set. A safety rejection is never turned into a “compat shadow success”.
Read-back T=02	TUNE request set, or ATU status reports tuning. After a stop command is accepted, telemetry may take time to update; FB does not mean tuning is complete.
Normal completion	The G7250 first detects actual TX, then the end of TX; tuning then ends and the ATU is set ON. Measured on hardware at about 1.1 s (see Table 5-2).
4 s timeout	More than 4 s after the first start, tuning ends and the ATU is set ON. Repeated starts do not extend it.
Meaning of OFF	ATU OFF clears the shared TUNE request and turns the ATU off; PTT OFF only clears the CI-V PTT source. Use `1C 01 00` to stop tuning; PTT OFF alone is not enough.

10 s PTT release without supported commands

When ≥10 s have passed since the last supported main command, the CI-V PTT is released. Any supported main command refreshes the timer, including meter reads, requests answered FA, and silent 00/01; unsupported main commands, empty frames and discarded over-length frames do not.

> The 4 s ATU timeout and the 10 s CI-V PTT release are separate mechanisms, and neither replaces an explicit stop from the host; continuous polling can keep a CI-V PTT request alive beyond 10 s. Use actual TX telemetry for status; FB does not prove that RF has started or stopped.

Table 1-10 RIT / XIT, address and G7250 extensions

CMD	Sub-CMD	DATA	Description
0x21	00	— / O[2] sign	[Norm] Read / write the shared offset; read 21 00 O[2] sign. Protocol ±9999 Hz → native ±1500 Hz, updating both native RIT and XIT offsets.
0x21	01	— / 00–01	[Real] RIT switch; read 21 01 S, write OFF/ON; XIT switch unchanged.
0x21	02	— / 00–01	[Real] XIT (∂TX) switch; read 21 02 S, independent OFF/ON; RIT switch unchanged.
0x19	00	—	Address query: replies 19 00 R, where R is the destination address of this request; not a fixed IC-7300 transceiver ID. The body must be exactly 19 00, anything else FA.
0x1D	17	— / 00–01	[Real] Optional-filter flag: 00 normal, 01 narrow; read 1D 17 S.
0x1D	18	— / 00–03	[Real] External tuner IO: bit0=IO1, bit1=IO2; read 1D 18 T. Not an ATU start command.
0x1D	19	—	Read-only model identity: replies verbatim 1D 19 72 50; does not pose as a fixed IC-7300 identity.
0x1D	20	— / 00–01	[Real] Antenna select: 00 antenna 1, 01 antenna 2; read 1D 20 A.

Table 2-5 Offset BCD: low digits first, sign last

Field	Description
O[0]	10 Hz / 1 Hz digits of the absolute offset (BCD).
O[1]	1 kHz / 100 Hz digits of the absolute offset (BCD).
sign	Raw single byte, 00 = positive, 01 = negative. The sign must not precede the BCD.
Write	native offset=round(offset×1500/9999); RIT and XIT are updated together. The legal full range is never FA just because the native range is only ±1500.
Read-back	offset=round(native offset×9999/1500), limited to ±9999; may differ from the written value because of 1 Hz native quantization.

+9999 Hz → 21 00 99 99 00 → native +1500 Hz; −1234 Hz → 21 00 34 12 01 → native about −185 Hz. RIT and XIT enables are independent; writing the shared offset does not turn either on.

G7250 extensions

1D sub-commands are G7250-specific extensions and are not part of the IC-7300 command set. The two bits of 1D 18 are the logical states of external tuner interface IO1 / IO2; pin polarity is not defined and they do not indicate tuning completion.

> 21: invalid BCD, a sign other than 00/01, out-of-range switch values and wrong length are FA. 1D: invalid range / length FA. Device address and model extension follow native conventions; a host must not identify the rig as an IC-7300 from the echoed address alone.

Table 3-2 Frame structure and complete examples

Request `FE FE R C BODY FD`; reply with swapped addresses `FE FE C R BODY FD`. Examples use R=94, C=E0 (native default address 94, same as the IC-7300 default). Bytes are sent as raw binary with no checksum or escaping; do not send the ASCII text “FE FE …”.

Operation	Request / reply
Read frequency 7.100 MHz	→ `FE FE 94 E0 03 FD` ← `FE FE E0 94 03 00 00 10 07 00 FD`
Set frequency 14.074 MHz	→ `FE FE 94 E0 05 00 40 07 14 00 FD` ← `FE FE E0 94 FB FD`
Set USB / default group	→ `FE FE 94 E0 06 01 FD` ← `FE FE E0 94 FB FD` (default group, previous group not kept)
Unselected USB DATA / FIL2	→ `FE FE 94 E0 26 01 01 01 02 FD` ← `FE FE E0 94 FB FD`
Compat CW-R / FIL1	→ `FE FE 94 E0 26 00 07 00 01 FD` → FB → `FE FE 94 E0 26 00 FD` ← `FE FE E0 94 26 00 07 00 01 FD` (actual mode unchanged)
Select slot 12, save	→ `FE FE 94 E0 08 00 12 FD` → FB → `FE FE 94 E0 09 FD` → FB after about 1 s In VFO mode the first frame only selects the slot for future writes; both replies use swapped addresses.
Compat Anti-VOX = 200	→ `FE FE 94 E0 14 17 02 00 FD` → FB → `FE FE 94 E0 14 17 FD` ← `FE FE E0 94 14 17 02 00 FD`
Squelch status, single byte	→ `FE FE 94 E0 15 01 FD` ← `FE FE E0 94 15 01 01 FD` (example: not muted)
ATU start / cancel	→ `FE FE 94 E0 1C 01 02 FD` → FB or safety FA → `FE FE 94 E0 1C 01 00 FD` → FB
Release PTT / read actual TX	→ `FE FE 94 E0 1C 00 00 FD` → FB → `FE FE 94 E0 1C 00 FD` ← `FE FE E0 94 1C 00 00 FD` (example: actually in RX)
Invalid FIL4	→ `FE FE 94 E0 06 01 04 FD` ← `FE FE E0 94 FA FD`

Table 3-3 Transceive reports

The G7250 checks for changes periodically: a change of the selected frequency sends `00 F[5]` and a change of CI-V mode or filter group sends `01 M K`; the check interval is not fixed. Reports use the addresses of the most recently received frame, swapped; before the first request the destination address is 00.

Received 00/01 are never acknowledged, including illegal ones, and are not queries; use 03/04/25/26 for confirmation. The 01 report carries no DATA, so a DATA-only change with unchanged M/K triggers no mode report; query 26 or 1A 06 instead.

Table 4 Interface limits and compatibility state

Item	Description
Serial / address	115200 baud, 8N1, no hardware flow control. Default address 94; the receiver does not filter on a fixed own address and replies with swapped request addresses. When connected through a Bluetooth virtual serial port, port settings depend on that connection.
Reply rules	Legal writes reply FB; legal reads return the command and data without FB. Illegal length, sub-command, BCD, range and safety rejections of supported commands reply FA. 00/01 are always silent; unsupported main commands are ignored silently, without FA.
64-byte body	The command body is at most 64 bytes (including CMD, excluding FE FE, both addresses and FD). A longer body discards the whole frame up to FD; an embedded FE FE is not used to resynchronize and the truncated command is never executed.
End of frame / bad input	FD terminates a frame and cannot appear as ordinary data. Empty command bodies are ignored; invalid BCD nibbles and frequency encodings above 4,294,967,295 Hz are rejected and never wrap into a legal frequency. The 64-byte limit does not mean every command accepts any length.
Real-control lock	Most real writes are protected by the SWR-scan and TX-calibration control lock, so legal values may still FA for safety. Compat writes never trigger native actions; PTT OFF / ATU OFF are always available.
Compat value storage / override	Compat values are isolated from native settings and memory channels. A written compat value reads back with priority; a later successful real write of that item clears it. Cleared on power-off or reset; never drives hardware and is not stored in non-volatile memory.
Memory command timing	Ordinary parameter writes are not guaranteed to be persisted immediately. 09/0B persist synchronously and FB is sent after the storage operation ends: 09 about 0.7–1.0 s, 0B about 0.4 s; FB does not report media errors. Hosts should use a reply timeout of at least 2 s for these two commands, otherwise a late FB is matched to the next request.
Memory slot content	Frequency, mode, DATA flag and filter of both A and B, plus the selection. The DATA flag survives a power cycle. Compat shadows are not stored in slots.
Not implemented	24 of the 31 official IC-7300 main commands are supported; full list in Table 4-2. Unsupported main commands are silent; unimplemented sub-commands of supported main commands reply FA.

Table 4-1 Compat-only state index

Scope	Description
Per physical A/B	Virtual M/D/K; 14 07/08 (when not executable), 0D (virtual mode); 16 12 MID, 42/43/4F/56/57; 1A 04; non-executable 1A 03 widths.
Global private	Non-native steps of 10; 14 05/0E/17; 16 45/47/58 and the compressor-ON override in DATA. 15 05/14 are read-only private defaults and cannot be written.
Defaults	PBT 07/08 = 128; default mode LSB, D=00, K=FIL1; other unwritten private items 0. Real writes by 01/06/26, memory recall and 0A copy handle mode / width overrides per command; shadows are never copied wholesale.

Table 4-2 Official IC-7300 commands not implemented

Command	Official function	G7250 behaviour
0E	Scan	Main command not supported: silent, no FA, and the 10 s PTT timer is not refreshed. Hosts should treat a timeout as “not supported” and not retry repeatedly.
13	Speech (voice synthesizer)	
17	Send CW messages	
18	Power ON / OFF	
1B	Repeater tone / TSQL tone frequency	
1E	TX band edge frequencies	
27	Scope data and settings	
1A 00 / 01 / 02	Memory contents / band stacking register / memory keyer contents	Main command supported, but reads and writes of this sub-command reply FA. No memory data or device capability is faked.
1A 05 0001–0193	Menu settings	
1A 07	IP+ function	
1C 02 / 03 / 04	TX frequency monitor / read TX frequency / antenna controller output	
08 01 00 / 01 01	P1 / P2 scan edges	

Without 1C 03, the SPLIT TX frequency can be read as the unselected frequency with `25 01`; this is the native VFO view, not a measured RF frequency.

Table 5-1 Hardware verification setup and results

Item	Description
Reference	IC-7300 instruction manual, chapter 19 CI-V control commands (pages 19-3 to 19-13), checked item by item for encoding and reply.
Method	Host connected directly to the CI-V serial port (115200 8N1); requests sent command by command and replies checked.
Full-range regression	14 suites, 12,544 requests, all passed: probe, frequency, modes, levels, filters, switches, DATA/COMP, meters, VFO, RIT, memory, parser and transceive, ATU/PTT safety, audio and backlight restore.
Official checks	4 suites, 309 requests, all passed: private/native isolation, unimplemented inventory, address and identity characterization, memory DATA persistence.
Dummy-load control	5 suites, 129 requests, all passed: PTT actual TX, VOX switch, ATU start / repeat / cancel, ATU completion or protection, SPLIT TX view.
Total / restore	23 suites, 12,982 requests, 0 failures. After testing, settings and memory channels were restored to their original state, and PTT / VOX / ATU were all OFF.

Table 5-2 Measured observations

Item	Description
Memory timing	09 measured three times: 1,015 / 672 / 1,000 ms (new slot slower, overwrite faster); 0B about 0.36–0.41 s. Test wait limit 10 s.
DATA persistence	Memory slots store the DATA flag: after a power cycle, recall reads back `26 00 01 01 02` / `26 01 02 01 03` with DATA kept.
Addressing	Destination addresses 94 / 70 / 7E all get replies, and `19 00` echoes 94 / 70 / 7E respectively; the receiver does not filter on a fixed address, and the existing device identity is kept.
Private isolation	After writing virtual modes, levels, switches, steps, AGC time constants and compressor ON in DATA, the actual native settings were unchanged.
PTT actual TX	Preconditions: dummy load, native power 5%, MIC gain 0, 7.100 MHz AM. After `1C 00 01`, 01 was read within a few polls; after `1C 00 00` it returned to 00. Raw meter codes in TX: PO 25, SWR 0, ALC 58, Vd 156, Id 16 (convert with Table 2-4).
ATU	Start / repeated start / cancel behaved as in Table 3-1. During completion T stayed 02 and became 01 after about 1.093 s, with TX telemetry 0→1→0. Completion is not proof of a successful match.
SPLIT	Selected 7.100 MHz / unselected 7.150 MHz views correct; 1C 03 replies FA, so the actual RF TX frequency is not certified.
VOX	`16 46` switch write/read and explicit OFF passed; no audio was injected to verify the threshold.

Revision history

Revision	Changes
Rev 1.2 · 2026-11-06	Separate Chinese and English editions; DATA flag storage in memory slots documented; examples use default address 94; added 09/0B timing and timeout advice, unimplemented-command list and hardware verification results.
Rev 1.1 · 2026-11-06	Levels / widths / offsets normalized over the full IC-7300 protocol range instead of FA on range mismatch; missing capabilities stored in private compat state and read back raw, without driving hardware.

References

Command encodings follow the ICOM IC-7300 instruction manual, chapter 19 CI-V command table and data descriptions (pages 19-3 to 19-13); memory copy on page 9-4, VOX threshold semantics on page 4-10.

> Measured results are limited to the direct serial tests described in Table 5-1; no host application such as Hamlib was used for verification. The VOX threshold was not verified with audio, ATU completion does not demonstrate matching performance, and the actual SPLIT TX frequency is not certified. FB or shadow read-back is not evidence of RF, filter or tuning completion.