# Tech Note: NJ/NX Series CPUs Shutdown Methodology In the Event of a Power Loss

NX701
NJ501
NJ301
NJ101
S8BA
S8VK





P237I-E-01

## NJ/NX CPU Shutdown Methodology

In many control systems, the need for a method of properly shutting down the controller on a power loss is needed in order to manage various 'engines' of the NJ/NX CPU's.

This paper will demonstrate the proper way to manage a power loss to the NJ501-1340 SECS/GEM controller. Similar routines can be used for SQL & Robotics CPU's.

Per the NJ501-1340 CPU User's Manual W528:

*"If you turn OFF the power supply to the CPU Unit while the GEM Services are in operation, the GEM Setting data, GEM Service logs, or spool data may be corrupted. To prevent corruption, you must <u>Always</u> end the GEM Services before you turn OFF the power supply to the CPU Unit."* 

Since there is no power-down subroutine or service flags available in an NJ/NX controller, an affordable and viable solution is to use the S8BA Uninterruptable power supply.

Figure 1 below illustrates a complete system configuration for accomplishing a managed shutdown process.



Figure 1 – Complete system configuration

The S8BA UPS includes discrete I/O (blue cable above) which can be connected to the NJ I/O. In Figure 4, detailed connections are shown to an EtherCAT NX coupler Input and output modules. CJ modules mounted directly to the CPU would function just as well (NPN Input and Contact Output are preferred).

Since the current S8BA product line is DC to DC battery backup (AC to DC in the future), a standard S8VK Power supply and NJ-PD3001 will also be required as shown in Figure 2.



Figure 2 – Wiring of S8VK to S8BA

Wire the output of the S8VK to the input of the S8BA, then, Output of S8BA to the NJ PD3001. Daisy-chain the DC power to the NX Coupler A shown below.



Figure 3 – CPU Power and I/O wiring overview



Figure 4 –detailed view of NX I/O wiring (Blue, Orange/White, Green)

Cable pin configuration							
		[UPS side]	[Cable side]				
	I/O	CONTACT port	S8BW-C02				
	0	Signal name	Pin number	Pin number	Cable color		
	Т	Backup signal output (BU)	1	1	White 🖊 Orange		
	0	Remote ON/OFF input (-)	2	2	Orange		
	-	Trouble signal output (TR)	3	3	White / Green		
	0	COMMON (COM)	4	4	Blue		
	Т	Battery LOW signal output (BL)	5	5	White / Blue		
	0	Backup stop signal input (BS)	6	6	Green		
	Т	Battery Replacement Signal output (WB)	7	7	White / Brown		
		Remote ON/OFF input (+)	8	8	Brown		

Figure 5 – Pin-Out diagram of <u>S8BW-C02</u> contact I/O cable of S8BA



Create a project in Sysmac Studio, go on-line with the NJ system. Under EtherCAT, right-click on the CPU and choose Merge and Compare. This should show the NX node configuration. Click apply settings.



Open the I/O Map and type in the variable as shown below

▼ NX-ID5342						
Input Bit 16 bits	Input bit (16 bits)	R	WORD			
Input Bit 00	Input Bit 00	R	BOOL	S8BA_BU	On Battery power signal from S8BA	Global Variables
Input Bit 01	Input Bit 01	R	BOOL		-	
Input Bit 02	Input Bit 02	R	BOOL			
Input Bit 03	Input Bit 03	R	BOOL			
Input Bit 04	Input Bit 04	R	BOOL			
Input Bit 05	Input Bit 05	R	BOOL			
Input Bit 06	Input Bit 06	R	BOOL			
Input Bit 07	Input Bit 07	R	BOOL			
Input Bit 08	Input Bit 08	R	BOOL			
Input Bit 09	Input Bit 09	R	BOOL			
Input Bit 10	Input Bit 10	R	BOOL			
Input Bit 11	Input Bit 11	R	BOOL			
Input Bit 12	Input Bit 12	R	BOOL			
Input Bit 13	Input Bit 13	R	BOOL			
Input Bit 14	Input Bit 14	R	BOOL			
Input Bit 15	Input Bit 15	R	BOOL			
▼ NX-OC2633						
Output Bit 00	Output Bit 00	w	BOOL	S8BA_BS	NJ signal to S8BA to stop	Global Variables
Output Bit 01	Output Bit 01	w	BOOL		•	

Figure 6 – Sysmac Studio I/O Map



Create the program below.

Shutdown_Instance					
S8BA_BU _GEM_ServiceStatus.EQRun	GEM_Shutdown				
	Execute Done				
On Battery power signal	Busy — Enter Variable				
Irom SobA	Error — Enter Variable				
	ErrorID — Enter Variable				
_GEM_ServiceStatus.Shutdown	S8BA_BS				
	NJ signal to S8BA to stop				

Figure 7 – Sysmac Studio program

When power is lost to the S8BA, it will go to battery mode and turn ON its BU signal.

If the GEM Service is running, this will in turn execute the GEM Service Shutdown command to properly stop the service.

When the service shutdown command is executed and the service is actually stopped, it turns ON the internal status bit \_GEM\_ServiceStatus.Shutdown flag.

This will turn ON the NJ output which instructs the S8BA to shutdown and turn off the battery which powers down the entire system properly.

S8BA_BU _DBC_Status.Rur	1	CloseSQL_Inst DB_Close Execute	ance Done	
'On Battery Power' signal from S8BA	MyDBconnection—	DBConnection	Busy Error	– Enter Variable – Enter Variable
			ErrorID	Enter Variable
_DBC_Status.Shutdown				S8BA_BS
				NJ signalto S8BA to stop

SQL CPU's have similar system variables and procedures:

Figure 8 – SQL CPU program to properly shutdown



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