

UT200SpW4RTR SpaceWire Router AutoStart Requirement

Table 1: Cross Reference of Applicable Products

Product Name:	Manufacturer Part Number	SMD #	Device Type	Internal PIC*
4-PORT SPACEWIRE ROUTER	UT200SpW4RTR	NA Note 1	NA	WD41A

Note 1: WD41A will not be sold against the SMD. All SMD shipments will be with Rev B Silicon.

*PIC = Product Identification Code

1.0 Overview

The Aeroflex UT200SpW4RTR (5962-08244) 4-Port SpaceWire Revision A router does not fully comply with Section 8.6 of the ECSS-E-ST-50-12C SpaceWire Standard. Section 8.6 of ECSS-E-ST-50-12C describes the AutoStart function that all SpaceWire links, nodes, and routers should support. The AutoStart function is designed to cause the Initialization state machine within each router port to transition from the Ready to the Started state only after a NULL character is received.

If the link is not disabled the 4-Port router will enter the “Started” state that the receiver is enabled and the router is sending NULL (01110100) characters to establish link. If the router does not receive a NULL character back from the other side of the link the router will wait 12.8us before it enters the “ErrorReset” state as described in section 8.7 of ECSS-E-50-12A.

The unimplemented AutoStart feature would have allowed the link to wait in the Ready state until a NULL character was received. A handshake must take place to ensure each end of the link is able to send and receive characters. The handshake sequence is each end of the link sends NULLs and waits to receive a NULL, then sends FCTs and waits to receive an FCT. If this handshake does not take place link will not be established.

2.0 Work Around

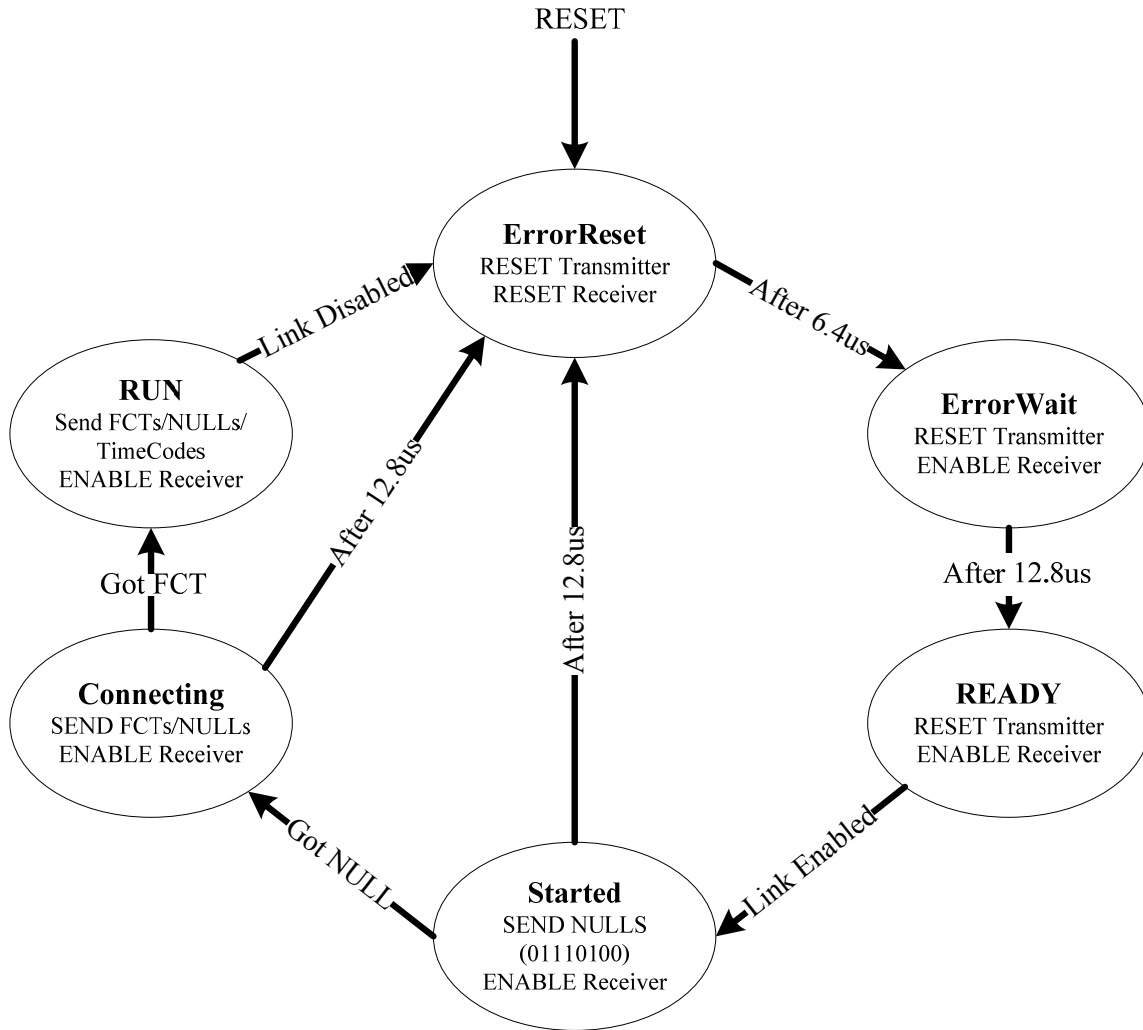


Figure 1. SpaceWire Link interface state diagram

The state diagram for initialization is shown in Figure 1. This flow handles the link initialization starting from reset and ending with the link operating normally and sending data in both directions. The UT200SpW4RTR will continue to loop from Reset → ErrorWait → Ready → Started → ErrorReset until the router receives a NULL from the other end of the link.

2.0 Corrective Action

This loop can be bypassed by disabling the links using the UT200SpW4RTR Link Disable Register. It is not necessary to bypass this loop, but if system requirements require, an example is provided below to show how to configure the router to bypass the loop.

The Link Disable Register allows all ports on the router to be enabled or disabled by writing into register 0x0107. Writing the appropriate bit in the Link Disable Register will disable that port and allow time for the other end of the link to initialize. Refer to Figure 2 for the register bit assignments.

Address	Bit Number	Description and Comments	
		High	Low
0x0107	0	Disable Port 1	Enable Port 1
	1	Disable Port 2	Enable Port 2
	2	Disable Port 3	Enable Port 3
	3	Disable Port 4	Enable Port 4

Figure 2. Link Disable Register bit assignments

In order to disable all the four SpW ports each of the 4-bits in the 0x0107 register need to be disabled. This can be done by writing ones into the register. The configuration write protocol can be used to configure the Disable Link Register from port 5 (System Port), as follows.

Write the following byte sequence directly into port 5 of the router;

- No Address Bytes required
- 0x00: for configuration
- Router ID: 00 as default assuming router ID has not been set
- Protocol ID: 00 for no protocol used
- Packet Type: 00 is Write
- Set up Configuration Space:
 - Address LSB: 07 for Link Disable Register
 - Address MSB: 01
- Write in Data:
 - Data LSB: 0F to set up all 4-bits of the 0x0107 register to disable all four SpaceWire ports on the router
 - Data MSB: 00
- Checksum: 0x17. This is the sum of the final destination address, router ID, packet type, address, and data bytes. $0x00+0x00+0x00+0x07+0x01+0x0f+0x00 = 0x17$

- EOP: 100000000

The SpaceWire packet takes the form shown in Figure 3. Figure 4 shows the same SpaceWire packet in data character format.

01	00	0A	00	00	07	01	0F	00	17	100000000
0 or More Address Bytes	0x00	Router ID	Protocol ID	Packet Type	Address LSB	Address MSB	Data LSB	Data MSB	Check Sum	EOP

Figure 3. Packet format

EOP	1	0	0	0	0	0	0	0	0	
Check Sum	0	0	0	0	1	0	0	0	1	0x17
Data MSB	0	0	0	0	0	0	0	0	0	0x00
Data LSB	0	0	0	0	0	1	1	1	1	0x0F
Address MSB	0	0	0	0	0	0	0	0	1	0x01
Address LSB	0	0	0	0	0	0	1	1	1	0x07
Packet Type	0	0	0	0	0	0	0	0	0	0x00
Protocol ID	0	0	0	0	0	0	0	0	0	0x00
Router ID	0	0	0	0	0	0	0	0	0	0x00
0x00	0	0	0	0	0	0	0	0	0	0x00
	8									0

Figure 4. Data character format