

Extender v1.04 for the OARUSB04G

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Part 1: Information for all users

1. Introduction

1.1 What is this extender?

This is version 1.04 of an extender for the OARUSB04G. It supersedes version 1.03, which is the only previous version. The version numbering is for consistency, as it is a port to the OARUSB04G of extender 1.04 for the equivalent European remote, the URC-6440. It retains the U.S. database of IR setup codes from the unextended OARUSB04G but is otherwise functionally identical to the extender for the URC-6440. **The extender can be installed, and many of its new features set up, without the use of RMIR. Note, however, that when used with RMIR it requires RMIR v2.03 build 8 or later.**

In contrast to conventional extenders on other remotes, the extender for the URC-6440 retains all features of the unextended remote such as the learning and the setup procedures available through a long press of the Setup button, including 9xx commands. Indeed, some of the 9xx commands are enhanced to give them greater power. The unextended OARUSB04G, however, has a few features that are not present on the URC-6440 and which are lost in this extender. The List button has a dual use as a Macro button. If List/Macro is held pressed until an LED becomes permanently lit then the remote enters a macro creation mode that enables up to six macros to be created on digit buttons. These differ from macros created with the 995 setup command in that they are macros on phantom buttons that cannot otherwise be accessed.

These buttons show up on the Macros tab of RMIR with names such as Shift-button62, even though the unextended remote does not have a Shift key and there is no physical button62.

In the extended remote the List button still has a dual use, but its second use now is as the Shift button, enabling the remote to be put into both Shifted and XShifted states. When a setup for the unextended remote is upgraded to one for the extended remote, access to macros created through the List/Macro facility is lost. But there are now effectively three times as many buttons as there were before the upgrade, each physical button now having also a Shifted and XShifted form. To retain access to these List/Macro macros, all that is needed is to use RMIR to change the assigned button. Its name on the Macros tab of RMIR will have been changed by the upgrade process to one such as Shift-XShift-1, where the digit is that used to access the macro on the unextended remote. This button does not exist, but by changing it to either Shift-1 or XShift-1 which do exist on the extended remote, access is retained through the same digit as used on the unextended remote.

For the unextended remote the Layout tab of the Device Upgrade Editor in RMIR shows, beneath the remote image, buttons with names button51 to button65 (21 buttons, as the numbers 51 to 65 are hexadecimal), and also button6E. These are accessed through the arrow key at the bottom right of the keypad. They are absent on the Layout tab in the extender, being replaced there by the 15 phantom buttons that are a feature of the extender. What has happened is that any function on button6E (on TV, STB and DVD devices) and button51 (on AUDIO device) is now directly on the arrow key and that functions on buttons52 to button65, used by the AUDIO device only, are now on the XShifted forms of the physical buttons with (hexadecimal) key codes 12 to 25. These are the buttons below the row of colored buttons, down as far as digit 5 but excluding Guide (which has key code 11).

1.2 Basic features

There are two variants of the OARUSB04G. The earlier one is identified in RMIR as the OARUSB04G 4000, the later one simply as OARUSB04G. The extender is suitable for both versions.

This extender differs from those for older remotes in that, with the few exceptions mentioned in section 1.1, it does not remove any of the original capabilities of the remote. In particular, the learning capability is retained, which is lost in traditional extenders. This one merely adds further features. In addition it can be installed without the use of any of the JP1 tools. All the original features and many of the new ones can also be set up without the need for JP1 tools, just through the setup mechanisms of the remote itself. It should be noted that the original remote has many setup mechanisms that were not described in the manufacturer's manual. These all still work, some in improved form, and all are described in this manual.

To make use of the full capabilities of the remote, however, does need the RMIR (RemoteMaster) program from the JP1 website. That program is under continual revision. **For use with this extender you need RMIR version 2.03 build 8 or later.** With the exception of Punchthroughs and the Special Functions, this manual does not explain in detail how to use RMIR to set up the remote but it does give the information about the features of the remote that are needed to make full use of its capabilities with RMIR.

The organisation of this manual is that sections 1 to 4 should be read by all users, sections 5 to 10 primarily describe the setup procedures available through the remote without the use of RMIR, section 11 describes setup procedures with no RMIR equivalent that are available only through the remote and section 12 describes the special functions that can only be set up with RMIR. Parts of section 10, on macros, are however also useful to users setting up macros with RMIR.

The main features provided by version 1.03 of the extender, which are all retained in version 1.04, are:

- an increase in the number of supported devices from four to twelve, and of activities (combo setups) from two to six

- provision of a Shift key used both to access the additional devices and activities and to effectively increase the number of keys to which functions can be assigned
- XShift as well as Shift capability, so the number of keys is effectively trebled
- punchthrough capability separately for the volume, transport and channel button groups for each device, effectively turning each device button into a simplified form of activity
- ability to set up all three punchthroughs, not merely the volume one, without the use of RMIR, by use of the 993 setup command of the remote
- direct entry of EFCs from the keypad, which enables *any* function to be sent to any device, whether or not it is included in the setup for that device
- macros which can be nested to any depth and which can include functions not in the setup of a device by the use of EFCs
- control of the duration for which each signal in a macro is sent, to avoid problems of unintended repeat action when the default behaviour sends a signal for too long
- the final key in a macro sequence repeats for as long as the button that sends the macro is held
- the ability to put macros on the device and combo buttons, which are performed after the device or combo mode is set
- device buttons without an assigned device can be used as ordinary buttons to which a function, macro or keymove can be assigned
- combo buttons can execute a macro without setting an activity mode, by use in the macro of the ComboCancel function
- long/short keypress functionality on the Power button in any combo mode, with a short press acting as a normal button for a selectable device and a long press (more than 0.25 seconds) having the special activity behaviour of sending the power signal for every device used in that activity
- shift cloaking, which gives access to the normal function assigned to a button even when that button has a macro or keymove assigned to it or when the button is directed to a different device by means of a punchthrough
- 15 phantom keys, which can also be Shifted and XShifted to give a further 30, to which functions can be assigned for use in macros
- inclusion of the following device-specific Special Functions
 - Long/Double Keypress
 - ToadTog
 - Device Specific Macros
 - Device Multiplexer
 - Pause
- permanent installation unless deliberately removed, so that batteries can be replaced without affecting the extender or the current setup
- no reduction in the memory space available for setup data
- no writing to flash by any extender feature — this is mentioned because the Device Multiplexer involved a write to flash memory in version 1.00 of the equivalent extender for the URC-6440.

Version 1.04 adds two new features:

- the ability within a macro to select a device without running any macro that may be set up on the device key concerned (see section 4.5)

- the ability to create global Special Functions, i.e. ones which operate for all devices (see section 12).

Be aware that nested macros, if not constructed with care, can easily result in an infinite loop. The remote will then appear to have locked up, which may be interpreted as a bug in the extender. Before filing a bug report, please press and hold the Pause key. This will exit an infinite loop caused by macro recursion, as explained in section 10.6. Other interactions can also sometimes give unexpected results, so please think carefully about the details of your setup if you get unexpected behaviour. If you are sure that the reason lies in the extender rather than your setup, please upload a .rmir file of your setup to the JP1 forum and make a post about it that includes a link to your setup.

The extender facilities are provided at the expense of only one thing. The extended remote will no longer be recognised by the simpleset.com website. This is a minimal loss, however, as RMIR provides superior features for setup and for the addition of new devices, including the ability to convert learned signals into a standard setup code. If you find it absolutely necessary to use simpleset.com, however, to obtain a new setup then you can do so by following the method described in section 5.5.

2. Installing and uninstalling the extender

You may install the extender on the unextended remote either with or without the use of RMIR.

2.1 Installing without RMIR

Before you install the extender, you need to save your present setup and collect certain information from it that will help you set up the extended remote. RMIR provides a way of upgrading your existing setup to one for the extended remote, but without the use of RMIR the installation leaves you in a factory reset state that you have to set up afresh. Please follow the following steps.

- Use the 990 command of the remote to discover the setup codes for each of your current devices. Instructions for this command are given in Section 8.2.
- Connect your remote to your PC and save the “settings.bin” file from the remote's external drive to your PC. Rename it to something more distinctive for later use if you need to uninstall the extender.
- Rename the file “Settings_reset_OARUSB04Gextender104(2576A1).bin” in the extender package as simply “settings.bin” and copy it to the remote's external drive.
- Disconnect the remote from the PC.
- Use the setup codes you discovered in the first step to set up your original devices afresh, following the instructions in Section 5.3, without needing to repeat any search procedure.

Your remote should now be ready for use, though it may be lacking any further customisation that you had made in your original setup. Later sections of this manual give instructions on further customisation without the need for RMIR.

2.2 Installing with RMIR

Before you begin, make sure that you have RMIR v2.03 build 8 or later. You first need to use RMIR to save your present setup as a .rmir file. It is also suggested that you save it as a .bin file, either with RMIR or by copying the settings.bin file from the remote's external drive to your PC, to enable you to return the remote to its present setup if required, just by copying the saved .bin file back to it. The .bin file is not used during installation but the .rmir file is used and must be created. Then follow these steps.

- If you have not already done so, download your remote to RMIR and save its present setup as a .rmir file (NOT as a .bin file).

- Rename the file “Settings_reset_OARUSB04G_extender104(2576A1).bin” in the extender package as simply “settings.bin”.
- Connect your remote to your PC and use standard file copying to copy the settings.bin file of step 2 to the remote. (Do NOT do this by loading settings.bin into RMIR and uploading it — this will NOT work, you MUST use standard file copying to the external drive created when you connect your remote.) Your remote is now in the factory reset state for Extender v1.04.
- Open RMIR and load the saved .rmir file of step 1. From the File menu, select “Install Extender...”, which opens a dialog for you to choose a file with a .hex extension. Navigate to where you have stored the unzipped extender package and select the file “OARUSB04G_extender104.hex”. Click the Open button. Your setup will be upgraded to one with the same settings but for the extended remote. Save this as a .rmir file with a new filename.
- Use RMIR to upload this converted file to your extended remote. The installation is now complete.

Note that the RDF file for this extender is already present in RMIR v2.03 build 8, so is not included in the extender package.

This converted setup will retain all the features of your original setup with one possible exception. As described in section 1.1, if you have created any macros with the List/Macro feature of the unextended remote, you will need to use the Macros tab of RMIR to change the bound button to one present on the extended remote.

2.3 Uninstalling the extender

No operation performed on the extended remote will affect the installation of the extender. Removing and replacing batteries will leave its state unchanged, and even a factory reset (981 command) will only return it to the factory reset state of the extended remote, not the unextended remote. To uninstall the extender, if you ever find it necessary, you need to copy into it a settings.bin file for the unextended remote.

If you saved a settings.bin file before installing the extender, simply copy this back into the remote with the standard file copying of your PC. Note that if you saved the file under a different name, you have to rename it back to settings.bin before you can copy it back. This will return the remote to the setup you had before installation.

If you only have a .rmir file saved before installing the extender, you first need to copy a reset settings.bin file to the remote. The file “Settings_reset_OARUSB04G(257601).bin” is provided in the extender package for this purpose. If you had the earlier version of the OARUSB04G then this will also upgrade it to the newer one. Again, you need to rename the file as settings.bin before copying it. After doing so, use RMIR to upload your saved .rmir file to the remote to restore the saved setup.

Please note that there is no way of converting a setup for the extended remote, whether saved as a .rmir or a .bin file, back to a setup for the unextended remote. The added features of the extender make such a reverse conversion impracticable.

3. The Shifted states

3.1 The Shift button

Many of the additional features provided by the extender are accessed by means of a Shift button. Clearly there is no new physical button on the remote. Instead, the dual function of the List/Macro button has been changed to make it a Shift/List button. A short press of List now gives a Shift action. To act as the List button it now needs to be held for one second or more. If you release the List button before an LED

lights up, it gives the Shift action and an LED will flash on release. If you hold it until an LED lights up, it acts as a standard List button. For simplicity a short press of List will be described as pressing the Shift button. Note that if you want the shifted List button then it needs two presses, the first being short to set Shift state and the second being one second or more to act as List.

There are actually three distinct shifted states, corresponding to Shift being pressed one, two or three times. Shift pressed in error can be cancelled by further presses as four presses are equivalent to none. In addition the shift states time out after about 10 seconds. A single press enters the Shift state, two presses enters the XShift state. Three presses followed by a digit button starts the direct entry of an EFC but when followed by any non-digit button it is equivalent to two presses and so enters the XShift state.

To indicate where you are in a cycle of repeated presses, an LED flashes once, twice, three and four times on successive presses. Since the fourth press turns shift action off, a fifth press starts the cycle again with one flash.

3.2 The Shift state

When Shift is pressed once, the remote enters the Shift state in which every button has a new action distinct from its action in the unshifted state. In this state the device and combo buttons access a second set of devices and activities (combo modes) described further below. All other buttons act as new buttons to which additional functions can be assigned. Note, however, that the SkipBack and SkipFwd buttons have only a single action in the shifted state. In the unshifted state they provide the SkipBack and SkipFwd functions on a short press, but Rewind and FastFwd functions if held for one second or longer. It is only the SkipBack and SkipFwd functions that have shifted forms.

Within RMIR these new buttons are set up through the Shifted column of tables and the XShift check box of dialogs. They can also be set up without RMIR through the use of keymoves and macros, as described in later sections.

3.3 The XShift state

When Shift is pressed twice, the remote enters the XShift state in which every button has a new action distinct from its actions in both the unshifted and Shift states. In this state the device and combo buttons access a third set of devices and activities (combo modes) described further below. All other buttons act as new buttons to which additional functions can be assigned. As in the Shift state, the SkipBack and SkipFwd buttons have only a single action in the XShift state, so there are no XShifted Rewind and FastFwd functions.

Within RMIR these buttons are set up through the XShifted column of tables and the XShift check box of dialogs. They too can also be set up without RMIR through the use of keymoves and macros, as described in later sections.

3.4 The three-shift state and EFCs

It is only the digit buttons that have a special behaviour after three presses of Shift. Other buttons remain in the XShift state on the third press, though when included in the button sequence of a macro (but not otherwise), the four colored buttons Red, Green, Orange and Blue also perform special functions after three Shifts. This usage within a macro is described in section 4.5.

This state permits what UEI, the manufacturer, used to refer to as Key Magic. This is the ability to send signals to perform functions that are not assigned to any button on the remote. Each setup code has the ability to send at least 256 different signals, and for newer setup codes indeed many more than this. This is far greater than the number of physical buttons on any remote, even allowing for shifted buttons, but they can all be sent from the three-shifted state by entering a 5-digit code from the keypad. In the terminology of the JP1 forum these codes are known as EFCs (extended field codes). On entry of each of the first four digits, an LED gives a short flash (even if the button is held for longer). The signal is sent

when the final digit is pressed. The signal will then be sent, and the LED will remain lit, for as long as the button is pressed.

For functions needed frequently, this is very tedious as it involves eight button presses, three of Shift and five of digit keys. However, if the EFC is known for a function it is also possible to assign it to a button (including Shifted and XShifted buttons) on the remote by means of a key move. This assignment can be done with RMIR, but it can also be done without RMIR by means of the 994 command, as described in Section 9.2. EFCs can also be used to include functions in macros that are not assigned to any button, again either with RMIR or without it by means of the 995 command.

Technical note 1: For setup codes capable of only 256 functions, EFCs start with two zeroes. On older remotes that only supported such setup codes, 3-digit EFCs were used. If a 3-digit EFC is known then just prefix it with two zeroes for use with remotes such as this one that use 5-digit EFCs. For setup codes capable of more than 256 functions, the first two digits of the 5-digit code are never both zero.

*Technical note 2: The 3-digit values of EFCs that begin with two zeroes are modulo 256, so that for example 00010, 00266 and 00522 all correspond to the same function. For codes that do not begin with two zeroes, the values are modulo $256*256 = 65536$, so 01010 and 66546 correspond to the same function but 00010 and 65546 do not, even though they also differ by 65536.*

3.5 Shift cloaking

It may be convenient to assign a frequently used key move or macro to a little-used unshifted button on the remote. Provided that nothing is assigned separately to the shifted button, the original function of the unshifted button will remain available through a feature known as shift cloaking. This means that the shifted button will perform the original function of the unshifted button whenever nothing has been assigned to that shifted button and even if something else, such as a key move or macro, has been assigned to the unshifted button. The same is true of the XShifted button, so that if the shifted button does have its own assignment but the XShifted button does not, then the original function of the unshifted button will be available on the XShifted button.

If a volume, transport or channel punchthrough has been set up (see section 4.3) that redirects the appropriate buttons of one device to perform the corresponding functions of some other device, shift cloaking also provides access to the functions of the original device, as shifted and XShifted buttons are not redirected by any punchthrough.

4. Devices, activities and special buttons

4.1 Devices and device types

The remote classifies real devices into four different types, namely TV, STB, DVD and AUDIO. These are the same as the names of the four physical device buttons on the remote. There is a different range of setup codes for each type, so that for example both TV and DVD have a setup code of 0702 but they do not send the same signals.

Initially each device button is set up to accept setup codes for the type of the same name, so you need to put a DVD player on the DVD button. If you also have a Blu-Ray player (which comes under DVD in the code list supplied with the remote) you seem to be stuck. You might want to put it on the AUDIO button, but that does not accept the DVD code-list type. What saves you is that it is possible to change the device type of any device button, even without the use of RMIR, as described in Section 8.1. This works also for the unextended remote, but like many of its features it is not mentioned in the documentation.

4.2 The additional devices

The shifted and XShifted device buttons provide eight more buttons on which devices can be set up. By default each shifted or XShifted button supports the same device type as the unshifted button. The shifted device buttons are named TV2, STB2, DVD2 and AUDIO2 and the XShifted ones correspondingly TV3, STB3, DVD3 and AUDIO3. **Wherever the instructions in this manual refer to pressing a device button, you can also use a shifted or XShifted device button even though that involves two or three button presses.** The device type assignments for the XShifted, shifted and unshifted device buttons are independent, so for example you can change the AUDIO button to the DVD type (for your Blu-Ray player) and leave the AUDIO2 button set for the AUDIO type. Or the other way round, of course.

There is an LED for each physical device button, which serves for the unshifted, shifted and XShifted devices on that button.

4.3 Device punchthrough

Device punchthrough, otherwise known as device lock, is a feature that allows particular groups of buttons to operate a device other than the one currently selected. In this extender there are three such groups of buttons:

Volume buttons: Volume up, Volume down and Mute

Transport buttons: Play, Stop, Pause, Rewind, FastFwd, SkipBack, SkipFwd, Record

Channel buttons: Channel up, Channel down, Previous channel and the digit buttons

Each of these button groups can be set to punch through to a device other than the currently selected one. The assignment of punchthrough devices can be made separately for each device and each button group. For example, when TV is selected then the volume buttons can operate the AUDIO device (e.g. an AV receiver), the transport buttons can operate the DVD device and the channel buttons the STB device. The devices the assignments can be made for, and to, include the eight additional devices described in section 4.2 as well as those of the four device buttons physically present on the remote.

With RMIR, punchthrough assignments are made on the Device Buttons panel of the General tab. Punchthroughs can also be assigned without the use of RMIR, as described in section 7.

When you press a button that has been redirected to a different device with a punchthrough, the LED that lights is that of the device used for the signal, not that of the currently selected device. The current device, of course, remains unchanged.

4.4 Activities (Combo modes)

An activity is a mode in which the buttons are arranged in groups with each group operating a different device. To a significant extent every device button can be set up as an activity with the use of device punchthrough as described in section 4.3. More detailed control is available, however, through the combo buttons.

There are two physical combo buttons on the remote, for the activities WatchTV and WatchMovie. These are dual-purpose buttons as holding them for about 3 seconds puts the remote respectively into Setup and Copy (Learning) modes. Like the device buttons, pressing Shift before either of the combo buttons gives you two further activities, WatchTV2 and WatchMovie2, and two presses of Shift, i.e. XShift, gives a further two, WatchTV3 and WatchMovie3. It is still true in Shift and XShift modes, however, that holding these buttons for 3 seconds or more will put the remote into Setup or Copy mode. **Wherever the instructions in this manual refer to pressing a combo button, you can also use a Shifted or XShifted combo button even though that involves two or three button presses.**

Note that WatchTV2/3 and WatchMovie2/3 are just names. The flexibility of combo setup provided by the extender allows you to set them up for many other purposes, however you may wish. The unextended

remote has very limited setup facilities for the combo buttons. There are four preset assignments for each of the two buttons, and you are restricted to this choice. In contrast, the extender divides the buttons of the remote into ten groups, four of unshifted buttons and six of Shifted and XShifted buttons. These groups are:

1. Volume buttons (Vol+/-, Mute)
2. Unshifted buttons that are not in groups 1,3,4,5
3. Transport buttons (Play, Stop, Pause, Rewind, FastFwd, SkipBack, SkipFwd, Record, List)
4. AV, TV, STB, DVD, AUDIO
5. Power with Shifted and XShifted Power
6. Shifted and XShifted Volume buttons
7. Shifted and XShifted buttons not in groups 5,6,8,9,10
8. Shifted and XShifted Transport buttons (excluding Rewind and FastFwd, which have no shifted forms)
9. Shifted and XShifted digit buttons
10. Shifted and XShifted AV, TV, STB, DVD, AUDIO.

Each group can be assigned independently to any of the twelve device buttons. This assignment can be made with or without the use of RMIR, as described in Section 6.1. By default for WatchTV and WatchMovie, groups 1,4, 6 and 10 are set to TV. The remainder, except for group 5, are set to STB for WatchTV and to DVD for WatchMovie. The Shifted and XShifted activities are similar, but to the corresponding shifted devices TV2, STB2 and DVD2. Group 5 in all cases is set to AUDIO3 for reasons explained in section 4.6.

Note that the device buttons are included in groups 4 and 10. This refers to these buttons when no device is assigned to them. As mentioned in section 1.2, any of the twelve device buttons can be used as an ordinary button, with an assigned function, keymove or macro, when no setup code or learned signals are assigned to that button. Note also that on the Activities tab of RMIR, the button group lists do not include the XShifted buttons, which as the list above shows, are each in the same group as the corresponding Shifted button.

Activities and punchthroughs do not interact. If in activity mode a volume, transport or channel button is pressed then the device used is that assigned by the activity, regardless of whether or not a punchthrough is set for that device and button group.

As with devices, there is an LED for each physical combo button that serves for both the unshifted and shifted (including XShifted) activities on that button. When any button is pressed in combo mode, the LEDs of both the combo button and the active device for the button group concerned both light up while the signal is sent.

4.5 Special buttons for macro control

There are four special buttons that are available only within macros, which are used to control macro behaviour. These are DCSave, DCRestore, ComboCancel and Hold. The first three are used to change the device or combo state of the remote in ways that cannot be achieved by including device and combo buttons explicitly within the macro sequence. The fourth is used to change the duration for which signals are sent within a macro sequence and to change the current device without activating any macro on the device key concerned.

The combo and device buttons, including their shifted and XShifted forms, can be included in the button sequence of a macro to change the current device and combo selection to a specific new mode. Such a mode change persists when the macro terminates. It is often useful, however, for a macro to be able to

change the mode to send a command to a specific device *without* that mode change remaining in effect when the macro terminates. The first three special buttons can be used to facilitate this:

DCSave saves the current device and combo mode for later restoration

DCRestore returns the current device and combo mode to that saved by the most recent DCSave

ComboCancel cancels the current combo (activity) selection and returns the mode to that of the last selected device button.

By default, each signal sent within a macro is sent for 250ms, except the final one which is sent for as long as the button with the macro is held, with a minimum of 250ms. For keys such as the direction keys up, down, left, right, this can be too long for certain physical devices as it can be interpreted by the device as the signal being sent two or more times. To resolve this, the extender provides a fourth special button:

Hold, when followed in the macro sequence by a digit, changes the signal duration to the digit value in units of 50ms, so that digits 0-9 give a range of durations from 0 to 450ms. The signal is always sent once, so a duration of 0 means that the signal will be sent exactly once. The digit forms part of the Hold command and is not sent.

If Hold is instead followed by a device key then that device is selected as the current device without activating any macro that may be assigned to the device key. If a device key is included in a macro without being prefixed by Hold, then the device is selected and any assigned macro is then activated. If Hold is followed by anything other than a digit or device key, both the Hold and that key are ignored.

There is an implicit DCSave at the start of any macro, or in the case of nested macros, at the start of the outermost macro. A macro can therefore return the remote to its mode on entry by including DCRestore as its final step, without the need for any explicit DCSave. There is also an implicit Hold 5, restoring the signal duration to its default of 250ms.

For a macro placed on a device or combo button, the mode change of that button takes place before the macro starts, and so before the implicit DCSave, which therefore saves the mode set by that button. If such a macro includes any device buttons then without a final DCRestore, the device or combo button would not put the remote into the mode set by that button as the mode changes of the device buttons would override it. Inclusion of a DCRestore at the end of the macro would return the remote to the initial mode saved by the implicit DCSave. It might seem that this could also be achieved by including the original device or combo button as the final step of the macro, but beware, this would cause an infinite loop as the macro, as well as the mode change, would be repeated when this final step was run. A DCRestore restores the mode without repeating any macro present on the corresponding button.

There is a further important feature of DCRestore when it is the last function in a macro. All keys in a macro that send a signal repeat that signal for 0.25 seconds or such time as is set by the Hold special button, except for the final key. The final key in a macro repeats for as long as the button with the macro is held, with this value as a minimum. In the case of nested macros, this refers to the final key in the entire sequence. However, to have this repeat action it has to be truly the final key, not merely the final one that sends a signal, with one exception. It can be followed by a DCRestore and still have this repeat action.

Because of the availability of device punchthrough, it may be desired to use the six combo buttons for other purposes than activity selection. This is where ComboCancel comes in. By including this as the first button in a macro sequence on a combo button, the activity selection of that button is cancelled and the remaining buttons in the macro sequence will then be performed as if the activity selection had not taken place. Note that ComboCancel does not have a corresponding save operation. A ComboCancel returns the mode to that of the last selected device button, whether that was selected by a physical button press or by the action of a device button included in a macro sequence. By following ComboCancel with DCSave, that device mode can then be saved for restoration later in the macro sequence.

There is no corresponding way of cancelling the initial device change when a macro is placed on a device button, but no device change will take place if the device button is unset, i.e. has no assigned setup code and has no learned signals assigned to it. ComboCancel is needed for combo buttons because there is no such thing as an unassigned combo button, all combo buttons having a default activity assigned.

The macro setup procedure of section 10.4 can be used to create macros on combo buttons, though not on device buttons. Macros on device buttons can only be created with RMIR. When a macro is created as in section 10.4, there is no direct means of including these special buttons. Instead, these functions can be included by means of the following equivalent three-shift button sequences:

DCSave	=	Shift, Shift, Shift, Red
DCRestore	=	Shift, Shift, Shift, Blue
ComboCancel	=	Shift, Shift, Shift, Green
Hold	=	Shift, Shift, Shift, Orange.

Although these take four button presses to enter, they only take up two button spaces within the macro, of the maximum 15 buttons allowed in a macro created as in section 10.4. This is so as they are stored internally as, for example, Shift + XShift-Green. If performed by button pushing outside of a macro, these three-shift sequences act as XShifted colour buttons as described in section 3.4. Nothing is lost by their use in a macro to perform these special functions, though, as XShifted colour buttons can themselves be included in a macro by using only two shifts rather than three.

4.6 The Power button in Combo mode

The Power button has a dual function when the remote is in a combo mode. If it is pressed for less than 0.25 seconds then it acts as the Power button of the device assigned by its button group (group 5) for the activity concerned. If held for longer than 0.25 seconds then it sends the Power signal in turn for each device that is assigned to a button group in that combo mode. Note that in long-press action it is the underlying function assigned to the Power button that is sent, even if a macro is assigned to that button. For a short press the button acts as normally, so the macro would be sent if one is assigned.

This long-press behaviour is the same as its behaviour in the unextended remote, but there it has to be held for two seconds before it starts this sending. Moreover, in the unextended remote the Power button has no effect if held for less than two seconds. The extender both substantially shortens this delay and allows a quick press to have a different effect. To avoid an unintentional behaviour on a quick press, the default assignment of group 5 in all activities is to the device AUDIO3. It is considered that this is the device button least likely to have an assigned setup code, in which case a quick press will have no effect. To use the short press behaviour, change the assignment of group 5 to an appropriate device button that has an assigned setup code. If desired, you may then also set up a macro on the Power button for that device.

With a long press, the LEDs of both the combo button and the device button concerned flash together as that button's Power signal is sent. The order in which the signals are sent is the left-to-right order of the device buttons for unshifted devices, followed by Shifted devices and then the XShifted ones again in left-to-right order.

It is possible to amend the action to exclude the Power signal for a device button that is assigned to a button group, but not to include the signal for a device button that is not assigned to any group. See Section 6.2 for how to do this without the use of RMIR.

Note for RMIR users: The Activity Functions table on the Activities tab shows check boxes for all twelve devices. The Power signal is sent for those devices that are assigned to a button group in the Group Assignments table and have the corresponding box checked in the Activity Functions table. So

unchecking a box for an assigned device will stop the Power signal being sent, but a checked box for an unassigned device has no effect.

Part 2: Setting up without RMIR

5. Device setup

5.1 General note on setup procedures

All setup procedures begin with pressing the Setup button and holding it until the TV LED flashes twice. This takes about 3 seconds. The Setup button is the dual-purpose button that acts also as the WatchTV combo button. Each further button pressed during a setup procedure will give one or two flashes of an LED. When Shift is pressed twice in succession, the second press will give two flashes but a third press will give only one. For all other cases where it is two flashes, it is explicitly mentioned in these instructions. Note that these flashes last 200ms. If at any point you get a longer, 600ms, flash then you have pressed a button that is invalid at that stage and the setup procedure has exited without making any changes.

Setup procedures time out if there is a gap of more than 10 seconds between button presses. If the procedure times out, the remote returns to normal operation. In normal operation an LED stays lit for the whole time a button is pressed, so if you get this behaviour rather than a 200ms flash then it has timed out.

5.2 Simpleset Brand Search

The main method for setting up devices on the unextended remote is by Simpleset Brand Search, as described in the original documentation. This works also for the extended remote, even for the shifted devices. The method in summary is

- Turn on the real device, such as a TV, that you wish to set up
- On the remote, press and hold Setup for about 3 seconds until the TV LED flashes twice
- Press the device button you wish to use to control the device (remember that this involves two or three button presses for a shifted or XShifted device)
- Point the remote at the device, then press and hold the digit button corresponding to the brand of your device until the device turns off. Please see the original documentation for the brand lists for each digit. While you hold the button, the remote will send the power signal for each setup code in turn for that brand, at intervals of about 3 seconds. The LED for the selected device will flash as each signal is sent. When you release the digit, the LED flashes twice and the device will be set up for the last setup code sent.

If you perform this brand search on a device button that is already set up, the search finds the current setup code in its list and continues from that point onward, cycling back to the beginning when the end of the list is reached and continuing until it reaches the starting point. So if you use this procedure and find that the code selected does not work your real device properly, you can repeat it to find the next one in the list that turns your device off. It does not start each time from the beginning.

5.3 Direct Code Entry

Use this method if you know the setup code for your device. You can also use it to try the setup codes for your device and brand given in the Code List booklet of the original documentation. This booklet is more selective than the built-in lists used for the brand search method of the previous section.

The method is as follows:

- On the remote, press and hold Setup for about 3 seconds until the TV LED flashes twice
- Press the device button you wish to use to control the device (remember that this involves two or three button presses for a shifted or XShifted device)
- Enter the four-digit setup code using the digit keys of the remote. The LED for the device will flash twice when the last digit is entered, and the code is then set up. If instead you get a single long flash (a short one is 200ms, a long one is 600ms) then you have entered an invalid code and the existing setup, if any, has not been changed.

5.4 Auto Search

This is similar to Simpleset Brand Search but the search is more exhaustive. This method searches through all the setup codes in the remote that are compatible with the selected device button, i.e. are for the device type of that device button as described in Section 4.1. As the search list is much longer, it has the facility to single-step backwards if you overshoot and it does not require a button to be held throughout the search. As for Simpleset Brand Search, if there is a code already set up on the selected device button, the search will start from that point in its list.

The method is as follows:

- Turn on the real device, such as a TV, that you wish to set up
- On the remote, press and hold Setup for about 3 seconds until the TV LED flashes twice
- Press the device button you wish to use to control the device (remember that this involves two or three button presses for a shifted or XShifted device)
- Point the remote at the device, then press and release the OK button. The remote will now send a Power signal for a setup code every 3 seconds and the LED will flash as each one is sent.
- When your real device turns off, press and release the OK button again. The LED will flash twice and the button will be set up for the last code sent. If you overshoot, press and release the Channel- (down) button rather than the OK button to go back a step. The remote will stop sending signals automatically but you can repeatedly press the Channel- (down) button to single-step backwards. It is still necessary to press the OK button when you reach the right code, to end the search and set up the last one tried.
- If you wish, you can skip the automatic forward search and go directly to single-stepping backwards by pressing Channel- (down) rather than OK after selecting the device button. This method is described in the original documentation but it omits the method of single-stepping backwards. That does, however, also work on the unextended remote.

5.5 What to do if these all fail

You may have a device that has no suitable setup built in to the remote, in which case all the above methods will fail. Do not despair, however, as device upgrades from other sources can be loaded into the extended remote with RMIR. The Device Upgrades area of the File Section of the JP1 forum is an excellent source of upgrades. If you find there an upgrade for your device, it does not matter if the upgrade is formatted for a different remote as RMIR can change the format to match your remote. The main page of the Device Upgrades area (before you select a subsection for your type of device) contains various versions of the “JP1 Master” spreadsheet that lists all the available upgrades, but make sure you use the most recent version.

The simpleset.com website also has setup codes available that are not built in to your remote. You can check if there is one for your device by sending an e-mail to UEI (aka One for All) at email@uebv.com.

If this gives you a setup code available from the simpleset.com website, you need to do the following to install it into the extended remote:

- When asked for an upload, upload an empty settings.bin file for the *unextended* remote. You may, after first re-naming it, use the Settings_reset_OARUSB04G(257601).bin file included in the extender package. Alternatively you can download one with the “Restore Remote” button of simpleset.com.
- Use the options “add device > other options > I know the code” to add the setup code you have been given.
- Save the resulting file to your PC. Do *not* download it directly to your remote.
- Open RMIR and load the downloaded settings.bin file.
- Go to the Devices tab. Select the new upgrade (there will be only one if you originally uploaded an empty settings.bin file) and press the Edit button to open it in the Device Upgrade Editor. Press Save As to save it as a .rmdu device upgrade file.
- Now load your current setup (as a .rmir or .bin file) for the extended remote into RMIR. Go to the Devices tab and press New to open the Device Upgrade Editor. Press the Open button and load your saved upgrade. You may now use the RMIR General tab to assign this to your desired device button. If you open the Code Selector (with the button on the toolbar that looks like a list of codes) then the new upgrade should be listed in its Upgrades panel.

6. Activity (Combo mode) setup

6.1 Assigning button groups to device buttons

Please note that this section refers only to the extended remote. The setup procedure for activities on the unextended remote is much more limited. Refer to the original documentation if you need to use it.

The ten button groups for activity setup are listed in Section 4.4. Each can be assigned independently to an unshifted, shifted or XShifted device button, even though the default settings assign only unshifted devices to unshifted combo buttons and shifted devices to shifted and XShifted combo buttons (except for group 5 which by default has AUDIO3 assigned for all activities, for reasons given in section 4.6). To change the assignments without using RMIR, do the following:

- Press and hold Setup for about 3 seconds until the TV LED flashes twice
- Press the Combo button to be set up. The TV LED will again flash twice
- Press the device button desired for a particular button group. Its LED will flash once.
- Press the digit for that button group (digit 0 for group 10). The device LED will flash twice.
- Repeat the last two steps for each button group that you wish to assign.
- When you have entered all your assignments, press again the Combo button that you are setting up. The LED of the last assigned device will flash twice.

Note that pressing a combo or device button means two physical button presses if it is for a shifted combo or device, or three presses for an XShifted one. In particular, if you are setting up a Shifted or XShifted combo button then the button to be pressed in the last step is again that Shifted or XShifted button, requiring two or three button presses.

6.2 Changing the power signals sent by the Power button for an activity

As described in Section 4.6, pressing the Power button for an activity and holding it for more than 0.25 seconds will send in turn the power signal for each device button that has been assigned to a button group. This procedure is for excluding devices that have been so assigned, or adding back devices that have already been excluded.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice
- Press the Combo button to be modified. The TV LED will again flash twice
- Press the device button you want to exclude or include in Power. Its LED will flash once.
- Press the Power button. The device LED will flash twice if the device has been removed from the Power button sequence or four times if it was absent and has been added back. If the LED gives one long flash (600ms) then the device is not assigned to any button group for that activity so no change has been made.

7. Punchthrough setup (aka Volume/Transport/Channel lock)

The concept of device punchthrough was described in section 4.3. Although these punchthroughs can be set up from the General tab of RMIR, they can also be setup up through the remote itself, as follows.

The volume, transport or channel buttons of all devices can be set to punch through to the same device, or the buttons can be grouped with each group punching through to a different device. Each setting can also be cancelled, to return the volume, transport or channel buttons to control the main device of the device button, but only by cancelling them for all device buttons. To cancel the setting for just some of the devices, you need to cancel them for all and then use the group setting procedure to reinstate the ones you want to retain. The procedures are as follows.

7.1 Setting the volume, transport or channel buttons of every device all to control the same device

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 993 with the digit keys. The TV LED will flash twice on the final digit.
- Optionally press digit key 1, 2 or 3 to select Volume, Transport or Channel punchthrough as that to be set. The default is Volume.
- Press the Volume Up button.
- Press the button for the device whose volume is to be controlled. The LED of the selected device will flash twice.

7.2 Setting the volume, transport or channel buttons of a group of devices all to control the same device

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Press the button for the device whose volume is to be controlled.
- Enter 993 with the digit keys. The LED of the selected device will flash twice on the final digit.
- Optionally press digit key 1, 2 or 3 to select Volume, Transport or Channel punchthrough as that to be set. The default is Volume.
- Press the buttons for each device in the group to be changed.

- Press Setup again, this time just a short press (*do not* hold it). The LED of the last device selected will flash twice.

Please note that the order in which these steps are carried out differs significantly from that in 7.1 above.

7.3 Removing volume, transport or channel punchthrough from all devices

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 993 with the digit keys. The TV LED will flash twice on the final digit.
- Optionally press digit key 1, 2 or 3 to select Volume, Transport or Channel punchthrough as that to be removed. The default is Volume.
- Press the Volume Down button. The TV LED will flash four times.

8. Other device procedures

8.1 Changing the device type of a device button

The relationship between device buttons and device types was described in Section 4.1. It was said there that the default assignment of each device button to the device type of the same name can be changed. Here is how to do it. Note, however, that this procedure also deletes all key moves, learned signals and device-specific macros (DSMs) currently set up on the device button being changed and it deletes the current setup code, leaving the device button unset.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 992 with the digit keys. The TV LED will flash twice on the final digit.
- Press the device button whose name is that of the type to be assigned (e.g. STB button for STB type, even if the type of the STB button has been changed to, say, DVD, by a previous use of this command).
- Press the device button whose type is to be changed. Its LED will flash twice.

8.2 Reading the setup code of a device button (setup code blink-back)

The setup code of a device button can be read by counting the blinks during the following procedure.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Press the device button whose setup code is to be read.
- Enter 990 with the digit keys. The device LED will flash twice on the final digit.
- Press in turn the digits 1 to 4 and count the LED flashes each time. These counts give the four digits of the setup code.

Care is needed during the counting stage, as there is only a short time after the last flash on a particular digit before the procedure times out. If you press a digit and the LED stays lit for the duration of your press, it has timed out. True flashes are each 200ms with an interval of 300ms between them. The most difficult case is when there are no flashes as the corresponding setup code digit is 0. Leave just enough time to recognise there are no flashes before pressing the next digit.

9. Key moves

Key moves enable you to change the function performed by a button, or to add a function to a button that has no function within the setup code for the device concerned. In particular this is how you assign a

function to a Shifted or XShifted button. You can even assign a function for one device to a button for a different device, so this can also be used to create a form of combo on a device button. Note, however, that in contrast to device punchthrough and activities, with key moves the device LED that lights when a key with a key move is pressed is the LED for the currently selected device, not the LED of the function if that is different.

There are two distinct forms of key move. One is a copy procedure, in which a button of one device is copied to another button, possibly (and usually) of a different device. The other is an assignment of an entirely new function for one device to a button, possibly (but not usually) of a different device. This latter type of key move enables you to add to a standard setup code some function of the original remote for your equipment that is missing from that setup. This may overwrite an unused function on some button or be put on an otherwise unused button, possibly a shifted one. This form of key move, however, requires you to know the 5-digit EFC for the function concerned, as discussed in Section 3.4.

9.1 Copying a function from one button to another

This copies a function on a button of one device to a button of the same or a different device.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 994 with the digit keys. The TV LED will flash twice on the final digit.
- Press the device button for the device you are copying from.
- Press the button whose function is to be copied.
- Press the device button for the device you are copying to. (This step can be omitted if copying from one button to another of the same device.)
- Press the button that you are copying to. The LED of the device you are copying to will flash twice.

9.2 Assigning a new function with a known EFC

This assigns a new function for some device to a button which may, but need not, be for that device.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 994 with the digit keys. The TV LED will flash twice on the final digit.
- Press the device button for the device to which the new function, with known EFC, belongs.
- Press Shift *three times* (one flash, then two, then one again, each time *on release*)
- Enter the five digits of the EFC with the digit keys.
- Press the device button for the device you are assigning this to. (This step can be omitted if you are assigning the function to its own device button.)
- Press the button that you are assigning the function to. The LED of the device you are assigning to will flash twice.

9.3 Deleting a key move from a particular button

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 994 with the digit keys. The TV LED will flash twice on the final digit.
- Press the device button for the device you are deleting from
- Press *twice* the button with the key move to be deleted. The device button will flash twice on the second press.

9.4 Deleting *all* the key moves from a particular device

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Press the device button whose key moves are to be deleted.
- Enter 994 with the digit keys. The LED of the selected device will flash twice on the final digit.
- Press and hold Setup for about 3 seconds until the LED of the selected device again flashes twice.

Note the order of the steps. The device button has to be pressed *before* the 994 command is entered.

Part 3: Macros with or without RMIR

10. Macros and phantom buttons

10.1 Traditional macros and DSMs

A macro is a sequence of instructions that can be performed by a single button press. There are two types of macro. Traditional macros are assigned to a button and operate when that button is pressed, regardless of the device that is selected. Most UEI remotes only support this type of macro, but some newer ones also support device-specific macros (DSMs). As their name implies, these operate only when the specified device is selected.

The OARUSB04G is unusual in that it supports both types of macro, but in its unextended form DSMs can only be set up through RMIR. This extender augments the built-in setup procedure to allow also the setting up of DSMs without needing RMIR.

A button may have both types of macro assigned at once, in which case the DSM operates when its device is selected and the traditional macro when any other device is selected. This is part of a more general priority ordering of DSM, then key move, then learned signal and finally traditional macro.

A macro is specified as a button list, each button performing whatever it would normally do with the device, and possibly combo mode, in force at that time. The button list can contain device and combo buttons so this mode may change during macro operation. The three special functions described in section 4.5 can also be included in a macro to change the mode in ways that cannot be achieved with the inclusion of device and combo buttons themselves.

The unextended remote behaves slightly differently, in that macros cannot be nested, so that if a button with an assigned macro is included then that button performs its normal action rather than the assigned macro. This extender, however, permits nested macros so the macro will be performed.

In the extender, macros can be assigned to both device and combo buttons, including the shifted and XShifted ones. In the unextended remote, however, they cannot be assigned to device buttons although they can to combo ones. A consequence of this is that the setup procedure of section 10.4 can be used to assign macros to combo buttons but not to device buttons. Macros on device buttons can be set up only with RMIR.

In the unextended remote a macro on a combo button is performed *before* the combo mode is set. In the extended remote, however, it is performed *after* the combo mode is set. This is so also for macros on device buttons, which cannot be created at all on the unextended remote. This order of events is significant if the macro itself includes a device or combo button, as discussed in more detail in section 4.5.

Although both traditional (global) macros and DSMs can be set up with RMIR on device buttons, as the device mode is set by the button before the macro is searched for, in this case there is essentially no

difference between the two. The specific device for the DSM would have to be that of the device button concerned, else the macro would not be run, and a global macro would have exactly the same effect.

A macro created with the setting facilities of the remote can include at most 15 steps, i.e. buttons in the button list, but one created with RMIR is not limited in length. This limitation is of little practical significance, however, as a nested inner macro uses only one button and can itself be up to 15 steps, so macro nesting allows the length to be extended as required.

10.2 Phantom buttons

Phantom buttons are a feature of the extender that can be accessed only through RMIR. They are buttons that cannot be accessed from the keypad of the remote, not even with use of the Shift key. Their purpose is that key moves and macros can be assigned to them for inclusion in an outer macro that *is* assigned to a physical button. The extender has 15 phantom buttons named Phantom1 through Phantom15 which can also be used in Shifted and XShifted modes, giving an effective total of 45 phantom buttons.

10.3 Including EFCs in a macro

The ability to generate *any* function of a setup code by means of its EFC, whether or not it is assigned to a button was described in Section 3.3. A new function with a known EFC can be assigned to a button by means of a key move, as described in Section 9.2. It is also possible to include such a function in a macro, even if it has not been assigned to a button through a key move. To do this, you simply include in the macro the eight button presses that would generate the function from the keypad, i.e. three Shifts followed by the five digits of the EFC.

If you are using RMIR then this can be shortened to six buttons by following one Shift with an XShifted button, e.g. Shift, XShift-1, 2, 3, 4, 5 where XShift-1 is the XShifted digit 1 (see Section 3.3). If you are creating the macro with the setup procedures of the remote, this shortening happens automatically, so although you press the eight buttons Shift, Shift, Shift, 1, 2, 3, 4, 5 it will be stored in the macro as six buttons and so take up only six of the allowed 15 buttons in a macro.

10.4 Creating a macro

The procedure for creating a DSM is the same as that for creating a traditional macro, except that it involves one additional step. It is also not available on the unextended remote, on which only the traditional macro setup works. This procedure cannot be used to create macros on device buttons, but it can be used on combo buttons. The procedure is as follows.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 995 with the digit keys. The TV LED will flash twice on the final digit.
- For a device-specific macro, press the device button for the device to which the macro is to be assigned. Omit this step for a traditional (global) macro.
- Press the button to which the macro is to be assigned (which cannot be a device button but can be a combo button).
- Press the sequence of buttons that you want to include in the macro. This can include device and combo buttons and shifts, and also the DCSave, DCRestore and ComboCancel functions by means of the button sequences given in Section 4.5. Note that in these sequences the second of the three Shift presses will give two flashes on release but the first and third presses will give only one flash, also on release.
- To end the macro, press and hold Setup for about 3 seconds until an LED flashes twice. This will be the LED of the last pressed device button, or the TV LED if no device button has been pressed. Note that the LED will flash once before it flashes twice. If you release it after the single flash it will be treated as a combo button and so will add WatchTV into the macro without terminating the macro.

10.5 Deleting a macro

The procedure for deleting a macro, either a DSM or a traditional one, is the same as creating an empty macro. It is therefore

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 995 with the digit keys. The TV LED will flash twice on the final digit.
- To delete a device-specific macro, press the device button for the device to which the macro is assigned. Omit this step for a traditional macro.
- Press the button on which the macro is assigned.
- Press and hold Setup for about 3 seconds until an LED flashes twice. This will be the TV LED for a traditional macro and the device LED for a DSM. Note that the LED will flash once before it flashes twice. If you release it after the single flash it will be treated as a combo button and so will start the creation of a new macro with the WatchTV button, rather than deleting the existing macro.

10.6 Pauses between steps and early exit from nested macros

Normal operation of the remote puts a pause of 300ms between macro steps that send a signal (800ms after an included Power button), but sometimes this is not sufficient. An additional delay can be added between any two macro steps by use of the Pause special function as described in section 12.5 below. It is possible to terminate such a delay early, while the macro is running, by pressing any button other than the Pause button. The signal on that button is not sent, it just terminates the delay and resumes the macro sequence at the next step.

If you have nested macros, it is also possible to terminate the entire macro sequence early before the next nested macro is called. To do this, press and hold the Pause button until the macro exits. This will also skip any remaining delays included through Pause special functions. Any other keys in the macro sequence between the point at which Pause is pressed and the next nested macro will be sent as usual. The early exit will occur immediately before the start of that next nested macro.

This feature can be used to exit an infinite loop inadvertently created by a nested macro sequence that calls itself. This pair of features, however, also has real practical uses. An example is a macro that selects a list of favourite channels in turn and enables you to stop when the desired channel is reached.

To do this, first create a series of macros on phantom buttons, each of which sends the sequence to select one favourite channel. Then put a macro on a button that calls these in turn with a special function Pause (on another phantom button) of, say, 30sec separating them. You can then operate as follows. Press the button to start the sequence. You will get each channel shown for at most 30 secs, but as soon as you want to skip to the next channel, press a button other than Pause. It immediately selects the next channel. But if you want the channel it has reached, press Pause. It will exit the sequence and leave you in the selected channel.

Part 4: Setup procedures with no RMIR equivalent

11. Other setup procedures

11.1 Learning a signal from another remote

The learning process is unchanged from the unextended remote and full instructions are given in the original documentation. In summary you learn a signal from another remote as follows.

- Press and hold Learn for about 3 seconds until the TV LED flashes twice.
- Press the device button for the device you want to learn to.

- Press the button that you want to send the signal when learned. The LED for the selected device button will start flickering.
- Place the two remotes facing one another, about 2 to 5cm apart, and press the button on the source remote that you wish to learn. Hold it until the LED on the OARUSB04G stops flickering and flashes twice.
- Repeat the last three steps if you want to learn more than one signal.
- To exit learning mode, press and hold Learn again for about 3 seconds until the LED of the last learned signal flashes twice. The signals will still have been learned if you do not do this, and the learning mode will time itself out after a short interval.

11.2 Disabling and re-enabling backlight-on-pickup

By default the keys light up when you pick up the remote. This behaviour can be disabled and re-enabled as follows.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Press and release the Pause key. The TV LED will flash four times if this has disabled backlight-on-pickup or twice if it has re-enabled it.

Note that the backlight will still light up when you press any button. To prevent this also, you need to set the backlight time-out to zero, as described next.

11.3 Changing the backlight time-out or turning backlight off permanently

There are four time-out settings for the backlight, set by digits 0 to 3. This value is the duration of the backlight in units of 3 seconds, so allowing you to turn the backlight off permanently (setting 0) or set it to stay on for 3, 6 or 9 seconds. The default is 6 seconds. This setting is changed as follows.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 978 with the digit keys. The TV LED will flash twice on the final digit.
- Press the digit (0 through 3) for the required setting. The TV LED flashes twice.

11.4 Resetting the remote

Resetting the remote deletes all key moves, macros and learned signals. It also deletes all device punchthroughs and resets combo mode, ToadTog and Multiplex settings and backlight time-out values to their defaults. It enables backlight-on-pickup if this was disabled. It does *not* change the device setups and does *not* delete any installed device upgrades. A reset is performed as follows.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 980 with the digit keys. There will be a slight pause after the final digit, then the TV LED will flash four times.

11.5 Performing a Factory Reset

A Factory Reset deletes all the settings of the remote, including the device setups and installed device upgrades. It leaves all the device buttons unset. The remote is returned to its as-new state.

Note, however, that this is the as-new state of the extended remote, so it leaves the remote in the state it was in after the reset file in the extender package was first copied to the remote. To return the remote to the as-new state before the extender was installed, you need to follow the instructions in Section 2.3 on uninstalling the extender.

A factory reset is performed as follows.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.

- Enter 981 with the digit keys. There will be a slight pause after the final digit, then the TV LED will flash four times.

11.6 Reading the signature of the remote

The signature of the remote is a six-digit number that is used by software to identify the model of the remote. In JP1 software it is used to identify the correct RDF (Remote Description File) to use, and is the first element in the name of that file. In earlier remotes it usually had eight digits, often consisting of two identical groups of four. In even earlier ones it sometimes had only four characters, which might be alphanumeric rather than only digits.

An extender always modifies the signature, to enable the correct RDF to be determined for an extended remote. This often replaces one of the signature digits with a letter. The signature of the unextended OARUSB04G is 257604 for the earlier version (the OARUSB04G 4000) and 257601 for the later one. This extender has signature 2576A1.

The signature of the remote, extended or unextended, can be read by a blink-back procedure similar to that described in Section 8.2 for reading the setup code of a device. When applied to the extended remote it gives the signature 257601 of the later unextended version. The procedure is as follows.

- Press and hold Setup for about 3 seconds until the TV LED flashes twice.
- Enter 983 with the digit keys. The TV LED will flash twice on the final digit.
- Press in turn the digits 1 to 5 and count the LED flashes each time.

The five counts give all six digits of the signature. The first four counts give the first four digits but the fifth count can (in principle) be 10 or more and gives the last two digits. Care is required in the final step, to ensure the procedure does not time out. See Section 8.2 for more details.

Part 5: Extender features only available with RMIR

12. The Special Functions

The most powerful uses of the extender come from combining the nested macro facility with the Special Functions. These are a set of functions common to most extenders, but for those extenders they usually take up space in the setup memory of the remote and are deleted upon a reset or factory reset. In this extended remote they are an integral part of the firmware. They take up no space in the setup memory and are left intact even by a factory reset.

With the exception of DSM, the special functions can be set up only with the use of RMIR. In the extended remote a DSM can also be set up without RMIR, as described in Section 10. DSMs are also supported by the unextended remote but can only be set up with RMIR.

The special functions, with their conventional shorthand names, are as follows.

DSM:	Device Specific Macro
LKP:	Long Keypress
DKP:	Double Keypress
Multiplex:	Device Multiplexer
Pause:	Pause
ToadTog:	‘Toggle-Only Actuated Devices’ Toggle

Some of these names are not much more informative than their shorthand versions, but at least they are pronounceable names! They are described in more detail in the following sections. Within RMIR they are all set up through the Special Functions tab. If you select that tab and press New, a dialog box opens.

Under 'Bound Key' you specify the device button (if any) and key to which you want to assign the new function. The drop-down box for the device button has an entry "<none>" at the bottom of its list. Selecting this creates a global Special Function that applies to all devices. This feature is new to version 1.04 of the extender.

Under 'Parameters' there is initially only one item, 'Type'. Here you select from the drop-down box which type of special function you want to create. When you make your selection, the display will change. Further items may appear under 'Parameters' and the 'Macro Definition' boxes will be either enabled or disabled, according to your selection. The LKP, DKP and ToadTog functions each allow you to specify two macros, and all the macro boxes will be enabled. DSM requires only a single macro and so the third macro box remains disabled. Both Multiplex and Pause are specified through the 'Parameters' section alone.

Note that although LKP and DKP send macros, they cannot be included as inner macros in a nested macro as there would be no meaning to the duration. If so included, they simply have no effect. On the other hand, a ToadTog *can* be included within another macro.

Each of the special functions will now be described separately.

12.1 Device Specific Macro (DSM)

This one is self-explanatory. DSMs have already been explained in Section 10.1. The setup procedure through the Macro Definition boxes is the same as for a traditional macro through the Macros tab. It is possible to create a global DSM, even if it is a contradiction in terms, but it is indistinguishable from a macro set up through the Macros tab of RMIR. If you save a setup containing a global DSM as a .rmir file then it will still appear as a global DSM when you re-load the file. However, if you download to RMIR from the remote a setup that was uploaded with a global DSM, it will appear instead as a normal macro on the Macros tab.

12.2 Long Keypress (LKP)

This function enables you to put two device-specific macros on one key. The first is selected by a short press of the corresponding button, the second by a longer press. You enter the two macros separately in the Macro Definition section, into the boxes for Short Keys and Long Keys. First click on one of these two boxes to select it, then enter the macro sequence from the 'Available Keys' box. The only limitation is that the short press macro cannot be longer than seven keystrokes, but this is no limitation in practice as, like other macros, nesting permits this to include buttons that themselves run further macros.

There is one other parameter to be entered. The Parameters section now has a box labelled Duration. You select a value 1 to 15 here that controls the time division between short and long keypresses. This value is in increments of an eighth of a second, so a value of 4 gives half a second, which is a typical value to use. Note that with a short press (less than the specified duration) the macro will not start until the button is released as the remote is waiting to see if it will be a long press. For a long press (at least the specified duration) the macro will start as soon as the specified duration has elapsed.

12.3 Double Keypress (DKP)

This is very similar to Long Keypress, except the distinction is between the button being pressed once or twice within the time selected by Duration. With a single press the macro will not start until the specified duration has elapsed, as the remote is waiting to see if there will be a second press. With a double press, the macro will start when the second press is made. Again, the single-press macro cannot be longer than seven keystrokes.

12.4 Device Multiplexer (Multiplex)

This function enables you to create a button that changes the setup code for a particular device button. It is not a toggle. If you want to be able to return to the original setup code then you need to define a second

button to do that. But you can create a toggle action if you wish, by combining this function with ToadTog, explained below.

The device whose code is changed is the active device, so if you have assigned a Multiplex to STB/Red then when STB is active, the Red button will change the setup for the STB device. Of course, if any other device is active then Red will do whatever is assigned to it for that device.

The rest of the setup is self-explanatory. The Parameters section has a drop-down box for Device Type and Setup Code. These are exactly the same as you would enter in adding a new device, or as displayed in the Device Buttons section of the General tab. Note that there is no need for the new device to be the same type as the original – you could change the code for the STB device into a DVD code, to switch between a satellite box and a DVD player on the STB button.

The change is persistent but not permanent. It is remembered if you change the currently selected device and then return to it or if you leave the remote so it enters its dormant sleep state. If you change the batteries or do a 980 reset (see section 11.4), however, it will revert to the setup code entered with the Setup button or with RMIR. This occurs because the change is held in RAM and so is lost by any action that clears or resets RAM memory. For the same reason, setup codes set with a Multiplex do not show in the General tab of RMIR, as that reads only flash memory. The value read by setup code blink-back (see section 8.2), however, *is* that of the current multiplex setting.

Pressing a key with a multiplex action gives two flashes if successful and one long flash if unsuccessful. The change will be unsuccessful if the new setup code is not actually present in the remote, either as a built-in code or as a device upgrade. In this case the setup code of the device is left unchanged. The new code, of course, does not have to be one assigned to any other button so a Multiplex can be used to support even more devices than the twelve allowed by the four device buttons and their shifted and XShifted forms.

12.5 Pause

The Pause function enables you to create a delay between two specific keystrokes in a macro. There is in any case a pause of 300ms between macro steps that send a signal (800ms after an included Power button). The qualification ‘that send a signal’ excludes such sequences as the seven button presses needed to send an EFC. Only the last one sends a signal so in effect all seven button presses are treated as a unit, with the 300ms delay occurring only after the last one. But if you have equipment that takes longer to respond, you may wish to insert an additional pause.

You will normally put a Pause on a phantom key, so that you can insert that key wherever you need a pause in your macros without having it take up unnecessarily some physical button. If you do assign a Pause to a physical button, pressing that button will have no effect.

For this function you simply enter the required delay in the Duration parameter box as a decimal value in seconds. It can have up to two decimal places and be up to a maximum of around 10 minutes, i.e. 600 seconds, so every practical eventuality is accounted for,

12.6 ToadTog

TOAD stands for Toggle-Only Actuated Devices. This function takes its name from its ability to create separate On and Off buttons for a device whose native On/Off action is only through a toggle button. This comes into its own when you want to create a macro to turn on several devices at once. If any of them were already on, a straightforward macro would turn on those that were off, but would also turn off those that were on. ToadTog circumvents this by ‘remembering’ whether the devices were on or off, and only turning on those that were off. It relies, of course, on the devices concerned never being turned on or off in any other way than through this remote control, as it has no way of keeping track of any other activations. A ToadTog can be included in another macro, as is required to achieve the above example of a macro that will turn on several devices without turning off those that were already on.

ToadTog has eight independent toggle memories, numbered 0 to 7. You choose the toggle number to use in the box marked Toggle #. They are all initially Off, but they retain their new value even when the remote enters its dormant sleep state. They do, however, all return to Off if you connect your remote to your PC to change its setup, or if you change the batteries.

The action of the bound key can be chosen, in the Condition box, to Toggle (Off → On, On → Off), Test Only (Off stays Off, On stays On), Force Off (Off stays Off, On → Off) or Force On (Off → On, On stays On). Whichever option you choose, you can assign two macros, one for each of the two states. Either or both of the macros can be empty, and for the Force On and Force Off conditions the macros when the state is already on, or already off, usually are empty. Pressing the assigned key performs two separate actions. It sends the macro determined by its current state, then it changes that state according to the assigned condition. So if the condition is Toggle and it is currently On, it will send the On macro then change the state to Off, ready for its next use. The headings of the two macro definition boxes change to reflect the choice of condition. As for LKP and DKP, there is a limitation on the length of the macro in the left-hand box, which in this case is the 'On' macro. This cannot be longer than seven keystrokes.

The simplest example is the original one, to create separate On and Off buttons from a toggle-only power switch. Assume that the device is to be off when we first start using the new buttons, and that we will use toggle 2 to remember its state. Then on keys for the appropriate device button we set

'On' key: Toggle # = 2
 Condition = Force On
 Off → On macro = Power
 Already On macro = <empty>

'Off' key: Toggle # = 2
 Condition = Force Off
 On → Off macro = Power
 Already Off macro = <empty>.

Another example is the use of a toggle ToadTog to switch a device button between two setup codes, such as two zones on an AV Receiver that supports two zones. The functions for two such zones commonly use the same protocol but with different device or subdevice values, and may be set up as two different setup codes. If you create a Multiplex on Phantom1 on the AUDIO device button to switch to the setup code for Zone 1, and one on Phantom 2 to switch to that for Zone 2, then you could use a ToadTog with toggle 3, say, on the AV key of the AUDIO device button as follows:

'AV' key: Toggle # = 3
 Condition = Toggle
 Off → On macro = Phantom2
 On → Off macro = Phantom1

Then when the AUDIO device is active, the AV button will toggle the action of the other buttons between Zone 1 and Zone 2, and although two setup codes are being used, they only take up one device button.

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