Application Note AN005

P7xxx series 2+1 redundancy, utilising internal control facility and external T/R/TR2000 switching units

Any identical P7xxx series synthesised converters will operate in 2+1 redundancy, without the need for an additional controller. All that is required is a T2000, R2000 or TR2000 switch unit which comes complete with all necessary interface cabling.
UpConverters require the T2000L/H which comprises input IF splitting & coaxial switching & RF coaxial switches at the output.
DownConverters require the R2000L/H which comprises input RF coaxial switches & IF coaxial switching and combiner at the output.
Combined Up & DownConverters require the TR2000L unit.
These units are available in two versions, the T2000L/R2000L/TR2000L for L-band converters and the T2000H/R2000H for SHF converters. The following table summarises the switch unit type required for each converter;

Converter Type	2+1 Type				
	TR2000L	T2000L	T2000H	R2000L	R2000H
P7000	☺				
P7001				☺	
P7002		☺			
P7003					☺
P7006			☺		
P7007					☺
P7008			☺		
P70010, 11, 12, 25, 35					☺
P70013, 14			☺		
P7018			☺		

T/R/TR2000 units come complete with IF and RF interconnecting cables and the serial CANBUS® communication cable.
The R2000, T2000 or TR2000 units are connected to the converter rear panel 9-way ‘redundancy’ connectors with the supplied cables and the units self-detect.

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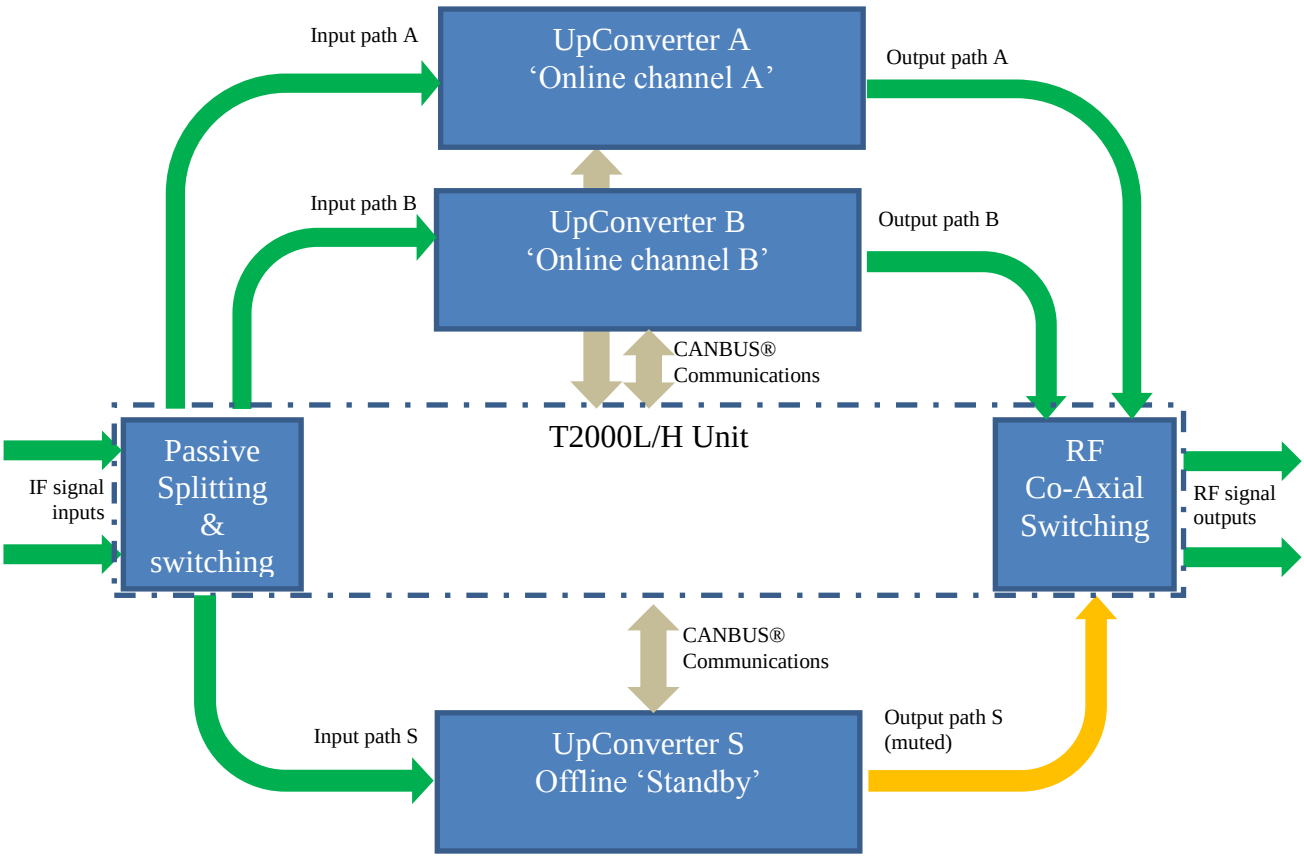
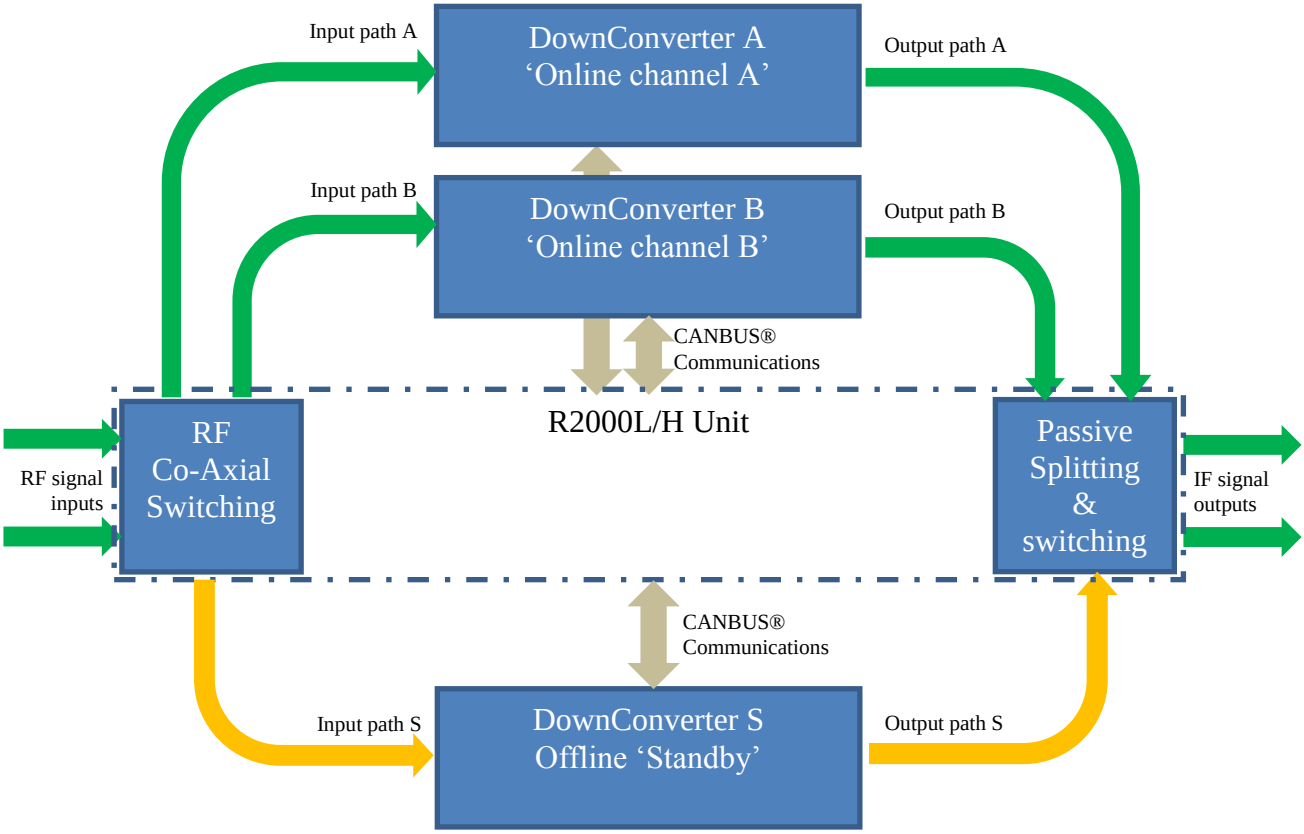


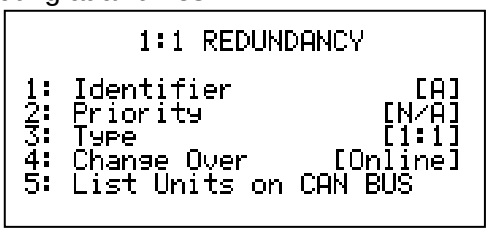
P7xxx series UpConverter in 2+1 redundancy using T2000L/H



P7xxx series DownConverter in 2+1 redundancy using T2000L/H

Operation

Within the P7xxx series menu structure there is a redundancy menu screen (see below), the redundancy type on the redundancy menu is set to [2:1], then each converter can be identified as either online path [A], online path [B] or standby path [S].
The coaxial switching within the T/R/TR2000 is controlled by all converters, which monitor each other and ensure correct signal routing at all times.



Automatic changeover

All converters monitor the alarm status of the other units and control the coaxial switch positioning. If an online converter develops an alarm condition, the standby converter will assume master control, configure itself to replicate the appropriate online unit and initiate switching, routing itself to the appropriate output.
Priority can be set to [N/A], path ‘A’ or path ‘B’, so that if there is a second failure the higher priority path will remain operational, if both units are set to priority [1] then this function will be ignored.
Changeovers are minimised, i.e. a unit taken off line due to an alarm, will remain off line even if it returns to a non-alarm state. The software provides the necessary delays of status to the control logic, to prevent unnecessary switching.

Manual changeover

The converters are able to ‘give away’ online operation to the standby unit, if instructed to do so from the front panel. A manual switchover will occur by pressing button 4 when in the redundancy screen. This will result in the configuration of the online unit being adopted by the standby unit and then the standby will be switched to the RF path, becoming an online unit.

Partial population – 2+1 system behaving as a 1+1 system

If the system is to be partially populated (only two converters available), the 2+1 system can be configured to behave like a 1+1 system by modifying the unit parameter ‘Force 1:2 to be 1:1’ (please refer to operation manual for details).
The two converters become online path [A] and standby path [S], whereas online path ‘B’ (which is not connected) is forced to a non-alarm state so that the control system does not attempt switch-over.

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