User Guide for Remote Control RC4111801/01R ; RC411

Purpose:

The purpose of this document is to define and identify the operation manual of project HP RC4111801/01R & RC411 RCU. The HP RC4111801/01R & RC411 RCU, will be referred to in this document, as the “RCU”. This RCU is transmitting BLE / IR for Monitor control.

1. Out Of Box Experience

First time inserting batteries,

RCU works in IR mode

RCU goes into pairing mode for 60 seconds by pressing the <<BACK + HOME>> key combo over 3 seconds.

2. General Product Description

2.1 Overview

This RCU is transmitting BLE / IR for Monitor control.

2.2 Control Monitor

The RCU can be set-up to control the APEX32 Monitor in either BLE or IR mode (mutually

exclusive).

2.2.1 *Control Monitor – BLE*

The RF platform is BLE, using HOGP (HID Over GATT Profile) as the top layer.

The RCU will pair with the APEX32 Monitor first before control over BLE is possible

2.2.2 Control Monitor – IR

The IR protocol to control the Monitor is RC6modeA. All features that rely on IR communications are disabled when RCU is in RF mode

3. Product Requirements

3.1 Factory Default Settings (Out-of-Box State).

1) The RCU is not paired and the BLE pairing table is empty.

2) The RCU is at IR mode, sends Monitor IR codes.

3.2 Data Retention

The RCU will retain previously stored settings in the event of a power down. Below are the data that will be stored in non-volatile memory:

1) Monitor control medium: BLE or IR.

2) BLE pairing information.

3.3. Key Code Tables

3.3.1 *RF Profiles and Reports*

All Monitor RF key codes are transmitted through BLE HOGP profile, the control is basedon HID

Consumer page (0x0C) and Keyboard page (0x07).

1). Keyboard Report

Keyboard Report								
Report ID: 0x01								
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Key Modifier							
Byte1	Reserved							
Byte 2	Keycode 1							
Byte 3	Keycode 2							
Byte 4	Keycode 3							
Byte 5	Keycode 4							
Byte 6	Keycode 5							
Byte 7	Keycode 6							

2). Consumer Report

Consumer Report								
Report ID: 0x02								
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Consumer Control Code1 (LSB)							
Byte 1	Consumer Control Code1 (MSB)							
Byte 2	Consumer Control Code2 (LSB)							
Byte 3	Consumer Control Code2 (MSB)							

3) *Monitor RF Key Code Table*

1 Input 0x0C/0x01A3		2 Power 0x0C/0x0030
	3 GOOGLE ASSISTANT 0x0C/0x0221	
	4 UP 0x0C/0x0042	
5 LEFT 0x0C/0x0044	6 OK 0x0C/0x0041	7 RIGHT 0x0C/0x0045
	8 DOWN 0x0C/0x0043	
9 BACK 0x0C/0x0224	10 HOME 0x0C/0x0223	11 VOL + 0x0C/0XE9
12 SETTINGS 0x0C/0x225	13 MUTE 0x0C/0x00E2	14 VOL - 0x0C/0xEA
15 Prime video 0x0C/0x01C9		16 YouTube 0x0C/0x0078
17 NETFLIX 0x0C/0x01C8		18 APPS 0x0C/0x01A2

1 Input 094		2 Power 012
	3 GOOGLE ASSISTANT 095	
	4 UP 088	
5 LEFT 090	6 OK 092	7 RIGHT 091
	8 DOWN 089	
9 BACK 085	10 HOME 080	11 VOL + 016
12 SETTINGS 084	13 MUTE 013	14 VOL - 017
15 Prime video 119		16 YouTube 121
17 NETFLIX 124		18 APPS 120

4）*Monitor IR key Code Table*

IR Protocol: RC6 Mode 6A,

Carrier Frequency: 36Khz

Customer ID: 0x8011H

System/command: 002(Decimal)

1 Input 094		2 Power 012
	3 GOOGLE ASSISTANT 095	
	4 UP 088	
5 LEFT 090	6 OK 092	7 RIGHT 091
	8 DOWN 089	
9 BACK 085	10 HOME 080	11 VOL + 016
12 SETTINGS 084	13 MUTE 013	14 VOL - 017
15 Prime video 119		16 YouTube 121
17 NETFLIX 118		18 APPS 120

3.4 . BLE Mode*5.4.1 BLE Parameters*

<I>. Device Info:

Device Name: “HP RC4111801”

Vendor ID: 0x005D

Product ID: 0xF08D

Note: At any one time, the RCU can only pair with 1 Monitor. The RCU keeps connection if the
Monitor is turned on and within BLE effective distance with the RCU.

<II>. Connection Parameters:

Connection Interval: 8 (1.25ms x 8 = 10ms)

Slave Latency: 99

Supervision Timeout: 4 seconds

Note: RCU will send the request of the link parameters upon link establishment. In BLE communication, the requested connection parameters will be up to the host to either accept or
reject, so the actual parameters applied may differ from the requested value defined above.
Different connection parameters will impact BLE response and power consumption.
OMNI

recommends Monitor side to always accept and apply the above parameters for the most
optimized performance for BLE response and power saving.

3.5 Connection Behaviors

Once a remote and Monitor are paired, the BLE link will be kept maintained (using the connection parameters in section 5.4.1)

If the host and remote disconnects, the following occurs:

1) After disconnecting, the RCU continuously transmits direct advertising at low duty cycle for 5sec
(no LED blink). After 5 seconds, remote goes to Step 2. This process is abort if RCU gets
connected within seconds.

2) RCU enters Sleep mode until the next user keypress. The process will start again fromStep 1.

3.6. Battery management

Battery Level (%)	function
>30%	full functional
<30%	IR and BLE, NO Voice, NO OTA
0%	NO IR, BLE and Voice

3.6.1 Low Voltage Detection

1) If RC Vbattery is ≤ 2.1V, fast blink LED for 2s to indicate battery low: Do not send RF to reconnect.Do not fire IR.

2) If RC Vbattery ry is > 2.3V, do normal operation (IR, BLE).

3) If RC Vbattery is 2.1V< Vbattery ≤ 2.3V, transmit IR/BLE low battery message upon user press keys:

• Case 1: RC is unpaired, user use RC as normal IR RC (don’t pair RC with any TV). If RC Vbattery is
2.1V< Vbattery ≤ 2.3V, send battery low key (000.195) via IR key code per 10 key presses.

• Case 2: RC is paired, paired TV is not connected. (RC was used to control another TV). If RC
Vbattery is 2.1V< Vbattery ≤ 2.3V, send battery low key (000.195) via IR key code per 10 key
presses.

• Case 3: RC is paired, paired TV is connected. If RC Vbattery is 2.1V< Vbattery ≤ 2.3V, send battery
low via IR & BT HID alternatively every 10 key presses.

Example:

10th key press sends IR battery Low keycode (000.195).
20th key press sends battery low (0x71) command in HID keyboard format.
30th key press sends IR battery Low keycode (000.195).
40th key press sends battery low (0x71) command in HID keyboard format.

3.7 LED Operations

3.7.1 LED Configuration

3.7.2 LED Behavior

Setup Action	LED	Timing
IR key press	Red	Blink at 2 times at 50ms interval
BLE key press	Red	100ms ON
Voice	Red	Static ON during Voice activity
BLE pairing	Red	Static ON when combo key is pressed, blink at 50% duty cycle (250ms LED ON time)
Error blink	Red	4 x 50ms ON / 50ms OFF

3.8 Remote Control Setups

3.8.1 General

The Setup features stated in this section changes the settings, activate a unique feature. Each feature is triggered by a set of unique combo keys.

Setup Feature	Combo Keys
Pairing / Re-Pairing	[BACK] + [HOME] for 3s
Factory Reset	[OK] + [MUTE] for 3s
Google Bug Report	[OK] + [BACK] more than 1s
Google Accessibility Shortcut	[DOWN] + [BACK] more than 1s

All setup modes can be triggered no matter Monitor control medium is RF or IR.
Before entering setup mode via combo keys entry, the RCU will check if battery voltage is at LVD
status. Setup modes will not be triggered if battery is at LVD status. In such an event, the LEDs will notify the user through the LVD blink. The RCU will then return to user mode.

3.8.2 Pairing/Re-Pairing (IR or BLE)

Pairing/Re-Pairing (IR or BLE)

The RCU shall only be able to pair with one Monitor at any one time.

The Secure Simple Pairing shall employ the "just works" for the pairing process.

The RCU acts as a BLE slave device.

After paired with host successfully, the pairing data will be bonded into the NVM so that the pairing won't be lost after batteries change.

Press and hold <BACK + HOME> keys for at least 3 seconds. RCU will then enter discoverable mode:

1. RCU is only allowed to pair to maximum one host. Once the pairing combo keys takes effect,RCU
will firstly terminate the present connection.
2. RCU then enters discoverable mode, sends out undirected advertising for pairing. The LEDblinks
during the whole discoverable state.
3. Once RCU is successfully paired with the host: the LED performs Confirmation blinking.
4. In case RCU has not gotten paired with any host after discoverable timeout, or pairing processis
failed: the LED performs an error blink to indicate RCU was not paired.
5. During the discoverable period while not paired yet and before timeout, it is allowed for user to abort the discoverable state by pressing <BACK> key or <HOME> key. RCU stops pairing and remains unpaired state.

3.8.3 *Factory Reset*

<< OK + MUTE >>

Press & Hold << OK + MUTE >> simultaneously for 3 seconds.

the remote control will delete all settings and returns to factory default mode as described in 3.1.(Red LED 1 on for 1000 ms).

3.8.4 Google Bug Report

<< OK + BACK >>

1. Press <<OK+ BACK>> simultaneously for 1 second, RCU will send OK and BACK combo RFcode
to Monitor.

- if RC is not connected to TV, send IR code 000.157 as long as the keys are keep pressed.
- If RC is paired and connected with TV, send BLE hid consumer control code 0xEC.

Key	IR Code	RF code
Back+ OK	000.157	0x0C/0xEC

2. For several seconds, Monitor will generate BUG REPORT, and send to google service (only request for android O and above).

3.8.5 Google Accessibility Shortcut

<< DOWN + BACK >>

1. Press <<DOWN+ BACK>> simultaneously for 1 second, RCU will send DOWN and BACK combo RF code to Monitor.

- IF RC is not connected, the RC transmits will transmit 000.114 command (transmit only 1 RC frame code) via IR.
- IF RC is connected, transmit 0XED via BT command (consumer Control HID 0X0C).

Key	IR Code	RF code
BACK + DOWN	000.114	*0x0C/0xED*

2. The Monitor received the code form RCU will turn on/off the Accessibility Shortcut function.

3.9 Voice Function

Voice Function

RCU features a button to activate the Voice Search application to search for content by speaking

through the remote's built-in microphone.

The RCU supports one-way voice transferred from RCU to host.

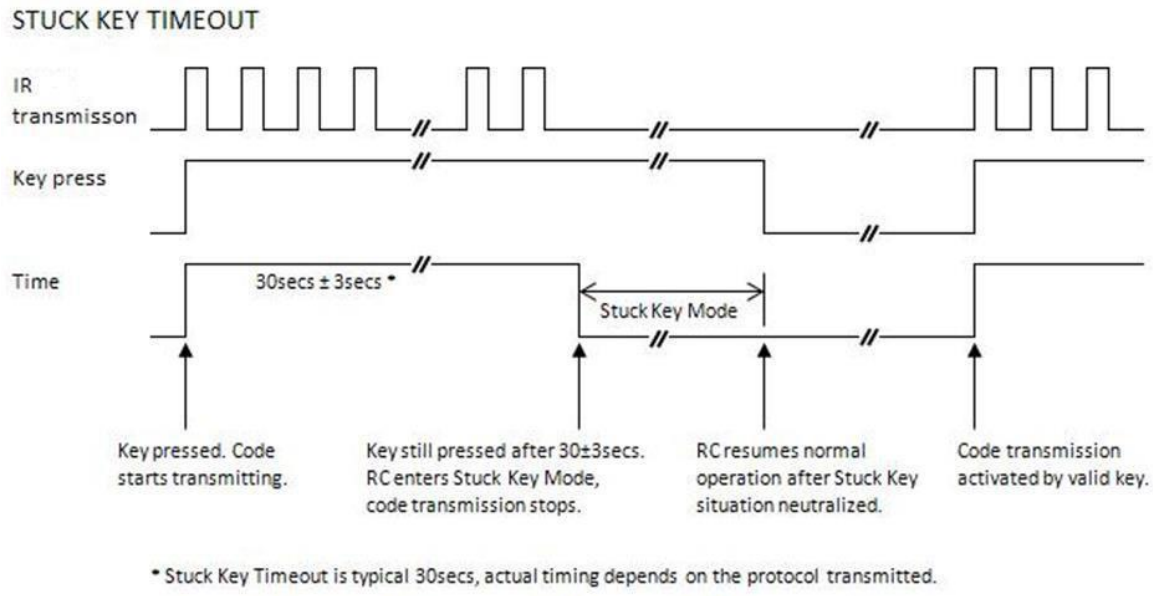
Google Android-R GATT voice - for host that runs Android-R (ATV11 voice spec. version 1.0);

3.9.1 Voice over GATT for Android R

Press and released <voice> key to open the voice function, RCU will close the voice function after receiving the stop command sent by the host.

3.10 Stuck Key Timeout

Stuck Key Timeout is a precaution taken in the event a key is being pressed continuously for 30 seconds (+/- 3 seconds). To conserve battery power, the RCU will stop all IR/RF key codes transmission automatically. It will resume operation after all keys are released.



* Stuck Key Timeout is typical 30secs, actual timing depends on the protocol transmitted.

3.11 Battery Voltage Monitor

LVD check will be triggered after a signal key is released in user mode.
In BLE mode and IR mode, when the LVD is detected (battery voltage<2.3V), upon key-release when not in any set-up mode: the BATTERY LOW-LED gives a warning blink (see 3.6).
While RCU works in BLE mode, it supports Bluetooth standard service of battery level notification.
The paired host is then able to get battery level of the RCU. The battery level report is described as below:

Battery Level Report								
Report ID: 0x05								
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Battery Level in percentage (0 ~ 100%)							

3.12 OTA

The RCU supports Google Android-R+ OTA

FCC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

Innovation, Science and Economic Development (ISED) Canada Compliance Statement

This device complies with Innovation, Science, and Economic Development 7 Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause in terference, and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d' Innovation, Science et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.