

ARIX
Corporation

*Uninterruptible Power Supply
Application Guidelines
for the ARIX
System90*

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When the utility line voltage returns to a usable level, a line voltage monitor in the UPS starts the battery charger and recharges the batteries. Many UPS systems let you install extra batteries to extend the system running time beyond the ten-minute minimum.

The duration of backup battery power depends on the rating of the UPS, the number of batteries installed, the magnitude of the load, and whether the batteries are fully charged.

To increase the reliability of your computer system, the UPS should also protect the system from surges and noise by filtering and providing surge suppression for both common mode and transverse mode. This feature is not required, but is highly recommended.

UPS models with dynamic power conditioning usually switch to the inverter at variances of +20% or -20% from nominal. Such models also provide the additional protection of an output isolation transformer that eliminates direct electrical connection between the load and the ac input line and greatly improves common-mode noise attenuation.

CAUTION:

Read this entire manual before beginning a UPS installation based upon these application guidelines.

UPS Environmental and Electrical Guidelines 2

Use the following information to ensure that a UPS used with the ARIX System90 family meets the recommended guidelines.

Unless otherwise noted, the following guidelines apply equally to the all models of the ARIX System90.

CAUTION

The ARIX System90 Model 25 may be configured to operate at a nominal line voltage of either 110 VAC or a 220 VAC. The local utility line power determines the required input and output frequencies. Always check that the UPS and the Model 25 are configured properly for the applicable ac output.

Following is a table which allows you to calculate the approximate power required from a UPS to support a System90 configuration. Multiply the quantity of each item by the Power/Unit to get Total Power. Add the Total Power numbers together to get the minimum required KVA rating of the UPS.

Table 2-1 UPS Sizing

Feature	Quantity	Power/Unit (KVA)	Total Power
Model 25 - 8 slot		1.75	
Model 40 or 45 - 16 slot		2.83	
Model 80 or 85 - 2x 16 slot		5.66	
Each Additional I/O Cabinet		2.83	
9 Track Tape Drive		0.3	
SCSI Disk Array		0.4	
8" Disk Drive Tray		0.5	
Total			_____ KVA

The actual time that the UPS can support the system on batteries is dependent upon the load on the UPS and the capacity of the batteries. With the UPS properly sized for the load (correct KVA rating), the support time can be extended with the addition of more batteries to the UPS.

The actual time required to complete an orderly system shutdown will vary with the system configuration and workload. ARIX recommends that you test your configuration, and verify that sufficient battery power is available to complete a system shutdown.

The guidelines noted here for the UPS are, in many instances, identical to the specifications for the ARIX computer system. Therefore, if your ARIX computer is being operated outside of its specifications, the UPS will likely also be operating outside of these guidelines. This variance from the specification should be taken into account when purchasing, installing, and operating the UPS.

In addition to the power or KVA rating of the UPS there are several other important requirements. The UPS unit should carry UL approval or whatever safety/regulatory approvals are required where the unit is to be installed.

Table 2-2 details the environmental requirements for the UPS to be compatible with the System90 environmental limitations. These items are meant as *guidelines only* and may change slightly according to the individual installation.

Table 2-3 details battery and backup characteristics.

Table 2-4 details electrical specifications.

Table 2-2 Environmental Guidelines for the UPS

Ambient Temperature	10°C to 40°C (Operating)
Relative Humidity	95% maximum (non-condensing)
Elevation	1500 meters (at 40°C ambient, full load without derating)
Audible Noise	55 dBA (at 1 meter)

Table 2-3 Battery and Backup Characteristics for the UPS

Battery	
Type	Sealed, Maintenance free
Life Expectancy	200 full discharge cycles at full load
Recharge Time	12 Hours maximum
Additional Running Time	Add extra battery packs
Backup	
Transfer Time	2 msec. maximum after AC Input Line failure
Minimum Backup Time	10 minutes after low battery alarm (Verify with your configuration).

Table 2-4 Electrical Specifications for the UPS

AC Input	
Voltage Range *	±20% of nominal line
Frequency	50 or 60 Hz as required, single phase
AC Output	
Power	Minimum required from Table 2-1 for your configuration
Voltage *	
In Backup Mode	±5% of nominal
In Standby Mode	±10% (with power conditioning)
Frequency	
In Backup Mode	Single phase 50 or 60 Hz, ±1 Hz
In Standby Mode	Single phase 50 or 60 Hz, Sync to 0.1% of line frequency
Frequency Slew Rate	±1 Hz/second
Harmonic Distortion (voltage)	5% total maximum for power factors
Power Factor	.9 lagging to .9 leading without derating
Load Crest Ratio (current)	3:1 minimum without derating (must handle 4:1 after derating)
Output Overload	125% for 1 minute 200% for 10 cycles
Load Transient Response	±8% for 100% step load change, recover to ±2% within 100 msec.
Transfer time to Inverter Power after power failure	Less than 2 milliseconds
Power Conditioning Noise Attenuation (recommended)	
Common Mode	45 dB at 100 KHz
Transverse Mode	45 dB at 100 KHz

* Nominal voltages: Model 25 110 or 220 VAC
(factory configured)

Model 40 or 45 220 VAC ONLY
Model 80 or 85 220 VAC ONLY

A UPS Interface 3

All models in the System90 family support the same alarm interface to a UPS. The rear panel of each system has a male DB-9 type connector labeled "UPS". This is the UPS interface connector. The interface is designed to accommodate signals commonly available from UPS products. Two alarm signals are supplied by the UPS. They are: AC FAIL and LOW BATTERY.

AC FAIL indicates that the utility power has failed and the system is running on battery power from the UPS. This signal should appear immediately when utility line power fails.

LOW BATTERY indicates that the UPS battery power reserves are low and that the system must complete its shutdown procedures. The LOW BATTERY signal must become active when the UPS has approximately 10 minutes of power remaining. The exact length of time required to shutdown a system is dependent on its size and configuration. Less than 10 minutes warning may be acceptable depending on your system. In order for the system to recognize the LOW BATTERY signal as valid the AC FAIL signal must also be true.

The System90 supplies a UPS OFF signal for those UPS units that can accept a turn off command to save battery power. When the system has completed its shutdown and powers down, it sends the UPS OFF signal to deactivate the UPS. Use of this signal is completely optional; some UPS units do not support it.

Due to the major effect an alarm from the UPS causes, the cable carrying the alarm signal to the processor cabinet *must* be shielded. This will prevent spurious electrical noise from inducing a false alarm.

Table 3-1 details the pin-out of the System90 UPS interface connector.

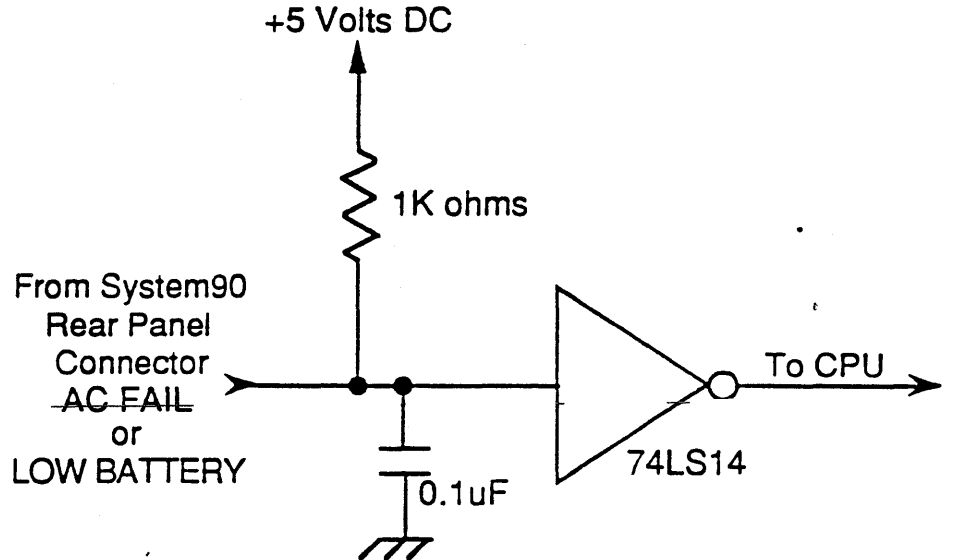
Table 3-1 UPS Interface Connector

Pin Number	Signal Name
1	AC FAIL - active low
2	NC
3	UPS OFF - active low
4	NC
5	LOW BATTERY - active low
6	NC
7	SIGNAL GROUND
8	NC
9	NC

NC = No Connection

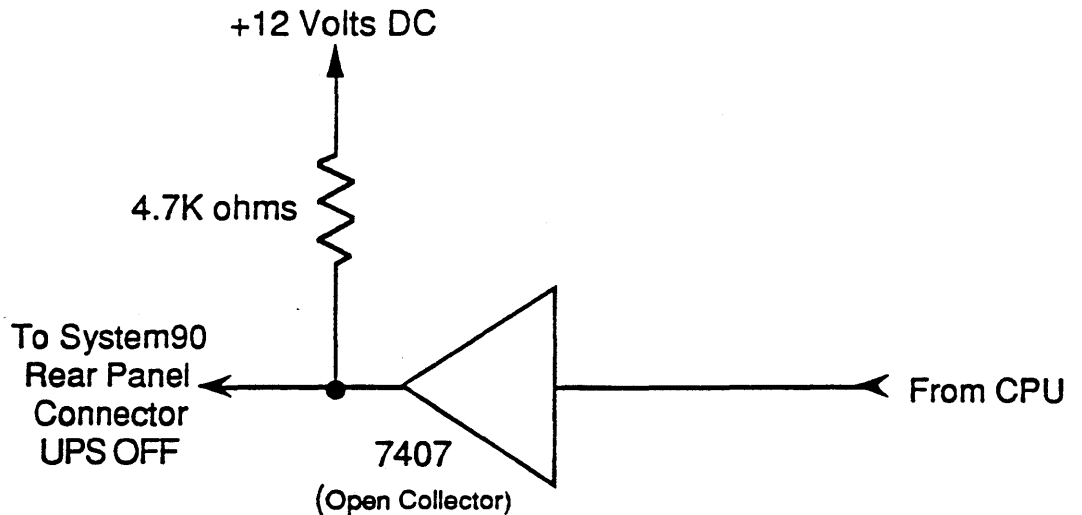
The two alarm signals from the UPS are connected to the input of a 74LS14 inverter on the System90. Each signal line has a 1 K ohm pullup resistor and a 0.1 uF filter capacitor to ground. All signals are active low (they are true when less than 0.8 VDC). Figure 3-1 illustrates the System90 electrical interface.

Figure 3-1 UPS to System90 Electrical Interface



The UPS OFF signal is driven by a 7407 open collector buffer with a 4.7 K ohm pullup resistor to +12 VDC. This interface is shown in Figure 3-2.

Figure 3-2 System90 UPS OFF Signal Interface



Usually the system's AC FAIL* (low true) alarm is driven by the UPS's AC FAIL signal, and the system's LOW BATTERY* (low true) alarm is driven by the UPS LOW BATTERY signal (see Figure 3-3). Another possibility is that both system

alarms (AC FAIL* and LOW BATTERY*) are driven by the UPS's LOW BATTERY signal (Figure 3-4).

Whichever interface connection you have, AC FAIL* must be true when the system's LOW BATTERY* alarm is true.

The LOW BATTERY alarm signal must occur at least ten minutes before the UPS system batteries drain to the point that the UPS shuts itself down. This ensures that the processor has sufficient time to write buffers out to the disk(s) and perform any other pre-defined power fail shutdown tasks. After the processor has completed its shutdown tasks it will turn its own power off.

Figure 3-3 illustrates a possible UPS cable connection with an ARIX System90. The UPS's LOW BATTERY and AC FAIL signals are shown separately driving the two system alarms using relays (opto-isolator transistors could be used as well).

Figure 3-3 UPS Alarms Driving System90 Alarms separately

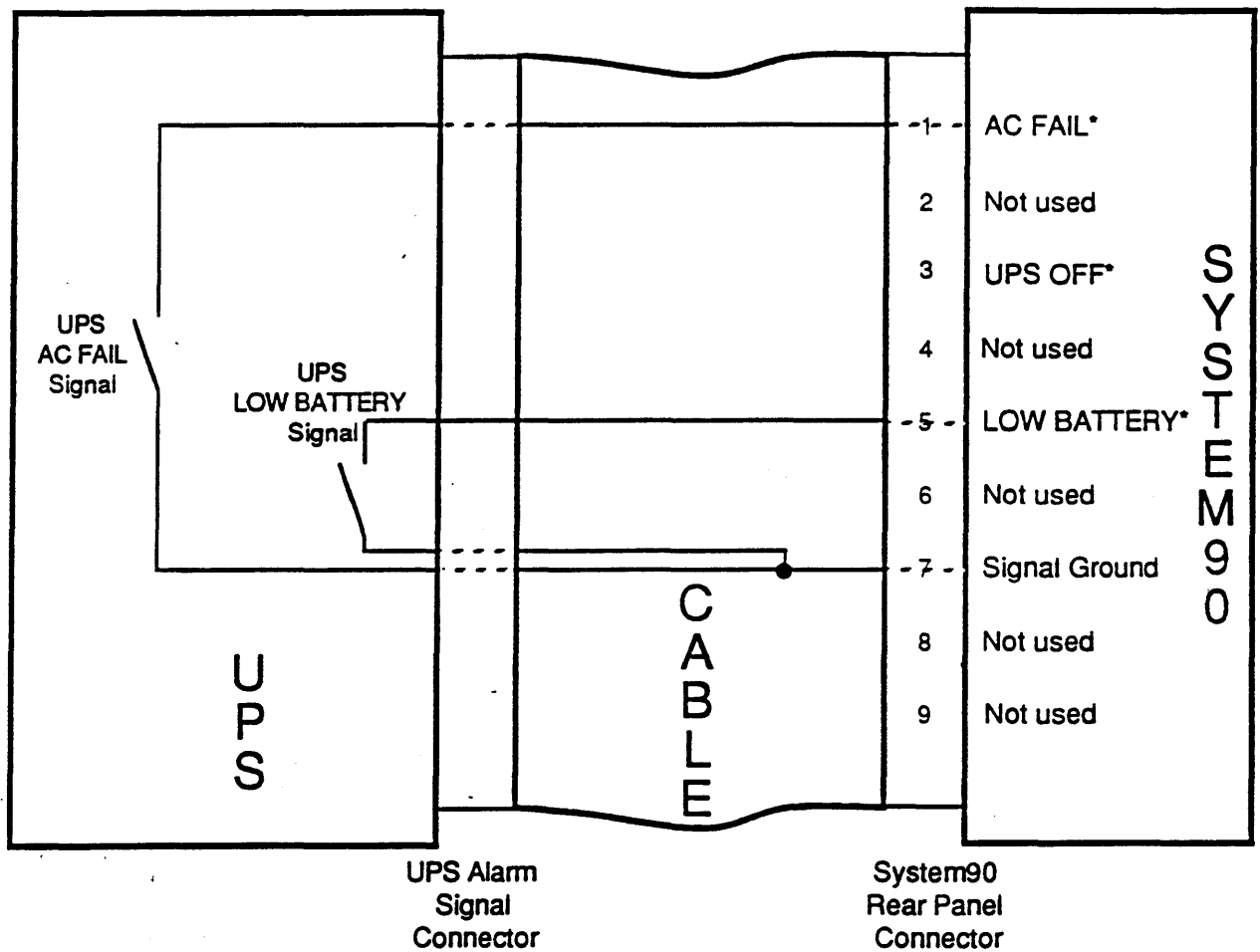
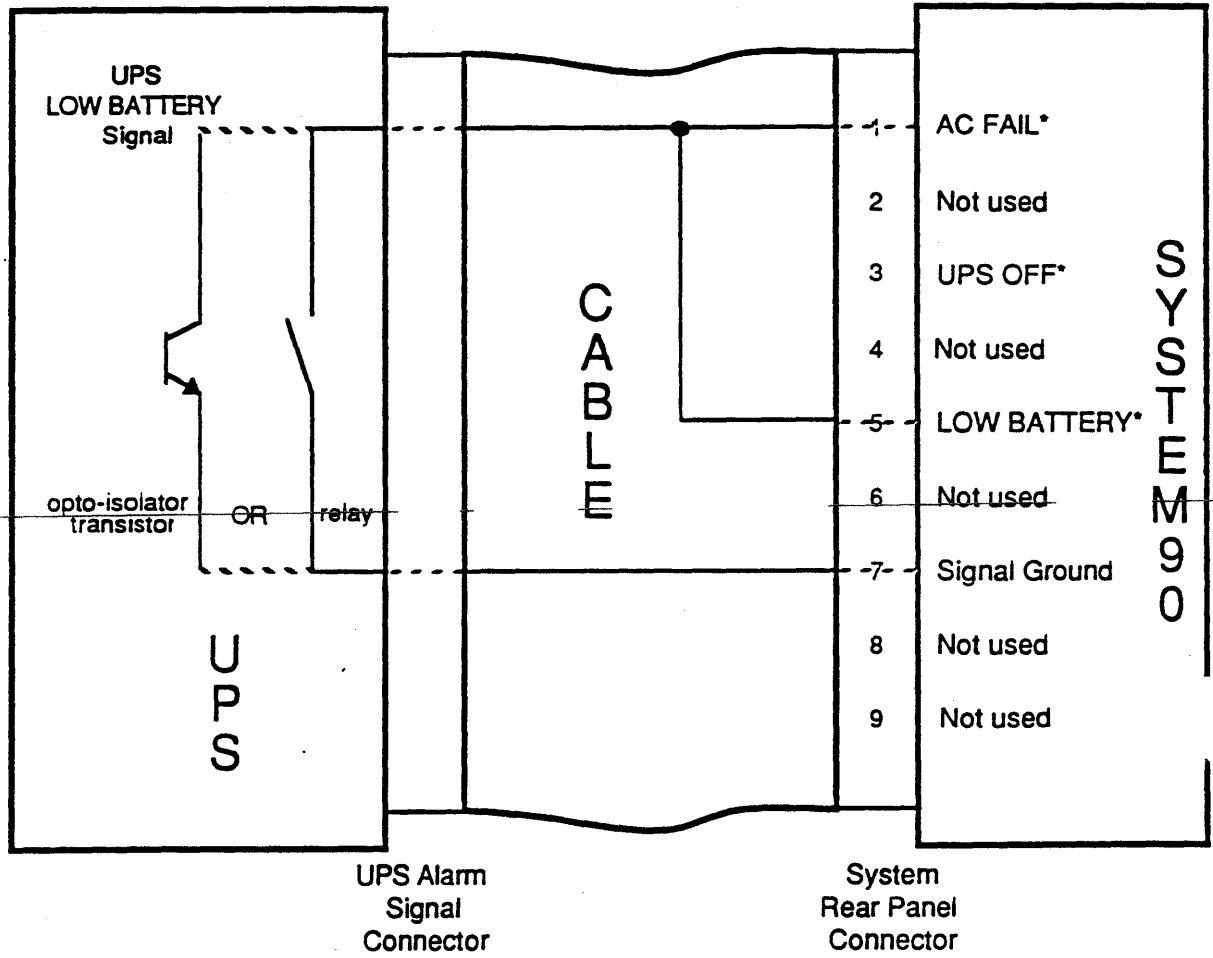


Figure 3-4 illustrates a second possible UPS cable connection with an ARIX System90. The UPS's LOW BATTERY signal is shown driving both system alarms using *either* an opto-isolator transistor or a relay.

Figure 3-4 UPS LOW BATTERY Alarm Driving both System Alarms



UPS Installation Comments

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A UPS installation typically requires certain clearance minimums for proper accessibility and ventilation. Also, install the UPS away from excessive dust and chemical fumes. Check the UPS manufacturer's manuals for warranty or other particulars regarding normal operation and proper application of uninterruptible power supplies.

Common safety requirements include the following:

- An AC input line circuit breaker
- A DC battery circuit breaker or fuse
- An AC output line circuit breaker

A UPS installation should meet any local safety requirements.

Before installing a UPS, inspect it for possible defects. Follow the manufacturer's recommendations for reporting any suspected damage or defect.

Notes, Cautions and Warnings

This section contains notes, cautions, and warnings that apply to all UPS installations. Always follow the manufacturer's recommended safety precautions for any electrical equipment.

Whenever installing electrical equipment such as an ARIX computer system or an uninterruptible power supply (UPS), be sure that the UPS voltage and power rating match the available line voltage and load requirements. Also be sure that the UPS output voltage matches the computer system requirements.

CAUTION

Turn OFF the AC input circuit breaker and all battery circuit breakers and unplug the AC input cord of the UPS before changing or making any connections.

Follow the UPS manufacturer's instructions when installing or using a UPS, plugging in battery cables, connecting the AC input to a utility outlet, or connecting the UPS into the system load.

NOTE

In case of a prolonged power shutdown, such as a regular evening or weekend power shutdown in the building, always switch the UPS OFF.

When utility power is shut off, the UPS reacts the same as if a power failure occurred and begins supplying backup power. Unless it is switched off, the UPS will run until the batteries discharge completely.

CAUTION

The UPS ON/OFF switch should be OFF whenever the UPS is not connected to the power line. If the switch is left on, the batteries will slowly drain. Leaving the UPS in this condition for an extended period could permanently damage the batteries.

Normal running of a UPS keeps it fully recharged. The maximum recharging period after using the battery-activated inverter to supply power to the system can be up to 12 hours. Before storing a UPS, fully charge the batteries by leaving it plugged in and turned on for at least 12 hours. Avoid permanent battery damage by storing batteries at room temperature. Freezing or overheating can damage batteries.

Internal reactions in batteries cause a slow self-discharge even at room temperature. Avoid high temperatures, and store batteries at lower temperatures for longer storage life. For fullest capacity and longer life, repeat the recharging process on any batteries stored for over 60 days (or as often as recommended by the manufacturer).

NOTE

Double check that the battery circuit breakers are turned off before storing UPS batteries.

Handling and especially shipping batteries requires particular care. Troubleshooting a UPS is recommended for qualified technicians only.

WARNING

Batteries have a high short-circuit capacity. Mistakes in connecting or disconnecting may cause an arc or weld that could result in severe burns. Always use eye protection when working with batteries.

Always follow the UPS manufacturer's instructions when installing a UPS.