

**Control Dynamics  
Digitalview**

**DRR-2T**

**Dual DAB+ tuner**

**RS232 protocol**

**Applies to DRR2T Version 1.5**

## Signalling

RS232 , 38400 bits/sec, 8 bits, no parity, 2 stop.

Pin	Function
2	Txd – data out of tuner
3	Rxd – data into tuner
5	ground

## Protocol Format

The RS232 command set is a simple ASCII based command structure. All Host commands will result in a response by the DRR-2T.

<Host command> < == > <tuner response>

Dynamic information such as the radio text (DLS or RDS) will automatically be sent to the host when a change is detected.

## Command

The structure of the command string is -

<STX><tuner>,<Command>,<data ....><ETX>

Where -

<STX>

Is the “start of command” character. This has a value of 0x2A (ASCII ‘\*’ astrix)

<Tuner>

Identifies the target tuner this can only be

0 = system processor

1 = Tuner 1

2 = Tuner 2

<command>

Identifies the command to be executed. 1.5This can only be a number corresponding to a valid command.

<data>

An ASCII string containing data valid for the command.

<ETX>

Is the “end of command” character, When the DRR2T receives this character it will the process and execute the command. This has the value of 0x0d (ASCII carriage return).

Remarks

The DRR2T has a 200 character buffer. Multiple commands can be sent without the need to wait for a response for each command.

**Response**

The DRR-2T will respond to a command with a string in the following format –

<STX><tuner>,<Command>,<Error code>,<data><ETX>

<STX>

Is the “start of command” character. This has a value of 0x2A (ASCII ‘\*’ astrix).

<Tuner>

Identifies the source of the command, this can be -

- 0 = system processor
- 1 = Tuner 1
- 2 = Tuner 2

<command>

Identifies the command that initiated the response. This can only be a number corresponding to a valid command.

<error code>

If no error occurred this value will be 0, otherwise the returned code will be –

Code	Error
0	No error
1	No DAB services.
2	Tuner address invalid
3	Unrecognised command
4	Command failed to be executed
5	Data field contains invalid data for the command
6	Command not valid for the selected tuner
7	Tuner is OFF
8	Tuner failed
9	Tuner is not in DAB
10	Tuner is not in FM

<data>

An ascii string containing data valid for the command.

<ETX>

## Commands

Code	Function
0	Start up message
1	Get hardware and firmware versions
3	Set service
4	Get current service information
6	Get DAB service list
7	Scan DAB
8	Get radio text
9	Get DAB service count
10	Scan FM
11	Set volume level
12	Mute audio
13	Set to Factory defaults
14	Stop command
15	Get Signal
16	Set band
17	Set preset
18	Load preset
19	Get presets
20	Standby
21	Set DAB service using ID
23	Next/Previous service
24	Next/previous preset
99	Reset tuner

### Start up Message

Command	0
Function	Sent by the DRR-2T indicating a reset
Format	*0,0,0,Digitalview DRR-2T
Data	none
Returns	*0,0,<error code>,Digitalview DRR-2T.

### Description

This message is sent by the DRR-2T on power up and after it has fully initialised and is ready to accept commands.

### Get Hardware and Firmware Versions

Command	1
Format	<0 1 2>,1

Function	Retrieve firmware and hardware versions of installed hardware.
Data	none
Returns	*<1 2>,24,<error code>,<String1>,<String2>
	When tuner = 0 <System processor firmware version>,<hardware version>
	When tuner = 1 or 2 <Tuner x firmware version RD> ,<Tuner x firmware version custom>

**Description**

Retrieves the hardware and firmware versions of the installed hardware.

**Example**

*Get the system processor and hardware versions.*

\*0,1  
\*0,1,0,01.0,01.0

*Get the firmware versions in the tuners*

\*1,1  
\*1,1,0,0201,0215  
\*2,1  
\*2,1,0,0201,0215

**Set Service using Index code**

Command	3
Format	<1 2>,3,<data>
Function	Tune to a selected DAB or FM service
Data	Valid range of the data field is 1...999999
Returns	*<1 2>,3,<error code>

**Description**

This function allows the tuning to DAB or FM service with a single command without the need to switch bands first. The DRR2T determines the desired band by the value in the data field.

If data is <999 then it is assumed to be a DAB service. The tuner will switch to DAB mode then the selected the service is tuned. The service number is the index service number return by the “DAB service list” command.

If data is between 87500 and 108000 (i.e. an FM frequency in kHz) the tuner is switched to FM and the desired frequency is tuned.

The value of <tuner> must be 1 or 2.

**Example**

*Tune tuner 1 to DAB service 18*

*\*1,3,18*

*Tune tuner 2 to Fm frequency 94.5Mhz*

*\*2,3,94500*

**Set Service using ID code**

Command	21
Format	<1 2>,21,<data>
Function	Tune to a selected DAB service using the service's ID code.
Data	The valid range of the data field is 1...999999
Returns	*<1 2>,21,<error code>

**Description**

The broadcaster may add or remove or rename broadcasted services. When this occurs, the desired service index value in the service list may change. The service ID is assigned by the broadcaster, it is a more reliable method to tune to the desired service.

The DRR2T will automatically switch to DAB if it in FM. The value of <tuner> must be 1 or 2.

*Tuner to the service with the ID 4117 – (6IX)*

*\*1,21,4117*

**Next / Previous DAB service**

Command	23
Format	<1 2>,23,<0 1>
Function	Tune to next DAB service in the service list.
Data	0 or 1
	0 = Previous service
	1 = Next service
Returns	*<1 2>,23,<error code>

**Description**

Tunes to the next/previous in the Dab service list. Refer to “Get DAB Service List” command to determine which will be the next/previous service. When the start/end of the list is reached, it will wrap around to the end/start of the list.

The value of <tuner> must be 1 or 2.  
The selected tuner must in DAB.

**Example**

\*2,23  
\*2,23,0

**Get Current Service**

Command            4  
Format             <1|2>,4  
Function            Return the currently tuned service for the selected tuner  
Data                none  
Return              <tuner>,4,<errorcode>,<band>,<freq>,<Preset>,<ID>,<service name>

Field	Data
<tuner>	The tuner to which the data relates to
<Error code>	0 if OK – see the error code table for other codes
<Band>	1 if the tuner is in DAB 2 if the tuner is in FM
<Frequency>	Service number if in DAB Frequency if in FM (in kHz)
<Preset>	If the current service has been programmed into the PRESET list, this is the preset number. It will be 0 if it has not been programmed as a preset.
<ID>	If in DAB this is the DAB service ID If in FM this is always 0
<Service name>	ASCII name of the service. If in FM and no RDS this will be the frequency If in FM and there is RDS data, this will be the station name.

**Description**

This used to retrieve details on the service that is currently playing.

This message is also automatically returned when the tuner detects a change radio text information.

**Example**

\*1,4  
 \*1,4,0,1,3,25,13312,720 ABC Perth  
 \*2,4  
 \*2,4,0,1,1,8,4117,6iX Digital

**Get DAB service list**

Command 6  
 Format <0|1|2>,6  
 Function Used to obtain a list of DAB services available.  
 Data none  
 Returns <tuner>,6,<error code>,<service number>,<service ID>,<service name>

Field	Data
<tuner>	The tuner to which the data relates to
<Error code>	0 if OK – see the error code table for other codes
<Service number>	The index of the service within the returned list.
<Service ID>	The DAB service ID as assigned by the broadcaster
<Service name>	ASCII name of the service.

the end of the list is identified by the <tuner>,6,0,0

**Description**

Used to obtain a list all DAB services that the DRR2T can receive together with information that can be used to select the service using other commands.

The service list is returned in alphabetical order, the service number is the index of the service in the list. This value may change if services are added, removed or re-named by the broadcaster. The ID is assigned by the broadcaster and should not change if services are added, deleted or renamed.

If <tuner> = 0 then any available tuner in DAB is used to return the list.  
 If <tuner> = 1 or 2 then the service list is obtained from the selected tuner.

The tuner must be in DAB mode for the list to be returned.

**Example**

\*1,6

*Returns*

- \*0,6
- \*1,6,0,1,4117,6iX Digital
- \*1,6,0,2,4126,6PR
- \*1,6,0,3,13312,720 ABC Perth
- \*1,6,0,4,4096,92.9
- \*1,6,0,5,4136,96fm
- \*1,6,0,6,13314,ABC Classic FM
- \*1,6,0,7,13320,ABC Country
- \*1,6,0,8,13318,ABC Dig Music
- \*1,6,0,9,13321,ABC Extra
- \*1,6,0,10,13315,ABC Grandstand
- \*1,6,0,11,13319,ABC Jazz
- \*1,6,0,12,13317,ABCNewsRadio
- \*1,6,0,13,13313,ABCRadioNational
- \*1,6,0,14,4101,Barry
- \*1,6,0,15,4127,Buckle
- \*1,6,0,16,4119,HotCountry Perth
- \*1,6,0,17,4097,Mix 94.5
- \*1,6,0,18,4118,My Perth Digital
- \*1,6,0,19,4146,Nova 937
- \*1,6,0,20,4147,NovaNation
- \*1,6,0,21,4099,Radar Radio
- \*1,6,0,22,15362,SBS Chill
- \*1,6,0,23,15363,SBS PopAsia
- \*1,6,0,24,15360,SBS Radio 1
- \*1,6,0,25,15361,SBS Radio 2
- \*1,6,0,26,15368,SBS Radio 6
- \*1,6,0,27,13316,triple j
- \*1,6,0,28,4098,U20
- \*1,6,0,0,

**Get Radio Text**

Command	8
Format	<1 2>,8
Function	Returns current radio text information transmitted by the radio station.
Data	none
Returns	<tuner>,8,<error code>,<string> Note: <string> is an ASCII string of up to 130 characters.

**Description**

Used to retrieve the “radio text” (DLS or RDS data) from the selected tuner. This also automatically returned whenever the tuner detects a change in the text information.

**Example**

\*2,8  
 \*2,8,0,Now: 'Chasin' Rodeo'-Troy Cassar-Daley

**Get Signal**

Command	15
Format	<1 2>,15
Function	Retrieves the current band and signal strength of the tuned station.
Data	None
Returns	<1 2>,15,<error code>,<band>,<Freq>,<Signal 1 >,<Signal 2>.

<Band>  
 1 = DAB  
 2 = FM

<Frequency>  
 If in DAB, this is the frequency of the ensemble (in kHz).  
 If in FM , this is the tuned frequency (in kHz).

<Signal 1>  
 If in DAB, this is the Signal quality reading (Value of 0..8).  
 If in FM, this is an indication of signal level. (Value of 0..8).

<Signal 2>  
 If in DAB, this is the signal BER. (0..255)  
 If in FM, this indicates if the signal is in Stereo. (0 = mono 1= stereo).

**Description**

Obtains the RF signal information from the selected tuner. This message is also returned whenever the DRR2T detects a loss or restoration of the RF signal.

**Example**

Tuner in FM  
 \*1,15  
 \*1,15,0,2,92100,6,1

Tuner is in DAB

\*1,15

\*1,15,0,1,206352,8,0

## Set Volume

Command	11
Format	<1 2>,11,{data}
Function	Sets the audio level
Data	Data must be in the range 0..32
Returns	<tuner>,11,<error code> <tuner,11,<error code>,<current value> - if the data field contains no information.

### Description

This is used to set or retrieve the audio level of the selected tuner.

If the data field is empty, the DRR2T returns the current setting. This message is also returned if the volume is adjusted using the IR command.

### Example

\*2,11

Returns the current level

\*2,11,0,32

Command to set the level to 16

\*2,11,16

Returns

\*2,11,0

## Set Mute

Command	12
Format	<1 2>,12,{data}
Function	Mutes the audio or retrieve the current mute setting
Data	0 to un-mute the audio 1 to mute the audio
Returns	<tuner>,12,<error code> <tuner,12,<error code>,<current value> - if the data field contains no information.

### Description

Used to mute or un-mute the audio on the selected tuner. If the data field is empty, the current state of the mute is returned.

### Example

*Return the current setting*

*\*2,12*

*Command to mute the audio*

*\*2,12,1*

### **Set Band**

Command            16  
 Format             <1|2>,16,{data}  
 Function           Selects either FM or DAB or to retrieve the current band.  
 Data                1 = DAB  
                       2 = FM

### **Description**

Used to switch between DAB and FM bands. When this function is used to select a band, the tuner will automatically tune to the last service that was used in the selected band.

If the data field is omitted , the current mode is returned.

### **Example**

*Switch tuner 1 to DAB*

*\*1,16,1*

*Get the current mode of tuner 2*

*\*2,16*

### **Set Preset**

Command            17  
 Format             <0|1|2>,<preset>,{band},{service}  
 Function           Program a specified preset location.

Data

<b>Field</b>	<b>Data</b>
<tuner>	If 0 <preset> , <band> and <service> are used to program the preset If 1 or 2 the current service on the selected tuner is tuned to programmed to the <preset>
<Preset>	The preset location to be programmed Must be in the range 1..30

<Band>	Optional The band to which the <service> data is to be programmed 1 for DAB 2 for FM
<Service>	Optional If for the DAB band, this is the DAB service ID number If for the FM band, this is the FM frequency (in kHz)

Returns \*<tuner>,17,<error code>

**Description**

The DRR2T contains 2 Preset lists of 30 locations each, one list for the DAB band and one list for the FM band. This function is used to program selected preset location either by using the information of a service already playing on a tuner or using data from the host.

To program a preset location using a service already playing –  
\*<1|2>,<17>,<preset location>

The DRR2T gathers the required data from the selected tuner and programs it to selected location.

To program a preset location using data from the host –  
\*0,17,<preset location>,<band>,<service ID/frequency>

The DRR2T uses this information to program the location. The service ID or frequency is not checked if it is valid.

The preset location must be from 1..30. To clear a preset location , the command can be used.  
\*0,17,<preset location>,<band>,0.

**Example**

*Program Preset 10 using tuner 1 information*  
\*1,17,10

*Program preset 29 in the FM preset list to 100.1MHz*  
\*0,17,29,2,100100

**Load Preset**

Command 18  
Format <1|2>,18,<Preset>,{band}

Function                      Tunes the selected tuner to the selected preset

Data

Field	Data
<tuner>	The target tuner
<Preset>	The preset location to use
<band>	Optional 1 for the DAB band 2 for the FM band If <band> is not specified, the preset list from currently tuned band is used

Returns                      \*<tuner>,18,<error code>

### Description

Tunes the selected tuner to the selected preset. The <band> field is omitted, the preset list for the currently tuned band is used. If specified, the tuner is switched to the required band before tuning to the preset.

### Example

*Set Tuner 1 to preset 3 on the current band*

*\*1,18,3*

*Set Tuner 1 to preset 6 on the FM band*

*\*1,18,6,2*

### Get Presets

Command                      19

Format                        <0|1|2>,19

Function                      Returns all the presets locations for both DAB and FM.

Returns                      <tuner>,<error code>,<band>,<preset>,<service>,<string>

Field	Data
<tuner>	The tuner to which the data relates to
<Error code>	0 if OK – see the error code table for other codes
<band>	Band to which the following fields relate to 1 = DAB 2= FM
<preset>	The preset location
<service>	If for DAB preset this is the DAB service ID. If for FM this is the FM frequency (in

	kHz)
<string>	If it is a DAB service, this is the service name.

Note: The list is terminated by the line

\*<tuner>,19,0,0,0,0

**Description**

This retrieves the presets lists for both DAB and FM.

In the DAB list , additional information is returned. If a tuner is on and in DAB , the service name is also returned.

**Example**

```
*1,19
*1,19,0,1,1,13315,ABC Grandstand
*1,19,0,1,2,4097,Mix 94.5
*1,19,0,1,3,0,
*1,19,0,1,4,0,
*1,19,0,1,5,4117,6iX Digital
*1,19,0,1,6,13319,ABC Jazz
*1,19,0,1,7,0,
*1,19,0,1,8,4101,Barry Comedy
*1,19,0,1,9,0,
*1,19,0,1,10,0,
*1,19,0,1,11,0,
*1,19,0,1,12,4136,96fm
*1,19,0,1,13,0,
*1,19,0,1,14,0,
*1,19,0,1,15,15360,SBS Radio 1
*1,19,0,1,16,4099,Radar New Music
*1,19,0,1,17,0,
*1,19,0,1,18,0,
*1,19,0,1,19,0,
*1,19,0,1,20,13312,720 ABC Perth
*1,19,0,1,21,0,
*1,19,0,1,22,13315,ABC Grandstand
*1,19,0,1,23,13314,ABC Classic FM
*1,19,0,1,24,0,
*1,19,0,1,25,4119,HotCountry Perth
*1,19,0,1,26,0,
*1,19,0,1,27,15362,SBS Chill
*1,19,0,1,28,0,
*1,19,0,1,29,13316,triple j
*1,19,0,1,30,4146,Nova 937
*1,19,0,2,1,0
```

*\*1,19,0,2,2,0*  
*\*1,19,0,2,3,0*  
*\*1,19,0,2,4,0*  
*\*1,19,0,2,5,0*  
*\*1,19,0,2,6,94500*  
*\*1,19,0,2,7,0*  
*\*1,19,0,2,8,96100*  
*\*1,19,0,2,9,0*  
*\*1,19,0,2,10,102900*  
*\*1,19,0,2,11,0*  
*\*1,19,0,2,12,0*  
*\*1,19,0,2,13,0*  
*\*1,19,0,2,14,0*  
*\*1,19,0,2,15,0*  
*\*1,19,0,2,16,100100*  
*\*1,19,0,2,17,93700*  
*\*1,19,0,2,18,0*  
*\*1,19,0,2,19,0*  
*\*1,19,0,2,20,0*  
*\*1,19,0,2,21,87700*  
*\*1,19,0,2,22,0*  
*\*1,19,0,2,23,0*  
*\*1,19,0,2,24,0*  
*\*1,19,0,2,25,0*  
*\*1,19,0,2,26,99900*  
*\*1,19,0,2,27,0*  
*\*1,19,0,2,28,97700*  
*\*1,19,0,2,29,0*  
*\*1,19,0,2,30,0*  
*\*1,19,0,0,0,0*

### Next / Previous Preset

Command	24
Format	<1 2>,24,<0 1>
Function	Tune to next PRESET service in the list.
Data	0 or 1 0 = Previous preset 1 = Next preset
Returns	*<1 2>,24,<error code>

### Description

Tunes to next/previous programmed preset location. If the location has not been programmed , it is skipped. If at the end/start of the list, it is automatically wrapped around to the start/end if the list.

1. The value of <tuner> must be 1 or 2.
2. If the selected tuner is in FM the FM preset list is used.
3. If the selected tuner is in DAB, the DAB preset list is used.
4. There must be 2 or more presets programmed.

**Example**

\*1,24  
\*1,24,0

**Standby**

Command	20
Format	<tuner>,20,<data>
Function	Turns ON/OFF the selected tuner or retrieves the current state of the tuner.
Data	0 to turn OFF the tuner 1 to turn ON the tuner
Returns	0,20,<error code> ,<tuner 1 state>,<tuner 2 state> 1 2,20,<error code> ,<tuner state>

Where the tuner states is

- 1 = Tuner is ON and in DAB
- 2 = Tuner is ON and in FM
- 3 = Tuner has failed
- 4 = Tuner is OFF

**Description**

Used to turn ON or OFF an individual tuner or both tuners. It is also used to retrieve the current state of the tuner.

If the address is 0 then the power state of both tuners is returned. The standby state is automatically returned whenever there is change in power state of a tuner.

**Reset Tuner**

Command	99
Format	<0 1 2>,99
Function	Resets and restarts the DRR-2T
Data	None
Returns	*<tuner>,99,<error code>

**Descriptions**

Resets the DRR2T.

**Example**

\*0,99

**Factory Defaults**

Command	13
Format	<0 1 2>,13
Function	Clears all services and preset information from the tuners.
Data	None
Returns	<tuner>,13,<error code>

**Description**

Used to reset the DRR2T back to factory default settings. All presets and scanned services are deleted.

The value of <tuner> can be 0,1 or 2.

**Example**

\*0,13

**Scan DAB**

Command	7
Format	<0 1 2>,7
Function	Clears DAB database and initiates a SCAN for DAB services.
Data	None
Returns	<tuner>,7,<error code>, <channel>,<frequency>,<found services>

**Description**

Initiates a search in the DAB bands for any DAB signals.

The value of <tuner> can be 0,1 or 2.

The scan is initiated in both tuners.

The DRR-2T will respond with progress of the scan.

To terminate a scan , send a ^C (0x03) will terminate the scan.

**Example**

\*0,7

**Scan FM**

Command	10
Format	<0 1>,10,<dir>
Function	Searches UP or DOWN for the next strongest FM signal.
Data	<dir> = 0 to scan down.

Returns = 1 to scan up.  
 <tuner>,10,<error code>,<frequency>

**Description**

This function automatically increments/decrements the FM frequency until it finds a strong signal.

Notes: The value of <tuner> can be 1 or 2.

The tuner must be in FM.

The DRR-2T will respond with progress of the scan..

The DRR-2T will stop scanning when either -

- it finds a strong signal,
- Loops back to the starting frequency,
- Receives a ^C (0x03) from the host.

**Example**

*Search for the next strongest signal*

*\*1,10,1*

**Automatic Responses**

The tuner will respond with specific responses when it detects changes in some parameters.

**Radio Text**

When ever a change in radio text information “get Current” (command 4) and Get Radio text (command 8) are sent to the host.

The frequency of this data depends on the broadcaster.

**Example**

*\*1,4,0,1,1,6iX Digital*

*\*1,8,0,Wake up with Johnny Young's Big Breakfast - Weekdays from 5.30am*

*\*2,4,0,1,7,ABC Country*

*\*2,8,0,Now: 'Baby My Heart'-Sarah Johns*

**Startup / Reset**

The tuner will send out a start up message whenever a tuner is reset or on power up. A “standby command” (command 20) is sent each time a tuner is tuner ON/OFF. The DRR2T can be turned ON/OFF either via a RS232 command, IR command or the front panel.

### **Loss of Signal**

When in DAB, when the RF signal is lost or restored, the “Get Signal” (command 15) response is sent to the host. It will also send a “Get Radio Text “ (command 8) with a “No Signal” message.

### **Change in Services or Mode**

A “Get Current Service” (command 4) is sent when the service is change in both DAB and FM modes.

### **Volume**

Whenever there is change in the volume level is changed using the IR commands, a “volume” response (command 11) is sent out.

### **Mute**

Whenever there is change in the Mute is changed using the IR commands, a “Mute” response (command 12) is sent out.