

# ROKSAN

*Caspian*

D S P

A/V  
Digital Surround Sound Processor

USER MANUAL



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Congratulations on your purchase of the ROKSAN Caspian DSP A/V Digital Surround Sound Processor. This processor is designed and manufactured to the highest specification and rigorously tested to offer you many years of trouble-free service.

Your Caspian DSP is at the heart of your A/V system. Its correct installation, set-up and operation will have a profound influence on the sonic performance of the entire A/V system installation.

Please read the contents of this manual thoroughly. It will help you to understand your A/V equipment better and enhance your Audio Visual experience.

This manual is divided into the following sections:

- Safety Instructions
- Introduction
- Cautions
- Installation
- Processing
- Set-up
- Operation
- Troubleshooting
- Guarantee
- Specifications

## **UNPACKING**

Included in the packing of your Caspian DSP you will find:

- One mains lead fitted with the correct mains power plug for your country
- One information pack and warranty card
- DSP remote control handset and two AAA batteries

After removing these items please retain all packing materials. Correct packing is necessary for transportation of your Caspian DSP.

## **MAINTENANCE**

After disconnecting your DSP from the mains supply, the cabinet and front panel may be cleaned with a lightly dampened soft cloth or chamois leather. **Avoid using abrasives or solvents.**

## **EU DIRECTIVES**

ROKSAN equipment is designed to comply with the legal provisions of EU Directives 89/3336/EC and 72/23/EC. The standards which have been applied are those which were in force at the time of the introduction of this product.

This product bears the CE mark.



This product is compliant to EN 60065.

**This product must be earthed.** Please ensure that other equipment connected to it is earthed according to the manufacturer's instructions.

## **AC MAINS SUPPLY**

Your Caspian DSP is set to operate from a fixed supply voltage which is marked on a label next to the mains input plug. Before connecting the mains lead please check that your mains supply corresponds to this label as below:

|                     |                            |
|---------------------|----------------------------|
| 230V Products ..... | Voltage Range: 220V – 240V |
| 115V Products ..... | Voltage Range: 100V – 120V |

The mains lead supplied with this product has an IEC mains socket which plugs into the IEC connector on the unit's rear panel. The other end is normally attached to the appropriate mains plug for your country. In the UK this is the standard UK13A plug.

This plug should ordinarily not be removed from the lead. If you *do* remove it, please dispose of it safely so that it cannot be plugged into a mains socket whilst in a potentially dangerous condition. We suggest that you obtain from your dealer a complete replacement lead.

Should you move to another area where either the mains voltage or the mains plugs are different from those as supplied with your DSP, please contact the appointed ROKSAN distributor for assistance.

### **Please observe correct mains polarity at all times.**

The DSP mains fuses are located on the rear panel next to the IEC mains connector. They must only be replaced by the fuse of the type and rating as described on the fuse rating label on the rear panel of the unit.

This product requires connection to earth (ground). The earth wire (in the UK this is colour coded green/yellow) of the mains cable supplied with your DSP must be connected to a suitable earthing point established for this purpose by your electricity supply company. If you are in any doubt, consult a qualified electrician.

If the equipment is likely to be unused for some time, unplug it from the mains supply.

## **GENERAL CAUTIONS**

### **FCC WARNING**

This equipment may generate or use Radio Frequency energy. The user may lose the right to operate this equipment if unauthorised modifications are made.

### **INTERFERENCE**

Properly installed, this unit should not cause harmful interference to radio communications, There is, however, no guarantee that such interference will not occur in a specific installation. If interference arises (which you can determine by switching the unit off and on) you could try to remedy matters by the following:

- Re-orient or re-locate the receiving antenna
- Increase the distance between the DSP and receiver
- Connect the unit to a different mains circuit from that of the receiver
- Consult your ROKSAN appointed dealer or an experienced Radio/TV technician for help and advice

### **LOCATION**

Your Caspian DSP should be located in a well ventilated area and kept away from sources of heat, dust and humidity and from direct sunlight.

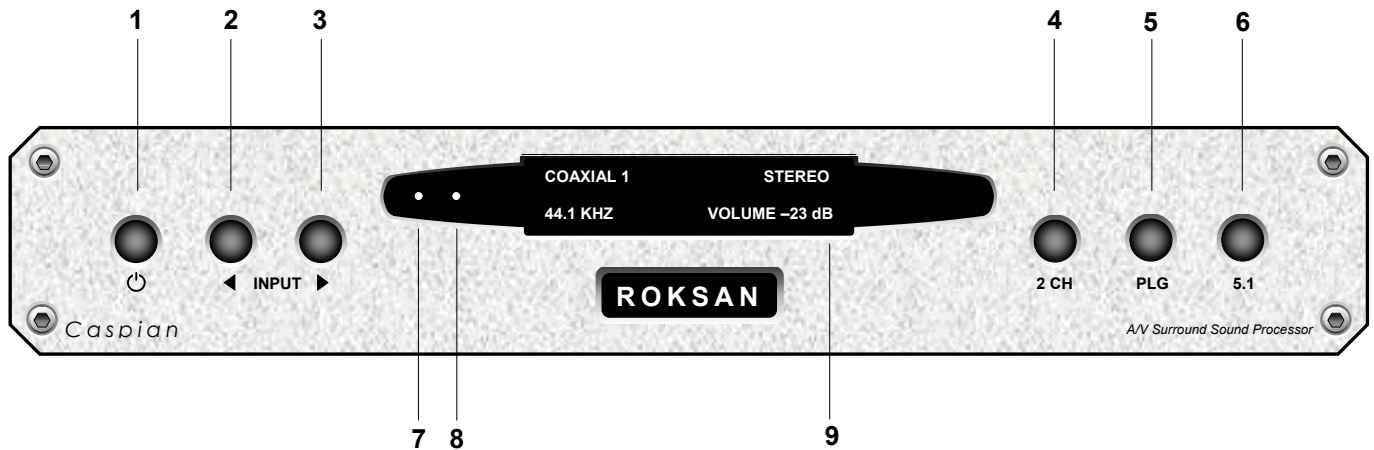
The DSP may be positioned either as a free standing unit or alongside another audio/video product. Never place the DSP on carpet or any surface likely to hinder normal ventilation.

Never allow liquids or other objects to fall into the unit.

This unit contains no user serviceable parts. **Do Not remove any panels or attempt to service it yourself.**

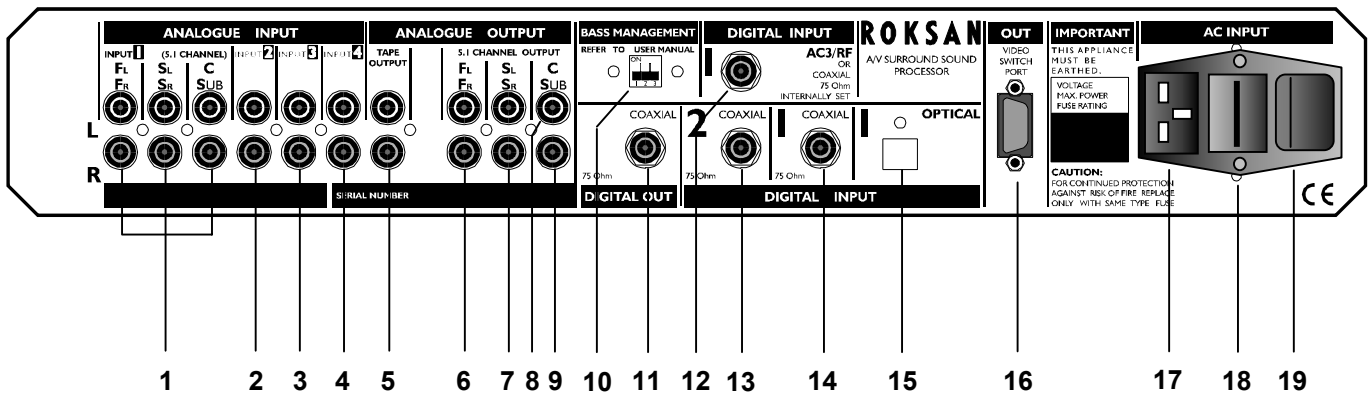
Unauthorised servicing will void the warranty.

**ROKSAN Caspian DSP Surround Sound Processor - Front Panel View**



1. Standby / On Button
2. Input Selection – Backward
3. Input Selection – Forward
4. 2-Channel Downmix
5. Pro Logic Surround Sound
6. 5.1 Channel Surround Sound
7. Standby Indicator Light
8. Overload Indicator Light
9. Main FL Display

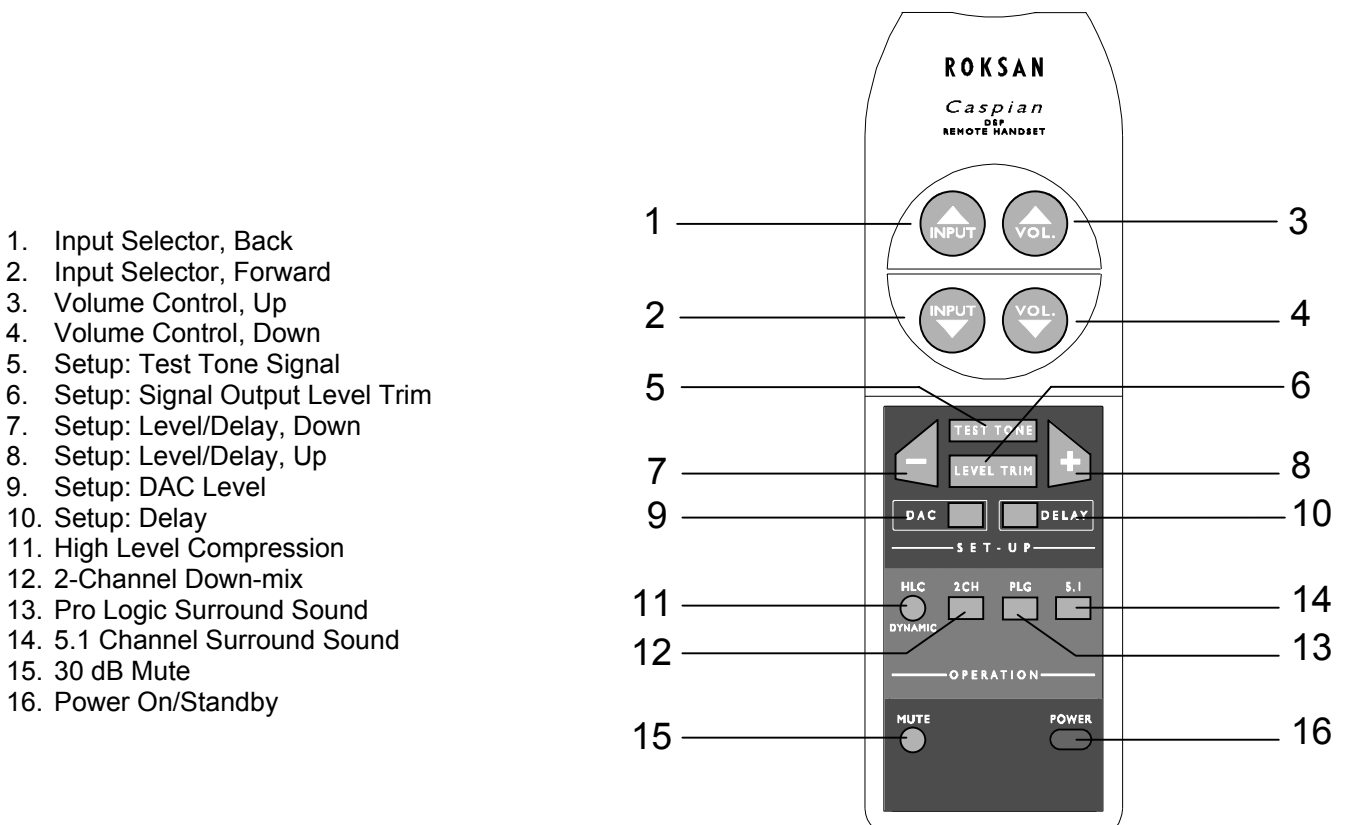
**ROKSAN Caspian DSP Surround Sound Processor - Rear Panel View**



1. Analogue Input 1, By-Passed (5.1 Channel)
2. Analogue Input 2, By-Passed
3. Analogue Input 3
4. Analogue Input 4
5. Tape Output
6. FL & FR Main Left and Right channel Outputs
7. SL & SR Left and Right Surround channel Outputs
8. Centre channel Output
9. Subwoofer Output
10. Main, Centre, Surround Speaker and Subwoofer LFE setting switches
11. Digital Output

12. AC-3/RF Digital Input
13. Coaxial Digital Input 2
14. Coaxial Digital Input 1
15. Optical Digital Input
16. Video Switching Link Output
17. Mains Power Connector
18. Mains Power Fuse Holder
19. Mains Power Switch

## **ROKSAN Caspian DSP Surround Sound Processor – Remote Handset**



## **INSTALLATION**

## *Caspian DSP*

### **CONNECTING MAINS POWER**

Please refer to rear panel view on Page 4. The moulded IEC connector of the supplied mains lead should be plugged into the socket **17** on the rear of the unit and then plugged into the mains supply. The Mains power switch **19** is on the rear panel of the DSP. This switch is normally left ON. If the unit is likely to be unattended for a long period, switch it OFF and unplug the mains lead from the mains supply.

### **INPUT CONNECTIONS**

**Analogue Inputs:** There are 4 Analogue Inputs with RCA Phono Sockets and Inputs **1,2** are by-passed.

**By-Passed:** First two Analogue inputs By-Pass the Digital sound processing and are only volume controlled.

**IMPORTANT:** These by-passed inputs are best suited to source components with 'high performance' analogue outputs (such as a Caspian CD player) and compliment their sound quality and performance.

- Analogue Input 1 is **5.1 Channel** and connections are made as follows:  
Right Channels (**FR,SR**) - Red; Left Channels (**FL,SL**) – White. Centre Channel (**C**) - Yellow; Subwoofer (**SUB**) - Orange.

This input can be used in **stereo** mode by connecting the Left and Right signals from the **stereo** source to the **FR** & **FL** Inputs.

- Analogue Input 2 is **stereo** and is for connection to source equipment with only **stereo** output signal (for example a compact disc or cassette player) and connections are made as follows:  
Right Channel (**R**) - Red; Left Channel (**L**) – White.
- Analogue inputs 3 & 4 which are **stereo**, can also be connected to analogue sources with Pro Logic output Surround Sound coded signal (for example a video cassette recorder). During playback of a video with Pro Logic Surround Sound the Caspian DSP will automatically switch to Pro Logic decoding and output in Pro Logic Surround Sound mode.

**Digital Inputs:** There are 4 Digital Inputs, 3 with RCA Phono Sockets and 1 with Fiber-Optic Toslink Socket.

- **AC-3/RF:** This input is intended for connection to the RF output of your Dolby Digital/DTS Laser Disc player. This input has an in-built RF demodulator that processes the audio signal stored on Dolby Digital/DTS encoded laser discs. If the laser disc has been encoded with **2-channel** information, you will only be able to select Dolby Pro Logic or 2-channel stereo mode for playback. If however, it has been encoded with **5.1 channel** information, your Caspian DSP will automatically switch to Dolby Digital or DTS 5.1 channel mode.
- **Coaxial, 75 Ohm:** There are two 75 Ohm coaxial inputs to receive digital signal from equipment such as a DVD player or DSS receiver. If the source material was encoded with **2-channel** information, you will only be able to select Dolby Pro Logic or 2-channel stereo mode for playback. If however, it was encoded with **5.1 channel** information, your Caspian DSP will automatically switch to Dolby Digital or DTS 5.1 channel mode.
- **Fibre-Optic Toslink:** This input can receive digital signal from Mini-disc, CD or DVD players with Toslink output option. If the source material was encoded with **2-channel** information, you will only be able to select Dolby Pro Logic or 2-channel stereo mode for playback. If however, it was encoded **5.1 channel** information, your Caspian DSP will automatically switch to Dolby Digital or DTS 5.1 channel mode.

## **OUTPUT CONNECTIONS**

**Audio Outputs:** Your Caspian DSP has 6 RCA Phono Sockets to output the 5.1 Surround Sound Audio channels and 1 Tape output (2-channel L & R audio).

- **Tape Output:** This has a 'fixed' output level suitable for analogue recordings such as recording on to compact cassette. Connect this output to the input of your Tape recorder.

**5.1 channel outputs:** These are calibrated and controlled by settings such as, Level Trim, Time Delay and Low Frequency Effects. Depending on the type of source programme and user selection, the output could vary from Dolby Digital or DTS 5.1 channel to Dolby Pro Logic or even 2-channel stereo. These outputs are Main stereo channels **FL** & **FR**, Centre channel **C**, Surround channels **SL** & **SR** and the Subwoofer output **SUB**.

- **Main FL & FR:** Connect this output to two inputs on your Caspian 5-channel A/V Power Amplifier or any other Power amplifier designated to drive your main L & R speakers. This output will then send the correct signal for either Surround Sound Main Speaker L & R or just L & R stereo listening.
- **Centre C:** Connect this output to one input on your Caspian 5-channel Power Amplifier or any other Power Amplifier designated to drive the Centre channel speaker in your A/V Surround Sound system.
- **Surround SL & SR:** Connect this output to two inputs on your Caspian 5-channel Power Amplifier or any other Power Amplifier designated to drive the L & R Surround Sound Speakers.

- **Subwoofer SUB:** Connect this output to the designated input of a suitable Active Subwoofer for Low Frequency Effects when listening in 5.1 Channel surround sound. If you are not using a subwoofer, your Caspian DSP can be set to 'compensate' for this by mixing and routing the low frequency signals to the Main L & R speakers.

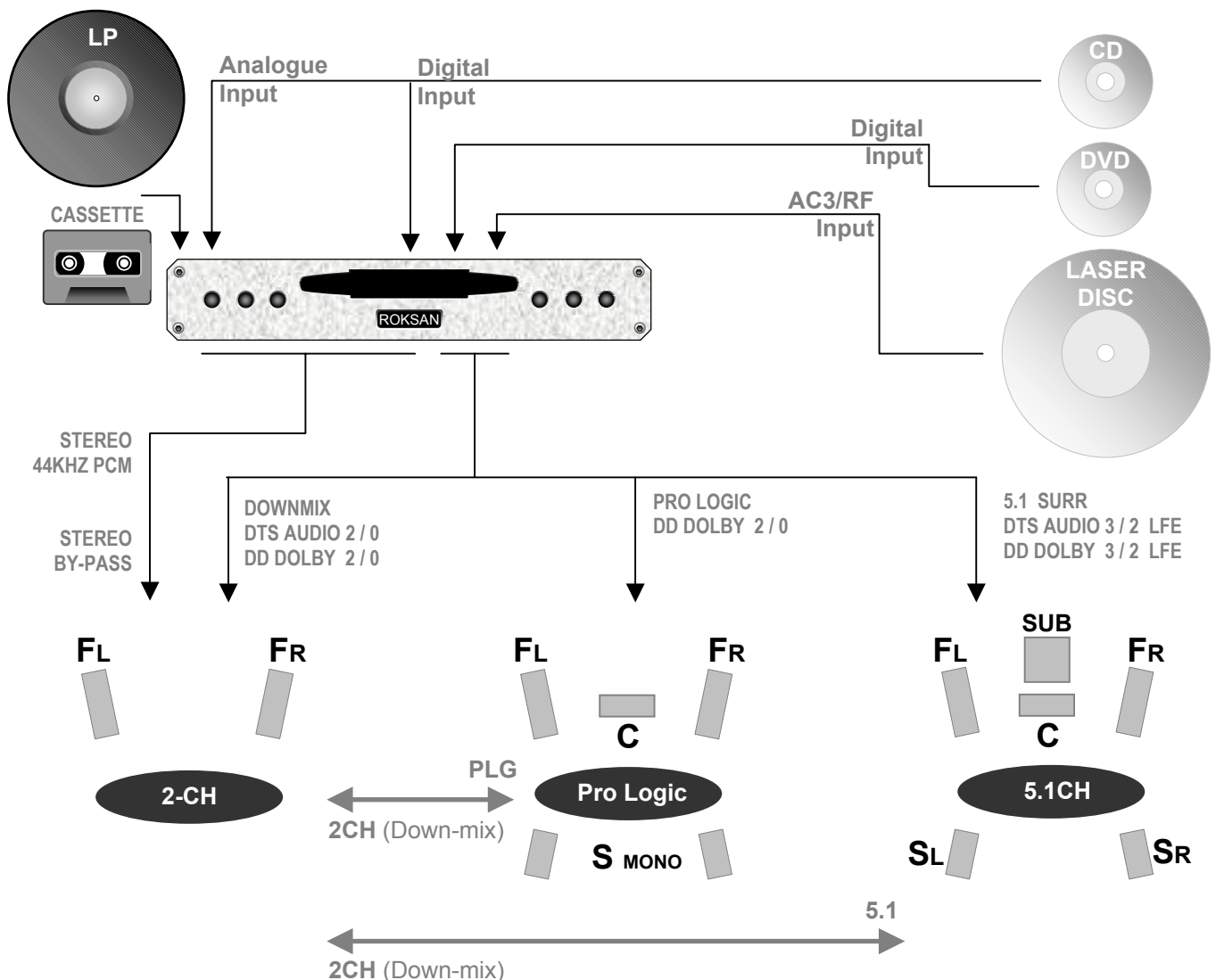
**Digital Output:** Your Caspian DSP has a Coaxial Digital Output to facilitate digital recording.

**Video Switch Output:** To simplify switching the output of the selected video source to the input of the TV/Monitor/Projector, your Caspian DSP provides a video switching output that can be connected to an optional *Caspian Video Switching Unit*. This unit will then perform the task automatically as different inputs (video sources) are selected on your Caspian DSP. For more information refer to your ROKSAN Caspian retailer or appointed distributor.

**IMPORTANT NOTE:** It is recommended to use high quality cables such as ROKSAN HDC-02A Analogue and HDC-01D Digital interconnects which are fitted with high quality ROKSAN connectors to ensure optimum performance of your home theatre system.

## PROCESSING

## Caspian DSP

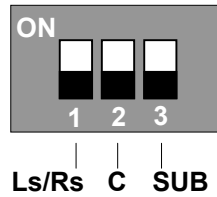


Your Caspian DSP is a high performance Digital Sound Processor that is used for Surround Sound, Analogue and Digital Input / Output control and Speaker settings. Before operating your Caspian DSP using front panel or remote handset controls, you must configure the system speaker settings. This is outlined and carried out as described below:

**Bass Management Configurations**

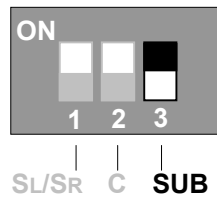
**Setup**

Please refer to rear panel view on Page 4. You will find an array of 3 switches, (10) on the rear panel of your Caspian DSP. By setting these individual switches to ON or OFF, different speakers and Low Frequency Signal 'Management' are selected.

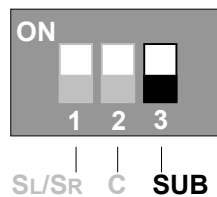


**Low Frequency Effects LFE**

- **Subwoofer Output OFF (Bass Frequencies below 100Hz mixed with FL & FR Channels):** By setting the 3<sup>rd</sup> switch to OFF low frequencies below 100Hz are routed to the Main Left & Right speakers and the subwoofer output is muted.

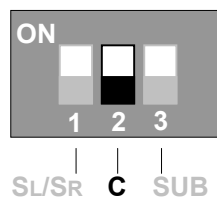


- **Subwoofer output ON from below 100Hz:** By setting the 3<sup>rd</sup> switch to ON, low frequencies below 100Hz from all 5.1 channels are routed to the subwoofer output.



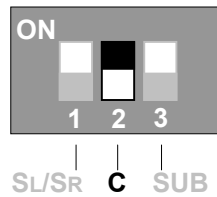
**Centre Channel Speaker Setting**

- **Centre Speaker ON:** If using a Centre channel speaker, set the 2<sup>nd</sup> switch to ON. Centre channel information will be processed separately and routed to the Centre channel output.



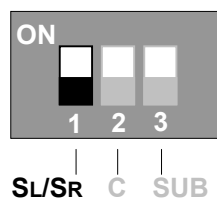


- **Centre Speaker OFF:** If not using a Centre channel speaker, set the 2<sup>nd</sup> switch to **OFF**. Centre channel information will be mixed to the Main Left and Right channels and signal output to the Centre channel will be muted.

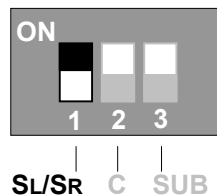


#### **Left and Right Surround Speaker Settings**

- **Surround Speakers ON:** If using Left and Right Surround speakers, set the 1<sup>st</sup> switch to **ON**. Surround channels information will be processed separately and routed to the Left and Right Surround channel outputs.



- **Surround Speakers OFF:** If not using Surround speakers, set the 1<sup>st</sup> switch to **OFF**. Surround channels information will be mixed to the Main Left and Right channels and signal output to the Surround channels will be muted.



**NOTE:** Centre and Surround speakers at all times are considered 'SMALL' and low frequencies below 100Hz are filtered from the Centre and Surround channel outputs. Only the Main Left and Right speakers or the Subwoofer can receive low frequency information.

## **OPERATION**

## **Caspian DSP**

Please refer to the front panel view on page 4.

After connection to the Mains supply, switch the Caspian DSP on at the rear panel. It will enter STANDBY and the STANDBY LIGHT (7) glows red.

### **Front Panel and Remote Handset Controls**

### **Operation**

You can control operations of your Caspian DSP from either its front panel or the Remote Handset. The Remote Handset gives you complete access to all these operations, while only six functions are available on the front panel. Refer to front panel view on page 4 and the Remote Handset view on page 5.

- **Standby / On:** Switch On your Caspian DSP from either the Remote Handset (**16**) or the front panel (**1**) and the Main FL Display will light indicating Dolby Surround Sound for a few seconds and then revert to the last volume setting and selected input.

**IMPORTANT: WHEN FIRST SWITCHED ON CHECK THE DSP VOLUME SETTING.**

- **Input Selection:** Select your desired source from either the Remote Handset (**1, 2**) or the front panel (**2, 3**).
- **Down-mix:** This mode instructs the decoding circuitry to automatically route and 'down-mix' the Centre, Left and Right surround and Subwoofer channel information to the front Main Left & Right channels for stereo playback. Any source programme that is coded for 5.1 Channel or Pro Logic Surround Sound can be down-mixed to 2 Channel Stereo from either the Remote Handset (**12, 2CH**) or the front panel (**4, 2CH**).
- **Pro Logic:** You can decode any source material encoded in Dolby Surround (**L<sub>r</sub>, R<sub>r</sub>** matrix) into Dolby Pro Logic using this function. Simply push the (**5, PLG**) button on the front panel or the (**13, PLG**) on the Remote Handset.
- **5.1 Channel:** Source material encoded in 5.1 Channel Dolby Digital / DTS will set your Caspian DSP automatically to Dolby Digital / DTS processing. If the signal is down-mixed to 2-channel stereo, you can revert back to 5.1 Channel by simply selecting the (**6, 5.1**) button on the front panel or the (**14, 5.1**) on the Remote Handset.

#### Notes on Automatic and Manual Operation of the Caspian DSP Processing Modes:

1. When first switched on the DSP will revert to the last selected input/setting.
  2. You can only change processing modes when a source connected to your Caspian DSP is playing.
  3. You can only select the Pro Logic mode with a 2 channel PCM or Dolby Surround encoded source material.
  4. The 2 Channel mode is automatically selected whenever a stereo source is playing.
  5. You can select the 2 Channel mode and down-mix a 5.1Channel/ProLogic encoded source to stereo.
- **Master Volume:** To control the overall volume, use the Up and Down VOLUME arrow buttons (**3, 4**) on your Remote Handset.
  - **Mute:** Mute button (**15**) on the Remote Handset reduces the output of your Caspian DSP by approximately 30dB. (This feature is particularly useful when you wish to answer a call or simply have a brief conversation)

#### Additional Signal Processing Features

#### Setup

Your Caspian DSP also includes additional features that allow you to tailor your system to your specific requirements. These include features such as DAC Input Level Trim, Dynamic Range Compression, 5.1 Channel Level Trim and Centre/Surround channel Delay.

**DAC Input Level Trim:** Sources connected to Analogue Inputs 3 and 4 of your Caspian DSP can have different (fixed) output levels which may result in substantial changes in loudness or overload the input. This feature makes it possible to accommodate these level differences. Your Caspian DSP allows you to 'Trim/Set' the Input Level from 0 to -12 dB in 1dB increments. Simply select the desired source and then press (**9, DAC**) on your Remote Handset and adjust the level up or down using the (**7 & 8, - & +**) buttons of the Remote Handset. Repeat this procedure for the other Input you wish to adjust. **Note:** *if the overload light (8) glows red, you need to reduce the input level.*

**Dynamic Range Compression:** Dynamic range is defined as the difference between the quietest sounds to the loudest peaks of programme material. If you wish to listen to your system at low levels, simply reducing the volume would cause the quietest passages to become inaudible. The Dynamic range compression allows you to hear everything at low volume including the quietest passages. This feature is especially useful for late night listening or when you want to play material at moderate levels without missing any of the programme's content.

Simply select (**11**, HLC ) on your Remote Handset and each time selected the dynamic range would cycle through OFF, 25%, 50% and 100% compression.

**Channel Test Tone:** In a properly configured home theatre system, all speakers produce the same sound pressure level at the main listening position. This is set-up by using the Test Tone feature. Press (**5**, TEST TONE) on your Remote Handset and each time selected it will cycle through Left, Centre, Right, Right Surround, Subwoofer and Left Surround channels. Ideally an SPL meter should be used to determine the sound pressure level at the listening position and for every speaker the relative level can be adjusted by pressing (**7** or **8**, + / -) on the remote hand set. If an SPL meter is unavailable, simply listen to the loudness of the Test Tone and adjust accordingly. Main 5 channels can be adjusted in level by **+/- 10dB**, the Subwoofer channel by **-10dB**.

**NOTE:** Any channels set to OFF by the Bass Management Switch (**10**) on the rear panel will be omitted from the cycle.

**5.1 Channel Level Trim:** This feature, similar to the Test Tone, simply trims the level for each speaker (without a test tone applied) . Press (**6**, LEVEL TRIM) on your Remote Handset and each time selected it will cycle through Left, Centre, Right, Right Surround, Subwoofer and Left Surround channels. Main 5 channels can be trimmed in level by **+/- 12dB**, the Subwoofer channel by **-10dB**. **NOTE:** Any channels set to OFF by the Bass Management Switch (**10**) on the rear panel will be omitted from the cycle.

**IMPORTANT:** You should first apply Test Tone for relative loudness adjustment and then if the Maximum output level is not sufficient, increase each speaker signal output by the same amount (For example: +3dB for each speaker as you cycle through them).

**Centre / Surround Channel Delay:** It is important that sound from Centre and Surround channels arrive at the same **time** as the Front Left & Right channels to the listening position. Ideally the speakers are placed equidistant from your listening position. Generally however this may not be practical and it is compensated by electronic delay introduced to the Centre and Surround channel signals.

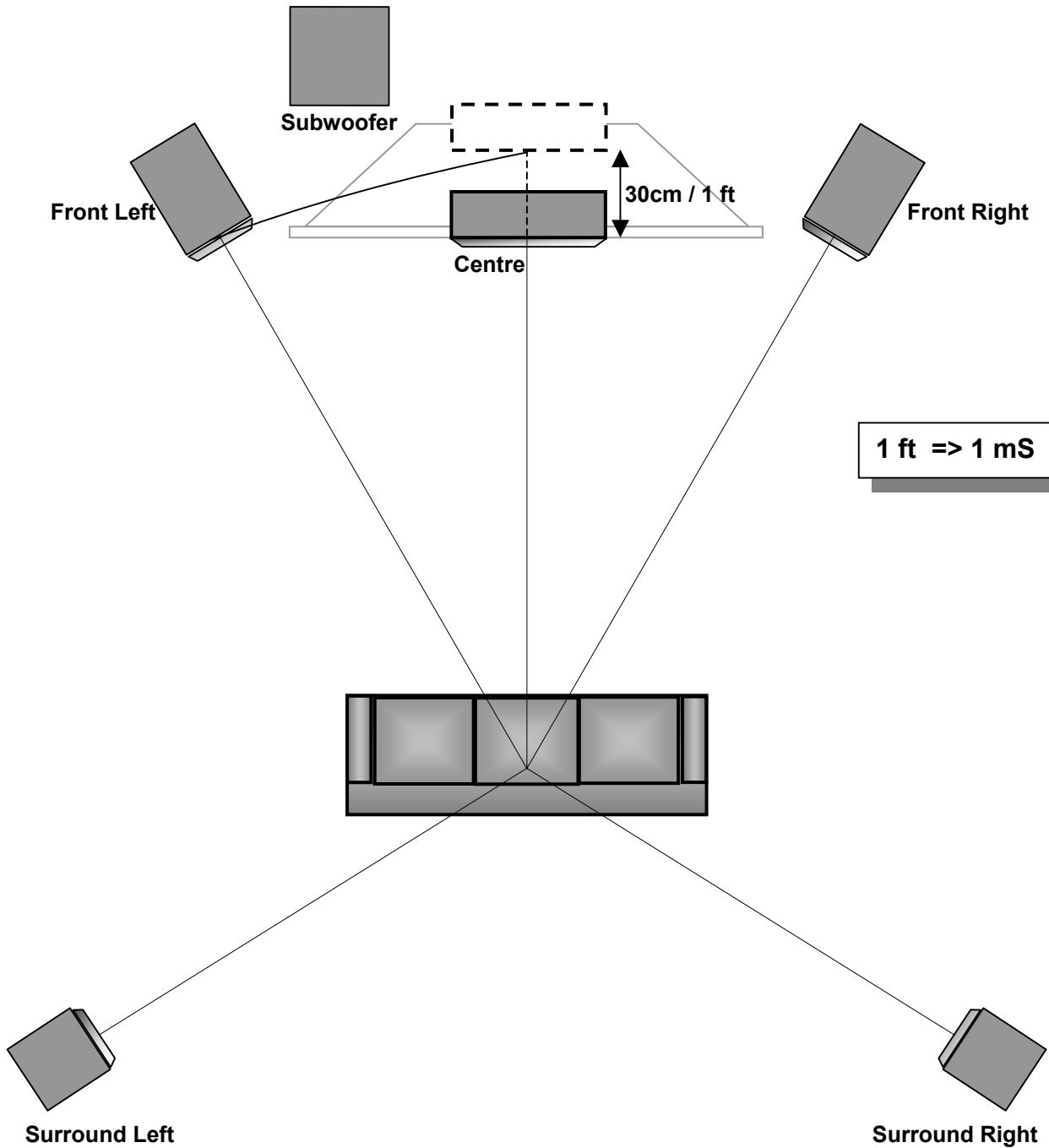
**Centre Channel Delay:** Use a tape measure or a string to determine the distance from each speaker to your favourite listening position. If the distance from the Centre speaker to your listening position is the same as the front Left and Right speakers, set the time delay to 0 mS. If the Centre speaker is in line with the front Left and Right speakers, time delay must be added to the Centre channel to **'move'** it back electronically and align the arrival time of sound from the Centre channel to coincide with that of the front Left and Right.

You should add 1 millisecond of time delay for every 30cm (1 ft) the Centre channel speaker is closer to you than the front Left and Right speakers. To adjust the Centre channel delay time, select (**10**, DELAY) on the Remote Handset, on first press the Display reads **Centre channel Time Delay.....mS** then adjust using the (**7 & 8**, - & +) buttons of the Remote Handset to set the desired time delay. Centre channel time delay can be adjusted from **0** to **5** milliseconds in **1** millisecond intervals. See Diagram below.

**Surround Channel Delay:** Dolby Digital delivers a discrete signal for each channel and there is no need to delay the surround channels to create a precedence effect to keep the soundstage focus in front of you. Sounds from the surround and front channels should arrive at approximately the same time. As a result, Dolby Digital material only requires a 0 to 15 milliseconds surround delay range compared to 15 to 30 milliseconds recommended for Dolby Pro Logic.

To adjust the delay time for the surround channels, select (**10**, DELAY) on the Remote Handset, on second press the Display reads **Surround channel Time Delay.....mS** then adjust using the (**7 & 8**, - & +) buttons of the Remote Handset to set the desired time delay. The amount of delay can be adjusted from **0** to **15** milliseconds in **5** millisecond increments (i.e. for every 3 ft. It may prove beneficial to set this delay one increment higher if the surround speakers are relatively close to the listening area).

For **Pro Logic**, surround delay can be adjusted from **15** to **30** milliseconds in **5** millisecond increments.



**CENTRE / SURROUND CHANNEL DELAY SETTING**

If you suspect that your ROKSAN Caspian DSP is not operating properly, first check all connections carefully. Below are some likely encountered problems with suggestions for possible cure. The list is not exhaustive: If you have any unresolved problems, please consult your appointed ROKSAN retailer or distributor.

| <b>SYMPTOM</b>  | <b>LIKELY CAUSE</b>   | <b>SUGGESTED REMEDY</b>   |
|---|---|---|
| No power  | AC Mains lead not inserted properly<br>Unit not switched on at rear panel   | Ensure AC Mains lead is fully inserted<br>Switch unit on at rear panel  |
| No output on one or all channels  | Master volume fully down<br>Missing or bad connection (bad lead)<br>Incorrect speaker settings  | Check volume level<br>Check all connections (interconnects)<br>Check setting on rear panel (10)                             |
| Can't select desired processing mode (for example DSP is in ProLogic instead of 5.1Channel) | Source material not compatible<br>Source equipment not set to desired mode<br>Disc menu not set to desired mode                               | Not Applicable<br>Check source menu and set mode accordingly<br>Check disc menu and set accordingly                         |
| Only stereo sound when you want surround sound  | Source material not encoded for surround sound<br>Downmix selected  | Not Applicable<br>Select <b>(PLG)</b> or <b>(5.1)</b> as appropriate  |
| Remote handset does not work  | Handset signal path obstructed<br>Battery weak or wrongly inserted<br>Handset transmission angle too wide<br>Room lighting/sunlight excessive | Remove obstruction, move handset<br>Replace battery, observe polarity<br>Operate handset in front of the DSP<br>Darken room |
| Unit powered but no response from either the front panel or the remote handset              | AC Mains voltage spike/surge  | Switch unit off at the rear panel and wait for a couple of minutes and switch it on again                                   |
| Hum from speakers   | Incorrect Grounding   | Check Mains polarity on all equipment<br>Check grounding of TV, Monitor etc.  |

There are no user-serviceable parts inside your Caspian DSP. If a fault should develop, refer any servicing to your appointed ROKSAN retailer, distributor or approved service agent.

Your ROKSAN Caspian DSP is guaranteed against any defect in materials and workmanship for a period of **two years** from the date of purchase.

This guarantee only becomes effective if the warranty card is validated by the ROKSAN authorised retailer from whom the equipment was purchased and returned to ROKSAN within **28 days** of purchase.

This guarantee excludes:

1. Damage caused due to accident, misuse, neglect and incorrect installation, adjustment or repair.
2. Liability for damage or loss during transit from the retailer or purchaser to ROKSAN or its authorised distributor for the purposes of repair or inspection.

Carriage costs to ROKSAN shall be borne by the consignor.

All claims under this guarantee must be made through an authorised ROKSAN retailer.

If equipment returned for repair to ROKSAN is found on inspection to comply with the product specification ROKSAN reserves the right to make a charge for examination and return carriage.

*Unvised servicing will void this guarantee.*

|                              |  |
|------------------------------|--|
| <b>No. of Inputs</b>         | 1 Analogue By-passed<br>(5.1 Channel)<br>1 Analogue By-passed<br>2 Analogue<br>1 AC-3/RF<br>2 Digital Coaxial<br>1 Digital Optical |
| <b>No. of Outputs</b>        | 1 Tape<br>1 Digital Coaxial<br>5.1 Channel (FL, FR, C, SL, SR and SUB)   |
| <b>Remote Handset</b>        | Yes  |
| <b>Frequency response</b>    | Front 5Hz-20kHz<br>Surround 100Hz-20kHz<br>Centre 100Hz-20kHz<br>Subwoofer LFE 5Hz-100Hz   |
| <b>Harmonic Distorsion</b>   | <0.002% (By-Passed), <0.005%   |
| <b>I M Distortion</b>        | (1kHz, 1Volt Output) <0.03%  |
| <b>Signal to Noise Ratio</b> | (A-Weighted) >97dB   |
| <b>Power Source</b>          | 100V – 120V 50Hz/60Hz<br>220V – 240V 50Hz/60Hz   |
| <b>Power Consumption</b>     | < 35W  |
| <b>Dimension</b>             | 432 x 430 x 70 (W x D x H) mm<br>432 x 430 x 80 (including feet)   |
| <b>Weigth</b>                | 10 Kg  |



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