

GPS10RB Redundancy: Theory of operation

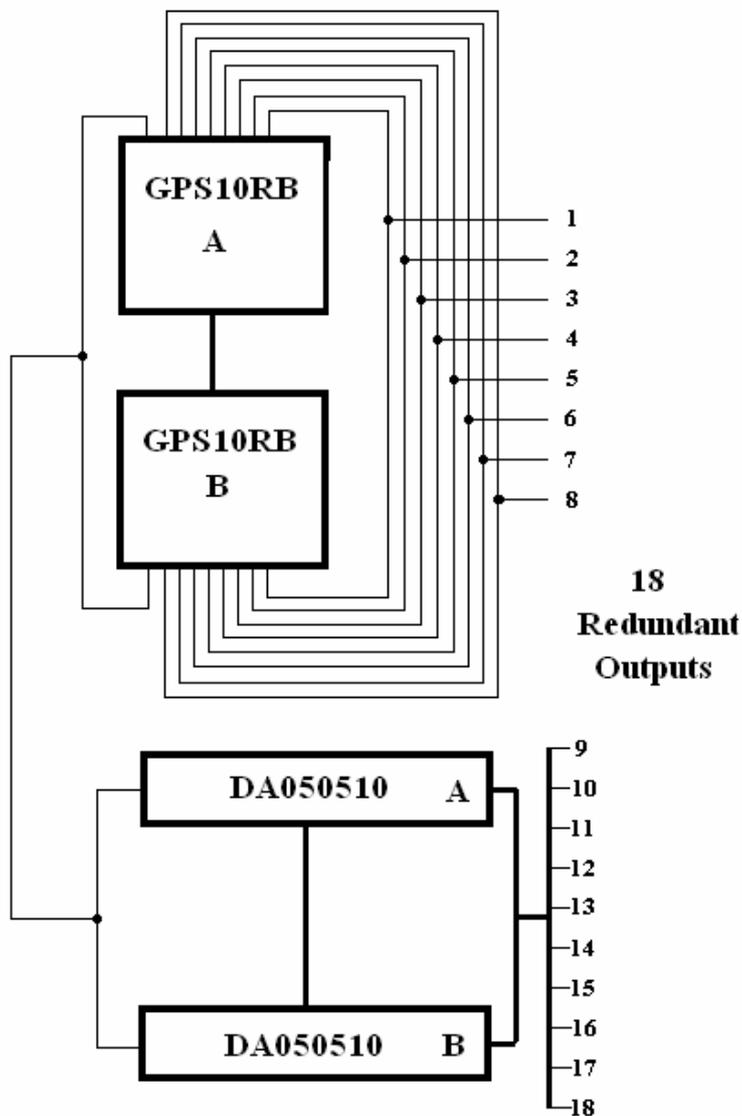
Introduction

This document shows how the GPS10RB frequency standard and DA050510 distribution amplifiers can be connected to give up to 20 redundant outputs. Detailed operation is discussed. However, the summary paragraph at the end of this document summarizes the entire operation.

The system described has 18 redundant 5 MHz outputs. However the number of outputs can be any number from 1 to 100 outputs and the frequency can be any frequency, e.g. 1 MHz, 10 MHz, 15 MHz etc.

Basic Equipment Set-Up

The basic set-up is shown on the next page.



Equipment:

- GPS10RB is a GPS disciplined rubidium frequency standard with 10 sinewave outputs. It must have option 24 that converts all outputs to 5 MHz.
- DA050510 is a 5 MHz distribution amplifier with ten sinewave outputs.
- Both GPS10RB **A** and **B** are identical units, there is no master or slave
- Both DA050510 **A** and **B** are identical units, there is no master or slave

Cabling

- GPS10RB **A** and **B** are interconnected with a data cable.
- Eight of GPS10RB-**A**'s outputs are connected in parallel to eight of GPS10RB-**B**'s outputs. These eight combined outputs form redundant outputs 1 to 8.
- DA050510 **A** and **B** are interconnected with a data cable.
- Ten of DA050510-**A**'s outputs are connected in parallel to ten of DA050510-**B**'s outputs. These ten combined outputs form redundant outputs 9 to 18.

Theory of Operation

Normal Power Up

- Assume GPS10RB-**A** is and DA050510-**A** are powered up first and are operating correctly. Their output amplifiers will be enabled and they will supply eighteen sinewave outputs.
- When GPS10RB-**B** is powered up, it will sense that GPS10RB-**A** is already powered up and working. So GPS10RB-**B** will disable its output amplifiers.
- When DA050510-**B** is powered up, it will sense that DA050510-**A** is already powered up and working. So DA050510-**B** will disable its output amplifiers.
- Thus with all units powered up, the eighteen outputs are supplied by GPS10RB-**A** and DA050510-**A**

Fault Condition 1

- Now assume GPS10RB-**A** develops a fault. This fault could be the loss of the GPS Antenna, or a failure of the GPS10RB-**A** power supply or a failure of the rubidium oscillator inside GPS10RB-**A**.
- GPS10RB-**B** will sense the failure in the **A** unit. The output amplifiers of GPS10RB-**A** will be disabled and the output amplifiers of GPS10RB-**B** will be enabled.
- So eighteen outputs are now supplied by GPS10RB-**B** and DA050510-**A**
- GPS10RB-**A** can be disconnected and sent for repair.

Fault Condition 2

- Now assume DA050510-**A** develops a fault. This fault could be the cable from GPS10RB-**B** accidentally disconnected or the loss of the DA050510-**A** power supply.

- DA050510-**B** will sense the failure in the **A** unit. The output amplifiers of DA050510-**A** will be disabled and the output amplifiers of DA050510-**B** will be enabled.
- So eighteen outputs are now supplied by GPS10RB-**B** and DA050510-**B**
- DA050510-**A** can be disconnected and sent for repair.

Fault Condition 3

- Now assume the GPS Antenna to GPS10RB-**B** is accidentally disconnected.
- GPS10RB-**B** will switch itself to Free Run mode and still give an accurate output.

Summary

- Whatever unit or units are powered up first become the enabled units and will supply the outputs.
- Whatever units are powered up second will be disabled.
- The system will always try and enable working units in any combination. E.g. A with A, A with B, B with A, B with B.
- A faulty unit can be disconnected and re-connected without affecting the main outputs.
- There are no master or slaves. This is useful as any unit can be interchanged with any other.
- Alarm outputs and front panel LEDS are available to show what units are enabled and what units have a fault.
- It is possible to manual select what units are enabled and disabled.