# UPS Monitor Kit for iSeries
# Installation and Customization

## Part 1: Overview

This product provides a starting point for a systems programmer to create a program to monitor Uninterruptible Power Supply (UPS) messages generated by the iSeries operating system.

The final program will manage a clean power down of the iSeries server in the event of a utility power failure.

Required to use UPS400:

A Windows PC running Win98 SE or higher, with network connection to the iSeries . (software load only)
OS/400 V4R0 or greater
CL or CLLE compiler

## Part 2:  Installation

Make sure that the iSeries user profile that you use has the authority to create libraries, and restore objects on your system.  The profile must also have iSeries Access authority. (QSECOFR would be best here)

On an iSeries command line, key in CRTSAVF UPSLIB.
Then key CRTLIB UPSLIB.

After Un-zipping  the UPS400.zip file that you downloaded from the website, copy the UPSLIB file to c:\

On the PC, click Start, Programs , Accessories, Command Prompt.

In the command prompt window, key “cd c:\” and press ENTER

Key “ftp 0.0.0.0” , substituting the TCP/IP address of your iSeries for the zeros, Press ENTER.

When FTP prompts for your userid, enter the iSeries user profile selected previously. When prompted, key in the password for the userid.

When the ftp> prompt appears, key in “binary”, and press ENTER.

Key in “put upslib” and push ENTER

When “file transfer completed successfully” appears, key “Quit” and press ENTER.

Key “exit” and press ENTER.

On an iSeries command line, key in:

RSTOBJ OBJ(*ALL) SAVLIB(UPSLIB) DEV(*SAVF) SAVF(UPSLIB) MBROPT(*ALL) ALWOBJDIF(*ALL)

Press ENTER.

Key CRTJOBD JOBD(UPSLIB/UPSJOBD) JOBQ(QSYS/QCTL) TEXT('UPS Monitor Job Description')

This completes the installation of the UPS400 Monitor Kit

## Part 3:  Creating the UPS CL Programs

Inside the newly created library UPSLIB is a source data file named QCLSRC.

The UPS Monitor program is named UPS.

If you wish to use the UPS program as is, just key a 14 next to the UPS program, and press F4.  Verify the the Program Library is UPSLIB, then press ENTER.

The source member UPSSUBMIT contains the CL command to submit the UPS job to the QCTL jobq.  This code may be copied into your system's QSTRUP command, or may be compiled using option 14, and used as a stand alone startup program called from a menu.

The source member UPSCANCEL contains the CL program to do a controlled shutdown of the UPS program.  This program must be compiled before use, using option 14.

## Part 4:  Customizing the UPS CL Program

This code is set up with areas that are mainly meant for code that is specific to your installation.

The areas at source lines 185 and 277 are meant to be jobq release  commands.  This code executes when utility power is restored before a shutdown has begun, or when the system resumes normal operations after an IPL.

The code at source line 246 is meant to be a jobq hold command.  This code executes when a utility power failure occurs, but before an actual shutdown has begun.

## Part 5: The logic of the UPS CL Program

When the UPS program starts, it sends the message 'UPS Monitor Program – Startup' to the QSYSOPR message queue.

Create a data area named UPSJOB in the UPSLIB that contains the job name, userid, and job number of the UPS program. This data is used in the UPSCANCEL CL program.

Delete the UPSMSGQ in UPSLIB.

Create the UPSMSGQ message queue in UPSLIB, and allocates it.

Change the QUPSMSGQ system value to UPSLIB/UPSMSGQ, and the QUPSDLYTIM system value to *NOMAX. This signals the system that a user created UPS monitor program is operating.

Check for the file RELEASE_ME in UPSLIB.

If this file is present, do the following;

Delete the RELEASE_ME file
Send 'JOBQ's held due to previous power failure, release queues' to QSYSOPR
Execute any custom code relating to release of queues, or restart of special processes.

Send 'UPS Monitor Program – Active' to QSYSOPR.

Check for messages on the UPSMSGQ, with a 10 minute time out.

It should be noted here that the system sends power event system messages to the message queue designated the the QUPSMSGQ system value. If there are no messages for 10 minutes, the receive message command exits with no message.

If the received message is not CPF1816 (Utility Power Failed) then check for a controlled cancel of the program. If a controlled cancel is requested, then do the following;

Send 'UPS Monitor Program – Controlled cancel detected.' to QSYSOPR.
Go to the normal exit code.

Go back and check for messages again.

If the received message is CPF1816, then read the message queue again for 60 seconds.

If the new message received is CPF1817 (Utility Power restored), return to the first message queue read.

Send a break message to all workstations - “Utility power failure has occurred. Please END your transactions and SIGN OFF the system, If power is not restored in 10 minutes, the system will begin shutdown.”

Send 'UPS Monitor Program – Power Failure detected ... 10 minute delay in progress' to QSYSOPR.

Any custom code for jobq or outq holds is executed now.

Place the value 600 in the variable &WAIT. (10 minutes)

Calculate the number of seconds since midnight, and place this value in the variable &START.

Read the message queue for &WAIT seconds.

If the message received is CPF1817 then do the following;
- Run the custom code to release any jobq's or outq's that were held.
- Send 'UPS Monitor Program – Utility Power restored ... Shutdown canceled.' to QSYSOPR
- Send a break message to all workstations - “Utility Power restored. System Shutdown is Canceled.”
- Return to the first message queue read.

If the message is not CPF1817 then do the following;
- Calculate the current time in seconds since midnight. Adjust the value for the possibility that we have just passed midnight. Store the result in &END.
- Fill the variable &RESULT with &END minus &START
- If &RESULT id greater than or equal to &WAIT, then do the following;
  - Send a break message to all workstations - “The system is now powering off. Please SIGN OFF NOW.”
  - Send 'The system is now powering down. Delay=5 minutes.' to QSYSOPR
  - Execute PWRDWNSYS command *CNTRLD with a 5 minute delay.
  - Create the file RELEASE_ME in UPSLIB.
  - Adjust the delay for the QUPSDLYTIM to 30 minutes
  - Goto the normal exit code.
- If &RESULT is less than &WAIT then subtract &RESULT from &WAIT, and read again.

Normal exit.

Deallocate the UPSMSGQ.

Change the QUPSMSGQ system value to QSYSOPR
Change the QUSPDLYTIM system value to 10 or 30 minutes, based on &UPSDELAY
Clear the UPSJOB data area in UPSLIB.
Send 'UPS Monitor Program – Normal Exit.' to QSYSOPR.

**A discussion on UPS capacity.**

Please notice that this program allows the computer to run for a total of 16 minutes before powering down. This breaks down as follows:

1 minute at initial power failure
10 minutes after sending warnings to users
5 minutes for PWRDWNSYS

If your UPS cannot run your system for that long, the the 10 minute wait can easily be adjusted. The 5 minute wait for PWRDWNSYS is necessary to allow the remaining processes to finish before power down.

**CAUTION!**

When the system is running on battery, if the UPS signals “battery low”, the system will power down immediately, regardless of the presence of a functioning UPS monitor program. The best thing to do is to run a full test of the UPS Monitor program. During an idle period, walk over to the circuit breaker for your computer, and turn it off! (be careful to turn off the utility side of the UPS, not the load side, where your system is plugged in!)

Let the monitor manage the power down, while watching the capacity indicator on the UPS. This test will also help to identify any hardware that may not be connected to emergency power, that perhaps should be. ( my personal favorite are switches and hubs. They are real easy to overlook, and they need power just like everything else.)

For problem reports and assistance, email support@atticdesignlab.com

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