TOSHIBA

User Manual
Uninterruptible Power System
1700 Series
Single Phase – 1.5/2.0/2.4 kVA

IMPORTANT NOTICE

The instructions contained in this manual are not intended to cover all of the details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Toshiba sales office.

The contents of this instruction manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Toshiba International Corporation's UPS Division. The warranty contained in the contract between the parties is the sole warranty of Toshiba International Corporation's UPS Division and any statements contained herein do not create new warranties or modify the existing warranty.

Any electrical or mechanical modifications to this equipment, without prior written consent of Toshiba International Corporation will void all warranties and may void UL/CUL listing. Unauthorized modifications also can result in personal injury, death, or destruction of the equipment.

UNINTERRUPTIBLE POWER SUPPLY

If additional information or technical assistance is required beyond what is included in this manual contact Toshiba's marketing department by calling toll free (800) 231-1412, by e-mail at toshibaups@tic.toshiba.com, or write to: Toshiba International Corporation, 13131 W. Little York Road, Houston, TX 77041-9990.

Please complete the following information for your records and to remain within this equipment manual:

Model Number: _____

Serial Number: _____

Date of Installation: _____

Inspected By: _____

October, 2003
Part no. 50124-001

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GENERAL SAFETY INSTRUCTIONS

Warnings in this manual appear in two different ways:

1) *Danger warnings* - The danger warning symbol is an exclamation mark enclosed in a triangle that precedes the large bold letters spelling the word "DANGER". The Danger warning symbol is used to indicate situations, locations, and conditions that exist and can cause serious injury or death:

DANGER

2) *Caution warnings* - The caution warning symbol is an exclamation mark enclosed in a triangle that precedes the large bold letters spelling the word "CAUTION". The Caution warning symbol is used to indicate situations and conditions that can cause operator injury and/or equipment damage:

CAUTION

Other warning symbols may appear along with the *Danger* and *Caution* symbol and are used to specify special hazards. These warnings describe particular areas where special care and/or procedures are required in order to prevent serious injury and possible death:

1) *Electrical warnings* - The electrical warning symbol is a lightning bolt mark enclosed in a triangle. The electrical warning symbol is used to indicate high voltage locations and conditions that may cause serious injury or death if the proper precautions are not observed.

2) *Explosion warnings* - The explosion warning symbol is an explosion mark enclosed in a triangle. The explosion warning symbol is used to indicate locations and conditions where molten, exploding parts may cause serious injury or death if the proper precautions are not observed.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS.

This manual contains important instructions for the 1.5 and 2.4kVA 1700 Series Toshiba UPS. These instructions should be followed during the installation and maintenance of the UPS and its batteries.

- The maximum ambient temperature in which this UPS unit should be operated or stored is 104 °F (40 °C).
- The batteries for the Toshiba 1700 Series 1.5 and 2.4kVA UPS are housed in a self-contained battery module. This module should not be opened under any circumstances. To replace the batteries, a new module should be obtained from your local Toshiba representative, or contact the Toshiba UPS marketing department toll-free at (800) 231-1412.
- When changing battery packs, be sure to use the proper model unit.

CAUTION Misuse of this equipment could result in human injury and equipment damage. In no event will Toshiba Corporation be responsible or liable for either indirect or consequential damage or injury that may result from the use of this equipment.

DANGER  Do not dispose of the battery module in a fire. The batteries inside may explode.

CAUTION Do not open or mutilate the battery module. Released electrolyte is harmful to the eyes and skin, and could be toxic.

CAUTION This unit contains sealed lead acid batteries. Lack of preventative maintenance could result in batteries exploding and emitting gasses and/or flame.

CAUTION Failure to replace the battery pack in accordance to the maintenance schedule may cause the batteries inside to crack, possibly releasing electrolytes from the battery, and resulting in secondary faults such as odor, smoke and fire.

INSTRUCTIONS IMPORTANTES CONCERNANT LA SÉCURITÉ

CONSERVER CES INSTRUCTIONS. Cette notice contient des instructions importantes concernant la sécurit.

ATTENTION Une batterie peut présenter un risque de choc électrique, de brûlure par transfert d'énergie.

ATTENTION Pour le remplacement, utiliser le même nombre de batteries du modèle suivant.

ATTENTION L'élimination des batteries est réglementée. Consulter les codes locaux à cet effet.

Inspection/Installation

Inspection of the New UPS Equipment

Upon receipt of the UPS, a careful inspection for shipping damage should be made.

After Unpacking:

1) Check the unit for loose, broken, bent or otherwise damaged parts. If damage has occurred during shipment, keep all original packing materials for return to shipping agent. Warranty will not apply to units damaged during shipment.
2) Check to see that the rated capacity and the model number specified on the nameplate conform to the order specifications.

Installation Precautions

CAUTION

1) Install the unit in a well ventilated location; allow at least 10 cm (4 inches) on all sides for air ventilation and for maintenance.
2) Install the unit in a stable, level, and upright position that is free of vibration.
3) Install the unit where the ambient temperature is between 32° and 104°F (0° and 40°C).
4) Do not install the UPS in areas that are subject to high humidity.
5) Do not install the UPS in a location that will cause direct sunlight to shine on the unit.
6) Do not install the UPS in areas that are subject to contamination such as high levels of airborne dust, metal particles, or flammable gas.
7) Avoid installation near sources of electrical noise. Always make sure that the unit earth ground is intact to prevent electrical shock and to help reduce electrical noise.
8) Do not install where water or any foreign object may get inside the UPS.
9) This UPS generates and can radiate radio-frequency energy during operation. Although RFI noise filters are installed inside the unit there is no guarantee that the UPS will not influence some sensitive devices which are operating close by. If such interference is experienced, the UPS should be installed farther away from the affected equipment and/or powered from a different source than that of the affected equipment.

Operating Precautions

CAUTION

1) The UPS should not be powered up until this entire manual has been reviewed.

2) The input power source voltage must be within +10% to -30% of the rated input voltage. The input frequency must be within the rated input frequency range. Voltages and frequencies outside of the permissible tolerance range may cause internal protection devices to activate.
3) The UPS should not be used with a load whose rated input is greater than the rated UPS output.
4) Do not use the UPS to provide power to motors that require high starting current or that require a long starting time such as vacuum cleaners and machine tools (unless appropriate sizing is done by a Toshiba applications engineer, or other qualified personnel).
5) Do not insert metal objects or combustible materials in the unit's ventilation slots.
6) Do not place, hang, or paste any objects on the top or on the exterior surfaces of the UPS.

External Layout

Electronics Module

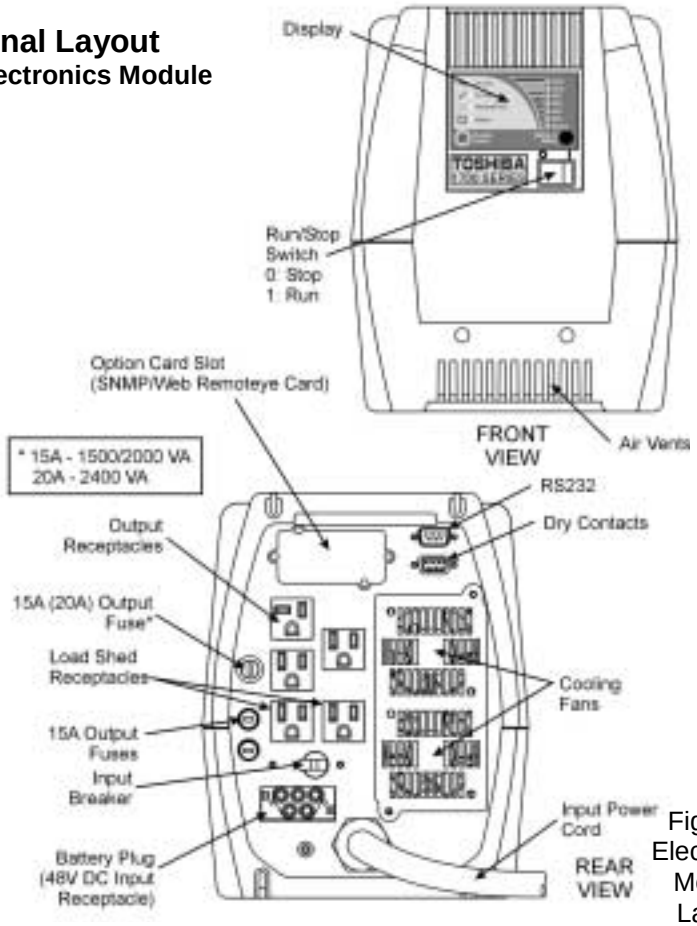


Figure 1 Electronics Module Layout

Battery Module

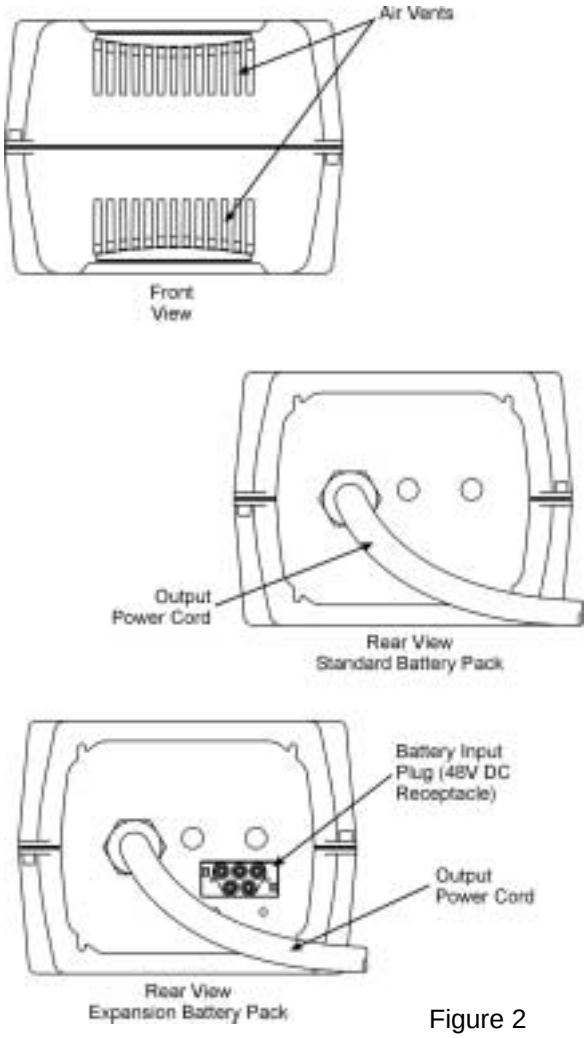


Figure 2
Battery Module Layout

UPS Connections

Standard Module Connections

The illustration on the following page shows the proper assembly of the two modules that make up the standard unit. If additional battery modules are being installed with the standard unit see page 20. For all other option modules see page 21.

Note: No more than three modules should be stacked on top of each other for any configuration.

Standard Module Connections (cont'd)

If two modules are to be stacked on top of each other, they should be interlocked to reduce the chances of the top module being knocked over. Modules do not have to be stacked for the system to operate. The following steps will guide the user through the process of assembling and connecting the modules.

Step 1: Place the electronics module on top of the battery module so that the six round feet on the bottom of the electronics module fit into the matching keyhole slots on the top of the battery module.

Step 2: Slide the upper unit forward. This will cause the two units to lock together. In order to unlock the units, lift up on the top module, and slide it back. This will release the interlock (figure 3).

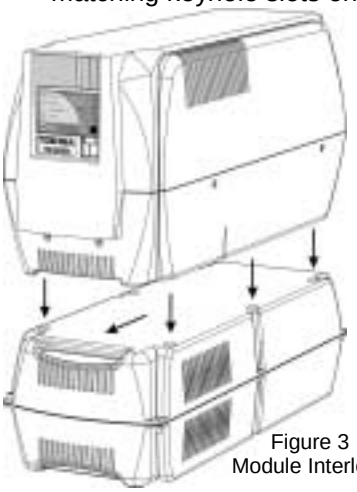


Figure 3
Module Interlock

Step 3: Connect the input power cord (figure 4) to the AC power source. If no AC power source is available go to step 5.

Step 4: Switch the input breaker to the on position (figure 1, page 9).

Step 5: Plug the battery cord coming from the battery pack into the blue battery plug located on the back of the electronics module (figure 4). **Attention**: If the battery cord is not plugged into the battery plug the UPS will not be able to provide backup power in the event of a loss of AC input power.

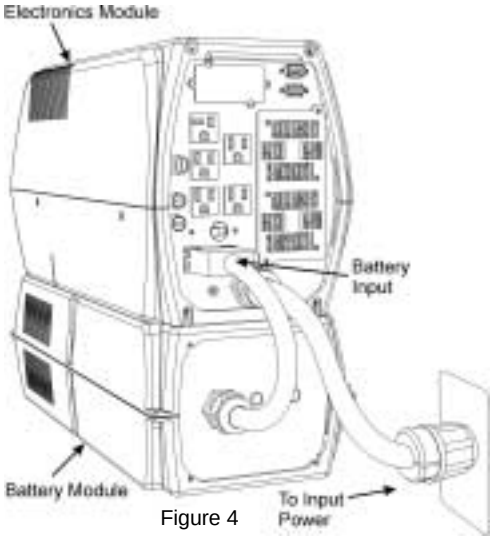
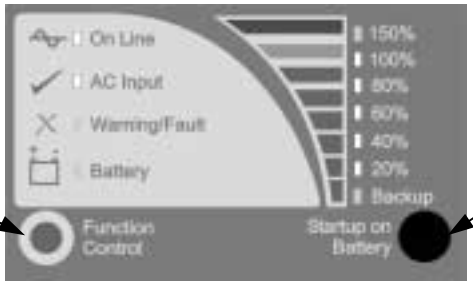


Figure 4
Power Connections

CAUTION Battery modules present a lifting hazard. The battery module for this unit weighs approximately 60 lbs. Two person lift is required to avoid injury.

Operating the UPS

Display Panel Layout



Function Control Button

Startup on Battery Button

ON LINE (green lamp)
Lights ***green*** when the UPS's inverter is supplying power to the load.

AC INPUT (green lamp)
Lights ***green*** when normal AC input power is being supplied to the UPS unit.

WARNING/FAULT (red lamp)
Lights ***red*** when the UPS unit is experiencing an abnormal condition.

BATTERY (red lamp)
Lights ***red*** to indicate that a condition exists that is affecting the batteries.

Starting the UPS System

Once the modules have been connected as shown in the preceding section (UPS Connections, page 10) the UPS system is ready to be started. There are two ways to start the system: from AC input power (if present) or from batteries. If not already done, switch the input breaker on (figure 1, page 9). If the "AC Input" LED is lit, proceed on to "Starting when AC power is available". If the LED is not lit, there is no AC power available. If the unit is to be started when AC power is not available proceed to "Starting on DC power."

Starting When AC Power is Available

If the system is being started with AC input power the system is started by switching the RUN/STOP switch to the RUN position (RUN = 1, STOP = 0). When the RUN/STOP switch is in the RUN position both the "AC Input" and the "On Line" LEDs should be lit. When the unit is started with AC input power it is advisable to allow time for the batteries to fully charge before any load is connected (see "Battery Recharge Time", page 16).

Starting on DC Power

If no AC power source is available, the UPS can be started from battery power. The length of UPS operation time on battery power depends on the number of attached battery modules and the amount of load the UPS is supporting. To start the UPS from battery power follow these steps:

Step 1: Make sure the RUN/STOP switch is in the STOP position (figure 1, page 9).

Step 2: Press the "Startup on Battery" button. The UPS will beep indicating that AC power is not available and the Startup on Battery mode has been activated.

Step 3: Switch the RUN/STOP switch to the RUN position. This must be done within 5 seconds of the Startup on Battery mode activation for the unit to startup using batteries.

Once the unit has started, the "On Line" LED will light, indicating that the inverter is running and power is available at the output receptacles. If the RUN/STOP switch is not switched to the RUN position within those 5 seconds, the unit will return to shutdown mode.

Stopping the UPS

There are two ways of turning the UPS off: switching from on line to bypass mode, or completely shutting down.

Option 1

The first option is to place the UPS into bypass mode. Bypass mode means that if there is AC power available, the UPS will route power directly from the input source to the connected loads without any conditioning. The UPS inverter is off during this state, but the attached loads do not lose power during the transition. To place the UPS into bypass mode, switch the RUN/STOP switch to the STOP position. This mode is most often used manually during maintenance and programming operations or automatically upon the occurrence of an internal UPS fault. (For more information concerning bypass mode see appendix E.)

Option 2

The other option is to turn the UPS off completely. This means that in addition to the UPS's inverter shutting down, **all power will be stopped to any equipment attached to the UPS**. To shut the UPS down completely switch the RUN/STOP switch to the STOP position. Then switch the input breaker off (figure 1, page 9). Once the input breaker has been switched off, all the LEDs should turn off. (If the RUN/STOP switch is in the RUN position when the input breaker is switched off, the unit will switch to battery backup mode. The unit will continue to run for as long as the available battery reserves can support the connected loads.)

UPS Display Status and Operating Condition

Operation Mode	Display State	LED State	Alarm State	Notes
Normal		On Line On AC Input On 20% to 100%* On *see note 1.	Alarm is off.	
Battery Backup		On Line On Battery On Backup On 60% to 100%* On *see note 2.	Alarm will sound for 1 second at 10 second intervals.	The unit will return to normal operation mode when AC power is restored.
Bypass		AC Input On 20% to 100%* On *see note 1.	Alarm is off.	Battery backup is not available.

UPS Display Status and Operating Condition

Operation Mode	Display State	LED State	Alarm State	Notes
Parallel Operation		On Line On AC Input On Battery On 20% to 100%* On *see note 1.	Alarm will sound for 1 second at 10 second intervals.	Parallel operation occurs when input power is present, but inadequate to fully power the connected load. The batteries are used to supplement the AC input power. The UPS will return to normal operation when full input power returns.

All other display conditions constitute either a warning or a fault condition. These conditions are explained in the section titled “Troubleshooting” (page 22) in the charts on Warnings and Faults.

Note 1: The level meter, which consists of the LEDs labeled 20% through 150%, will light according to the current amount of load connected. As the load exceeds one level, the next level will begin to blink, increasing the blink rate as the load increases until that full percentage is reached. For example, if the unit is loaded to 40% of maximum output power the 20% and 40% LEDs will be lit. If another small load is added increasing the load to 45% the 60% LED will begin to blink. If a little bit more load is added so that the total load becomes 50% the 60% LED will blink faster. This will continue until enough load is added to equal 60% of the maximum output power at which time the 60% LED will stop blinking and light continuously.

Note 2: The level meter described in note 1 above also displays the remaining battery time when the unit is in backup mode. If the batteries are fully charged when the unit switches to backup mode the 20% through 100% LEDs will light. As the batteries begin to discharge, the LEDs starting from the top will blink rapidly then slowly and will then turn off as the battery time runs down. For example if the unit has been running on battery power and there is 90% battery capacity remaining the 20% through 80% LEDs will be lit and the 100% LED will be blinking.

System Reset

The UPS is reset by moving the RUN/STOP switch from RUN to STOP and then back to RUN. Use this reset procedure to transfer from bypass back to inverter after a fault occurs. Some faults can only be cleared by shutting the UPS down, waiting for all LED's to go off, and then restarting the UPS (see "Troubleshooting", page 22).

Battery Backup Time

The exact amount of backup time provided will vary depending on the UPS model being used, number of batteries, condition of the batteries and other factors. However, the chart below gives the times that can be expected from the standard units with batteries in good condition. For greater backup time, an additional battery module may be added to the standard unit. Only one additional battery module may be added to the standard unit. For longer runtime options contact your Toshiba sales representative or the Toshiba marketing department at (800) 231-1412 or by e-mail at toshibaups@tic.toshiba.com.

Table 1
Backup Time*

UPS Model	With 1 Battery Module Full Load / Half Load	With 2 Battery Modules Full Load / Half Load
1500 VA	13 min / 35 min	35 min / 90 min
2000 VA	10 min / 25 min	25 min / 60 min
2400 VA	7 min / 20 min	23 min / 50 min

* Times given are approximate and will vary depending on the age of the batteries, the ambient temperature, the number of previous discharges and the type of load.

Load Shed Function

The 1700 Series includes a load shed function. During battery backup operation, this function allows the load connected to two of the receptacles (figure 1, page 9) to be turned off in an effort to conserve power for more critical loads. The battery level at which these receptacles will be turned off, or "shed", can be set by the user (see "The Function Control Button", page 17). By default, this feature is configured so that the receptacles will remain on for the full battery backup time available (no "shedding")

Battery Recharge Time

The following table gives estimates on time required to recharge the UPS's batteries. The recharge time may vary depending on the ambient temperature, the age of the batteries, and other factors.

Table 2
Battery Recharge Time*

Unit	Standard Unit	With Expansion Battery Module
1500 VA	3 ½ hours	7 hours
2000 VA	3 ½ hours	7 hours
2400 VA	3 ½ hours	7 hours

* Recharge times are to 90% full capacity.

Fan Speed
The 1700 Series UPS has variable speed fans. The fan speed will vary depending on a number of factors. As the load placed on the UPS increases the fan speed will increase. The temperature of the environment the UPS is operating in can also cause the fan speed to increase. Finally, when the unit is operating in battery backup mode the fans will operate at higher speeds. (For a more detailed explanation of the variable speed fan function refer to appendix B)

Battery Check Function
During startup the UPS will perform an automatic 'Battery Check' to detect whether a problem exists in the battery circuit. If a problem is detected during the test, the Battery LED and the Warning/Fault LED will flash and an audible alarm will sound. If a problem is indicated, check to be sure that the battery plug is correctly connected to the electronics module. Pressing the Function Control button will cause the UPS to check the batteries again. If the batteries pass the test, the unit will return to normal operation. If the batteries fail the test again, they should be allowed to charge (see Table 2, “Battery Recharge Time”) and the test should be performed again. If the batteries continue to fail the tests, the battery module should be replaced. **It is important to note that when the UPS has detected bad batteries, the battery backup mode is disabled.** The unit will continue to operate and provide clean power, but as there is no battery power available, the unit cannot provide backup power if input power is lost.

The Function Control Button
The function control button is located on the display panel (see “Display Panel Layout”, page 12). This button is used to perform several different UPS operations, including initiating self test, providing programming options, and silencing the alarm. A brief description of each function follows along with a step by step guide to accessing each function.

1) **Self-Test**. In order to perform a self-test the UPS must be operating in the normal mode (see “UPS Display Status and Operating Condition”, page 14). To initiate the self-test simply

press and hold the Function Control button until the battery LED begins flashing. The self-test performs the same battery check described above.

2) **Alarm Silence**. The alarm silence feature is used to stop the audible alarm from sounding. Any time the audible alarm is sounding pressing the Function Control button will silence the alarm.

3) **Programming Mode**. There are three programming options: load shed, bypass enable/disable, and reset battery installed date. In order to enter the programming mode the UPS must first be operating in Bypass mode without faults (see "Stopping the UPS: Option 1", page 13). Then press the Function Control button. (Press and hold" always means to hold until the unit gives audible feedback). The unit will give an audible feedback indicating the unit is in programming mode. (If at anytime while the UPS is in the programming mode there is one minute of inactivity the UPS will automatically exit the programming mode and return to bypass operation.)

   A. Load Shed. The backup LED will light indicating the UPS is now ready to make changes to the load-shed settings (see "The Load Shed Function", page 16 for an explanation of load shedding). To accept this option press and hold the Function control button. For the next option go to step B.

      A.1 The UPS comes from the factory set so the load shed receptacles function for the full battery backup time. Pressing the Function Control button will change the setting for the load-shed level. The LEDs on the right side of the display will light to indicate the current setting for the load-shed level. For example, since the default factory setting is for no load shed, the first time the option is accessed no LEDs will be lit. Pressing the button once will cause the 20% LED to light. This would indicate that the load shed receptacles should be turned off when there is 20% battery power remaining. Pressing the Function Control button successive times will increase the load shed level in 20% increments (continuing to press the button will cycle back to no load shed).

      A.2 Once the option is set to the desired level, press and hold the Function Control button. This will save the new load shed level setting. The UPS will indicate that the value has been stored by blinking the LEDs. After blinking the LED for a short time the UPS will exit the programming mode and return to bypass operation. To

return the system to normal operation switch the RUN/STOP switch back to the RUN position.

B. Bypass Enable/Disable. Press the function control button. The unit is now ready to change the bypass enable/disable option. This is indicated by the backup LED turning off and the 150% LED turning on. This setting determines whether the UPS will go to bypass in the case of an input overvoltage fault (for further explanation of Bypass Overvoltage / Undervoltage see appendix E). To change this setting press and hold the function control button. For the next option go to step C.

B.1 This setting is set to disable bypass at the factory. Pressing the function control button causes the 100% LED to light, indicating bypass has been enabled. Pressing it again will change it back to disabled and the 100% LED will go off.

B.2 Once the option is set as desired, press and hold the function control button to save the setting. The UPS will indicate the setting has been saved by blinking the LED(s). The LED(s) will continue to blink for a short time after which the UPS will exit programming mode and return to bypass operation. To return the system to normal operation switch the RUN/STOP switch back to the RUN position.

C. Reset Battery Installed Date. This should be done whenever a new battery pack is installed. Press the function control button. The unit is now ready to reset the battery installed date. This is indicated by the Battery LED turning on. Once this mode has been entered press and hold the function control button to reset the battery install date to the current date. The UPS will indicate that the date has been reset by blinking the Battery LED for a short time after which the UPS will return to bypass operation. To return the system to normal operation switch the RUN/STOP switch back to the RUN position.

Note: It is not necessary that the unit's internal clock be set to the correct date. The UPS will track time relative to the battery installation date. If it is desired to set the date, this can only be done through remote communication. For instructions on performing this operation refer to either the "UPSmart" or "Remote Eye II" manual depending on the type of remote communication being used.

Fixed Frequency Mode

The 1700 Series UPS has the option of operating in a fixed frequency mode. Normally the UPS operates in the frequency auto-detect mode. If a specific output frequency is required (i.e. 50Hz or 60Hz) the UPS can be set at the factory to supply the desired frequency regardless of the input frequency (input frequency must be within allowable limits, see Specifications on page 32). For a unit already in use the output frequency can be set through software. For instructions on setting the output frequency through software please contact Toshiba at (800) 231-1412 or by e-mail at toshibaups@tic.toshiba.com. **It is important to note that when the UPS is operating with a fixed output frequency, output is disabled in bypass.** The bypass enable/disable option described in the preceding section on the programming mode does not change the bypass setting in the case of a fixed frequency mode unit.

Adding an Additional Battery Module

Figure 5 shows the standard unit with the expansion battery module added. The expansion battery module differs from the standard battery module in that it has an additional battery input connector on the back. To install an expansion battery module follow these steps:

1) Unplug the standard battery module, unlock and remove the electronics module.

2) Lock the expansion battery module on to the battery module. Connect the standard battery module to the expansion battery module.

3) Lock the electronics module on to the expansion battery module. Connect the expansion battery module to the electronics module.

It is not necessary to stack the modules for the system to operate.

Refer to the section entitled “UPS Connections: Standard Module Connections” on page 10 for an explanation of how to lock and unlock the modules.

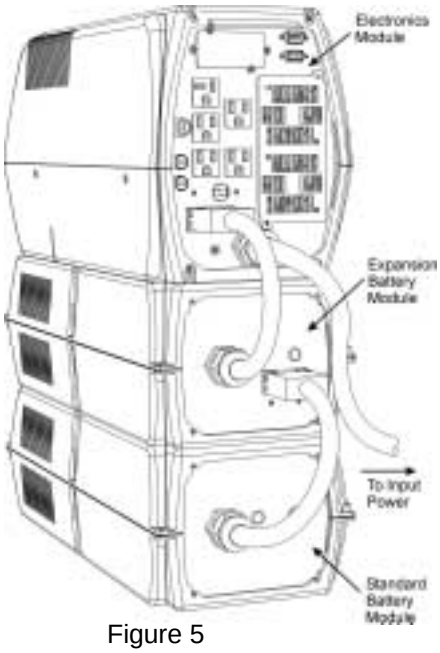


Figure 5
Expansion Battery Module

Other Option Modules

There are a number of other optional modules that can be ordered for the 1700 Series UPS system. Table 3 shows the available option modules. For information about options not listed here contact Toshiba's UPS Marketing Department at (800) 231-1412 or by e-mail at toshibaups@tic.toshiba.com.

Table 3
Option Modules

Part No.	Description	Input Voltage	Output Voltage
UF1-IO-0XX-6BG	Dual Transformer Module	208V	240/120V
UF1-IO-0XX-6AA	Single Isolation Transformer Module	120V	120V
UF1-IO-0XX-6EE	Dual Transformer Module	230V	230V

The XX in the part number is replaced by the kVA rating of the system (i.e. 2.4kVA = 024)

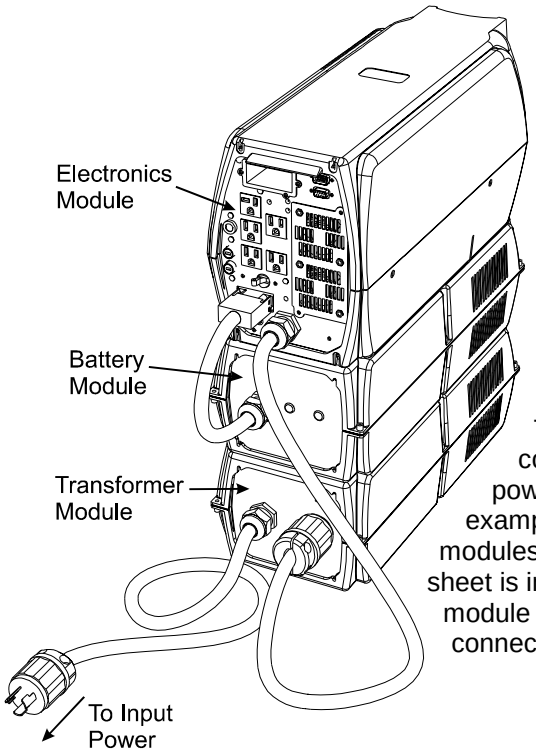


Figure 6 shows the standard 1700 series UPS with an optional input isolation transformer module (UF1-IO-024-6AA). Installation of the input transformer requires the input power cord from the electronics module to be plugged into the transformer module. The transformer power cord is plugged into the power source. This is an example of how the option modules work. An instruction sheet is included with each module that shows how to connect each particular module.

Figure 6
Isolation Transformer Module

Communication Interface

Remote Contacts (IBM AS/400)

The remote contacts interface is a standard feature. It is provided through solid state relays with contacts through a DB9 male connector located on the back of the UPS (refer to the Communication Option User Manual for a more detailed description of this option).

RS-232C

RS-232C serial communication interface is a standard feature provided through a DB9 female connector located on the backside of the UPS (see “Electronics Module Layout “, page 9). This interface allows control of the UPS from a personal computer (see the Communication Option User Manual for a list of the data available from the UPS via the RS-232C communication link)

Option Card Slot

The option card slot is a standard feature. An optional network adapter card slides into the slot which is located on the back of the electronics module (figure 1, page 9). This optional interface allows the UPS to be monitored across the network or from any point on the Internet (refer to the Communication Option User Manual for a more detailed explanation of this option).

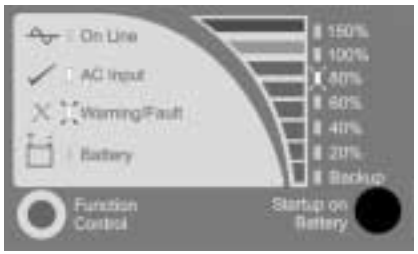
Troubleshooting

Warnings and Faults are those abnormal conditions that can occur and could cause the unit to stop normal operation. These conditions are detected by the protective circuitry in the unit. The UPS “Warning/Fault” lamp will light ***red*** when a warning or fault occurs. "Troubleshooting" involves monitoring the LED’s on the front panel and then interpreting the readout by using the warning and fault mode display charts that follow.

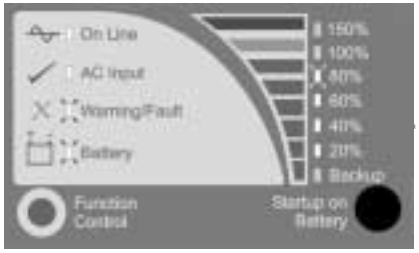
Warning/Fault Modes

All warnings will cause the red “Warning/Fault” LED to flash. All faults will cause the red “Warning/Fault” LED to light continuously. Some warnings and most faults will cause the UPS to transfer to bypass mode. In many cases, after the condition that caused the fault is corrected the unit will automatically transfer back to normal mode. For those cases where the unit does not transfer back automatically use the "System Reset" procedure to transfer the UPS back to normal mode (see “System Reset”, page 16). If the system faults again after being reset contact your Toshiba UPS service representative at 1-800-231-1412.

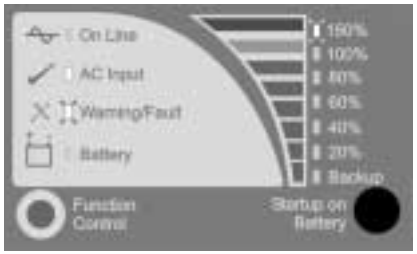
Warnings

Warning	Display State	LED State	Alarm State	Description and Resolution
Low Battery During Battery Backup		On Line On Warning/Fault Flash Battery Backup On 20% - 40%* Flash On *Depending on remaining battery capacity.	Alarm will sound for 1-second at 5-second intervals.	The batteries are more than 70% depleted. The warning will continue until either the batteries become completely exhausted or AC input power is restored.
Current Limit (Over Current)		AC Input On Warning/Fault Flash 80% Flash	Alarm will sound for 1/2-second at 1-second intervals.	A current limit warning is typically a sign of misapplication. The load may not be appropriate for UPS support. For further explanation contact your Toshiba UPS service representative at 1-800-231-1412.
Ambient Over Heat		AC Input On Warning/Fault Flash 100% Flash	Alarm will sound for 1-second at 15-second intervals.	The temperature of the UPS operating environment is too high. Causes of this condition include allowing the room temperature to exceed 104°F (40°C), a blocked vent or direct sunlight on the unit. The unit will transfer to bypass until the temperature is reduced.

Warning (cont'd)

Warning	Display State	LED State	Alarm State	Description and Resolution
Battery Over Heat		On Line On AC Input On Warning/Fault Flash Battery Flash 20% to 100%* On *according to current amount of connected load.	Alarm will sound for 1-second at 15-second intervals.	This warning can be caused by the same conditions listed for ambient overheat. Another possible cause would be a problem with the battery module, which could prevent the unit from providing backup power.
Input Under Voltage (On-Line mode) *see note 1.		On Line On Warning/Fault Flash Battery On Backup On 20% to 100%* On *according to current battery capacity.	Alarm will sound for 1/2-second at 10-second intervals.	This warning will occur if the input voltage drops below the minimum allowable voltage. The UPS will supplement the input power with battery power for as long as possible. When the batteries are exhausted, the unit will shutdown.
Input Over Voltage (On-Line mode) *see note 2.		On Line On AC Input On Warning/Fault Flash Battery On Backup On 20% to 100%* On *according to current battery capacity.	Alarm will sound for 2, 1/2-second beeps at 10-second intervals.	This warning will occur if the input voltage exceeds the maximum allowable voltage. The UPS will switch to battery backup. When the batteries are exhausted, the unit will shutdown or switch to bypass according to selected settings.

Warnings (cont'd)

Warning	Display State	LED State	Alarm State	Description and Resolution
Input Frequency Regulation (On-Line mode) *see note 3.		On Line On AC Input On Warning/Fault Flash Battery On Backup On 20% to 100%* On *according to current battery capacity.	Alarm will sound for 3, 1/2-second beeps at 10-second intervals.	The input frequency is outside specified limits. The UPS will switch to battery power. The UPS will return to normal operation if the frequency returns to within an acceptable range. Otherwise the UPS will shutdown when the batteries are depleted.
Output Overload		AC Input On Warning/Fault Flash 150% Flash	Alarm will sound for 1-second at 15-second intervals.	The connected load exceeds the UPS power rating. Reduce the load attached to the UPS. The unit will automatically return to normal operation.

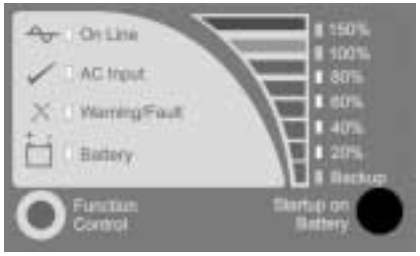
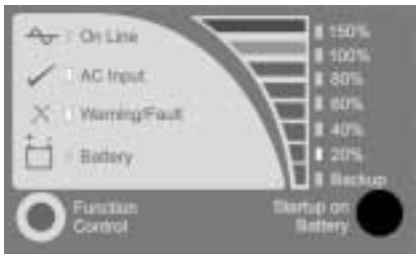
= Flashing LED = LED lit continuously

Note 1: If the unit is operating in Bypass mode and an input undervoltage condition occurs, the Warning/Fault LED will flash along with the 20% LED. The unit will shutdown. The AC Input LED may also be on if some AC voltage is still present.

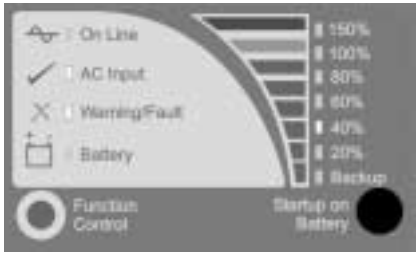
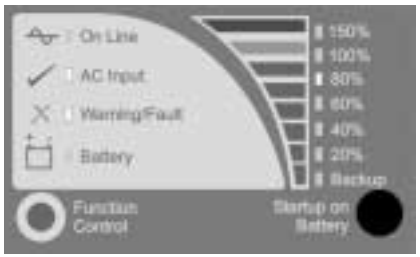
Note 2: If the unit is operating in Bypass mode and an input overvoltage condition occurs, the Warning/Fault LED will flash along with the 40% LED. The unit will shutdown. The AC Input LED will also be on.

Note 3: If the unit is operating in Bypass mode and an input frequency regulation condition occurs, the Warning/Fault LED will flash along with the 60% LED. The unit will shutdown. The AC Input LED may also be on.

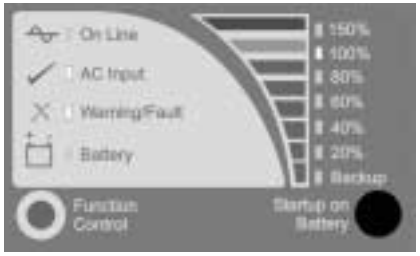
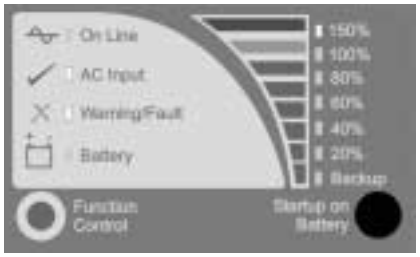
Faults

Fault	Display State	LED	Alarm State	Description and Resolution
Replace Battery		On Line On AC Input On Warning/Fault On Battery On	Alarm will sound for 1/2-second, at 1/2-second intervals.	Battery pack is not connected or needs replacement as soon as possible. After replacing the batteries the battery timer must be reset (see “The Function Control Button”, page 17). Failure to replace the battery pack could result in danger to the user and failure of the system to provide backup power.
Battery Shutdown		Warning/Fault On Backup On	Continuous alarm	The battery power of the unit has been exhausted. The unit will shutdown or switch to bypass according to settings. Batteries must charge before backup power will be available. For charging times see page 16.
DC Bus Over Current		AC Input On Warning/Fault On 20% On	Alarm will sound for 1/2-second, at 1/2-second intervals.	This fault indicates an internal problem with the UPS. Contact your Toshiba UPS service representative at 1-800-231-1412.

Faults

Fault	Display State	LED State	Alarm State	Description and Resolution
DC Bus Over Voltage		AC Input On Warning/Fault On 40% On	Alarm will sound for 1/2-second, at 1/2-second intervals.	These faults indicate an internal problem with the UPS. Contact your Toshiba UPS service representative at 1-800-231-1412.
DC Bus Voltage Imbalance		AC Input On Warning/Fault On 60% On		
Output Under Voltage		AC Input On Warning/Fault On 80% On		

Faults

Fault	Display State	LED State	Alarm State	Description and Resolution
Output Over Voltage		AC Input On Warning/Fault On 100% On	Alarm will sound for 1/2-second, at 1/2-second intervals.	These faults indicate an internal problem with the UPS. Contact your Toshiba UPS service representative at 1-800-231-1412.
System Over Heat		AC Input On Warning/Fault On 150% On		

= Flashing LED = LED lit continuously

Storage of UPS Equipment.

General Guidelines

If the UPS equipment is to be stored; the following guidelines should be used.

Avoid:

1) Storage in sites subject to extreme changes in temperature or high humidity.
2) Storage in sites subject to exposure of high levels of dust or metal particles
3) Storage on inclined floor surfaces or in sites subject to excessive vibration.

Before Storing:

1) Allow UPS to be operated for 4 hrs to ensure that the batteries are fully charged.
2) Stop the unit (see "Stopping the UPS" on page 13).
3) Place the unit's Input Breaker switch in the "off" position (see “Electronics Module Layout”, page 9).

Storing:

1) Store within a temperature range of -20° to 40° C (-4° to 104° F).
2) For best results, store the UPS in the original shipping container and place on a wood or metal pallet.
3) The optimum storage temperature is 21° C (70° F). Higher ambient temperatures cause UPS batteries to need recharging more frequently.

Recharging requirements during storage:

Recharging the batteries requires that the battery module be connected to the UPS and the UPS must have AC input power available. The UPS can be in either the on line or bypass mode. (See “Starting the UPS”, page 12, and “Battery Recharge Time, page 18)

1) If stored in an ambient temperature less than 20°C (68°F), recharge the batteries every 9 months.
2) If stored in an ambient temperature of 20° to 30°C (68° to 86°F), recharge the batteries every 6 months.
3) If stored in an ambient temperature of 30° to 40° C (86° to 104°F), recharge the batteries every 3 months.

Disposal

Please contact your local environmental agency for details on disposal of electrical components and packaging in your particular area. ***It is illegal to dump lead-acid batteries in landfills or dispose of improperly***. Please help our Earth by contacting the environmental protection agencies in your area, the battery manufacturer, or call Toshiba toll-free at (800) 231-1412 for more information about recycling.

Preventive and Scheduled Maintenance/Parts Replacement

Preventive Maintenance

Toshiba's 1700 Series of UPS systems have been designed to provide years of trouble-free operation requiring a minimum of preventive maintenance.

The best preventive measure is to keep the area around the unit, particularly the air inlet vents, clean and free of moisture and dust accumulations. If the atmosphere of the installation site is very dusty, use a vacuum cleaner to periodically remove dust accumulations from the exterior of the unit, especially around ventilation openings. Schedule authorized Toshiba service centers to perform internal parts inspections annually, or call a Toshiba UPS service representative at 1-800-231-1412.

CAUTION Proper maintenance of the battery system of this unit is essential to the safety and reliability of the UPS system.

Parts Replacement

The following list shows intervals for periodic maintenance and replacement of certain UPS parts.

1) Battery Module: Replacement should be done once every 3 to 5 years at a minimum.
2) Output Fuses: Replace once every 7 years (always replace fuses with same fuse type and rating).
3) Cooling fan: Replace once every 3 years. (Fan replacement must be done by Toshiba authorized service personnel.)

Appendix A: Specifications

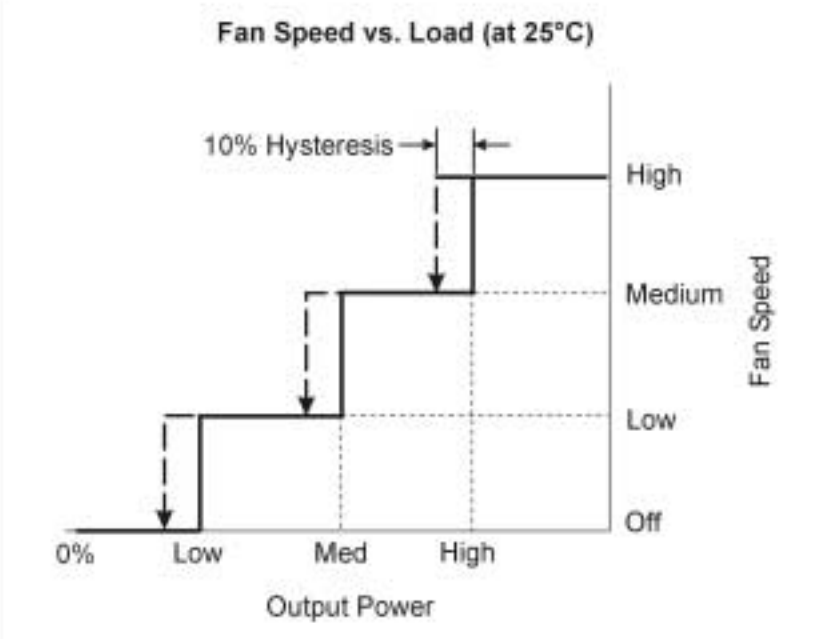
Model Number		UF1A1A015C6(T)	UF1A1A024C6(T)
Capacity		1500VA (1.05KW)	2400VA (1.68KW)
Input	Input voltage[1]	Single phase 120VAC, +20% to -50%	
	Input frequency	45 to 65 Hz	
	Input capacity	1500VA	2400VA
	Input power factor	Approximately unity (0.95 to 1.0)	
Bypass	Input voltage[2]	Single phase 120VAC, ±10%	
	Output voltage	Single phase 120VAC	
	Overload rating	See appendix C	
Output	Output voltage	Single phase 120VAC	
	Output voltage regulation	Within +/- 3%, steady state	
	Output frequency	50/60 Hz (+/- 0.5% in free running mode, line sync range +/-1%)	
	Rated load power factor	0.7	
	Rated output current (rms)	12.5A	20A
	Inverter overload capacity	125% for one minute; 150% for 30 seconds	
	Crest factor	2.5 at full load	
Battery	Type	12V, flame retardant, sealed lead acid	
	Battery backup time (fully charged, 0.7 power factor, 25°C (77°F)	13 minutes (at full load)	7 minutes (at full load)
	Configuration	2 strings in parallel, 4 batteries per string	
Environment	Operating temperature	0° to 40°C (32° to 104°F)	
	Altitude	Up to 1000m (3000 ft) above sea level	
	Efficiency	86%	

Note1: Below 77% input voltage unit may begin parallel operation; supplementing input power with battery power. The point at which parallel operation begins is load dependant (for a detailed explanation of Parallel Operation see appendix D).

Note2: Input voltage range is limited in bypass for load protection. (For a detailed explanation of Bypass Undervoltage / Overvoltage see appendix E.)

Appendix B: Fan Speed Control

The fans in the 1700 Series will operate at any of four different speeds depending on the environment and system conditions. In the first stage the fans are off. As the load and or the ambient temperature increase the fans will subsequently go to low, medium or high speed as required.

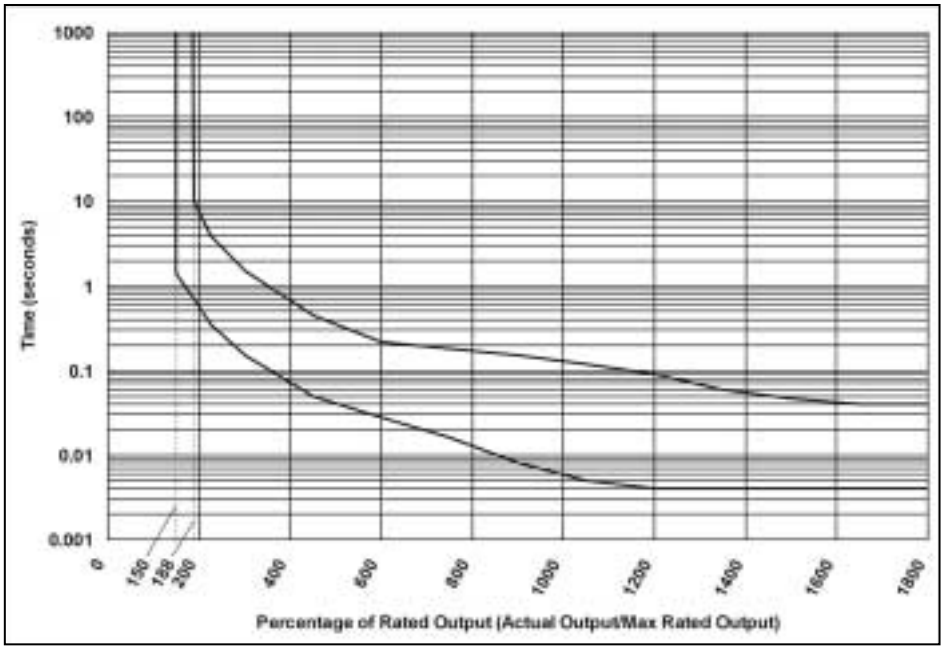


The temperature reference given on the graph above refers to the temperature inside the UPS. There will typically be a 5°C difference between the internal and external temperature. The 10% hysteresis shown is to ensure that the unit will not oscillate between fan speeds. When the output power reaches a level that requires the fan speed to increase the load will have to be reduced 10% below that level before the fan speed will return to the lower speed.

Anytime the unit is operating from battery power (or any DC supply) the fans will operate at high speed.

Appendix C: System Overload Rating

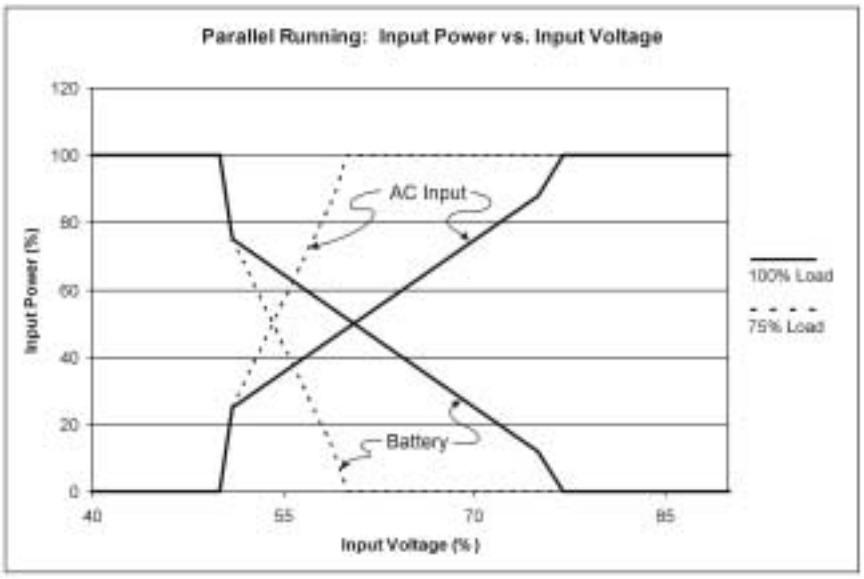
The 1700 Series UPS is capable of supporting short duration overloads. When operating in the On Line mode output overloading of 125% of the rated output current can be supported for 1 minute, and 150% for 30 seconds. If the overload continues the unit will switch to bypass mode. When in bypass mode the 1700 Series overload capacity is limited by the input breaker. The following graph shows the response of the breaker depending on the applied load. The two lines shown on the graph represent the upper and lower limits of the breaker response. The response of a particular breaker could fall anywhere between these two lines.



If the load capacity of the breaker is exceeded the breaker will trip, shutting down both the UPS and the attached loads. If the breaker's capacity is not exceeded the unit will continue to operate in the bypass mode until the applied load is reduced. When the load on the UPS is reduced to within the specified limits the UPS will automatically return to On Line mode.

Appendix D: Parallel Operation

The 1700 Series UPS offers a standard feature that allows the unit to operate with very low input voltage without de-rating the output power. If the input voltage drops below a certain point the unit will switch to parallel mode. Parallel mode means that the unit is using the available input voltage and supplementing with battery power. Because battery power is being used, the time the unit can operate in parallel mode is limited. However, the time will be longer than that available when the unit is operating on battery power alone. The point when the UPS will enter parallel mode will vary depending on the output load. The following graph shows the various stages based on full output load and 75% output load.



As shown by the graph the lower the output load the lower the input voltage can go before parallel mode is activated. However, the minimum input voltage will always remain at 50% (60VAC for a 120VAC system).

Appendix E: Bypass Undervoltage / Overvoltage

When the 1700 Series UPS is in bypass mode and bypass is disabled the undervoltage and overvoltage limits are restricted to +/-10% of the rated input voltage. If the input voltage is outside of this voltage window the UPS output will be turned off. There is a 5% hysteresis associated with both the upper and lower limits. This means that once output has been turned off the input voltage will have to be within ±5% of the rated input voltage before the output will be turned on.

When the UPS is first started, if the RUN/STOP switch is in the STOP (bypass) position the unit will start in the on-line mode for 1 second before switching to bypass mode. If the input voltage is out of range the UPS will turn off the output after 1 second rather than switching to bypass.

The overvoltage and undervoltage limits can be turned off by the user if desired (see “Function Control Button”; section 3 “Programming mode”; part B, page 18). If bypass is “enabled” the bypass voltage window will **not** be restricted. In the bypass enabled state whatever voltage appears on the input will be passed on to the output. This helps to ensure that the UPS output will never be turned off; however, very high or low voltages could be passed on to the attached equipment.

Appendix F: Unit Configuration Options

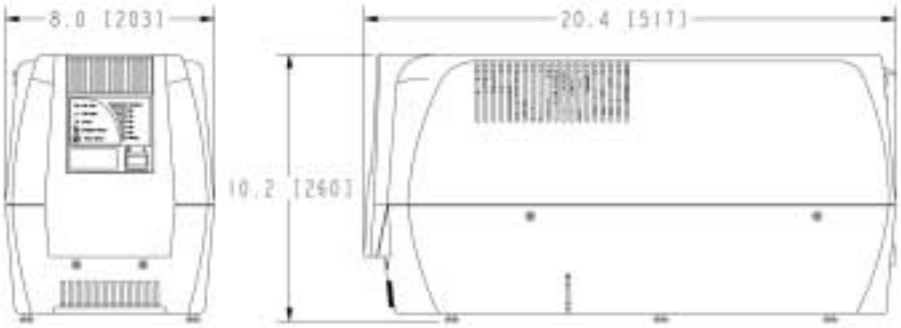
The following chart shows the configuration options for each base model UPS.

Model Number	Description	Available Option Modules	Description
UF1A1A015C6	1500VA Electronics Module	UF1-BC-087	48V battery module
		UF1-EBC-087	Extended runtime 48V battery module
		UF1-IO-015-6BG	208V input; 240V/120V output transformer module
		UF1-IO-015-6AA	120V input isolation transformer module
		UF1-IO-015-6EE	230V input; 230V output transformer module
UF1A1A015C6T	1500VA Electronics Module with internal isolation transformer	UF1-BC-087	48V battery module
		UF1-EBC-087	Extended runtime 48V battery module
		UF1-IO-015-6BG	208V input; 240V/120V output transformer module
		UF1-IO-015-6EE	230V input; 230V output transformer module
UF1A1A024C6	2400VA Electronics Module	UF1-BC-087	48V battery module
		UF1-EBC-087	Extended runtime 48V battery module
		UF1-IO-024-6BG	208V input; 240V/120V output transformer module
		UF1-IO-024-6AA	120V input isolation transformer module
		UF1-IO-024-6EE	230V input; 230V output transformer module
UF1A1A024C6T	2400VA Electronics Module with 1500VA internal isolation transformer [1]	UF1-BC-087	48V battery module
		UF1-EBC-087	Extended runtime 48V battery module
		UF1-IO-024-6BG	208V input; 240V/120V output transformer module
		UF1-IO-024-6EE	230V input; 230V output transformer module

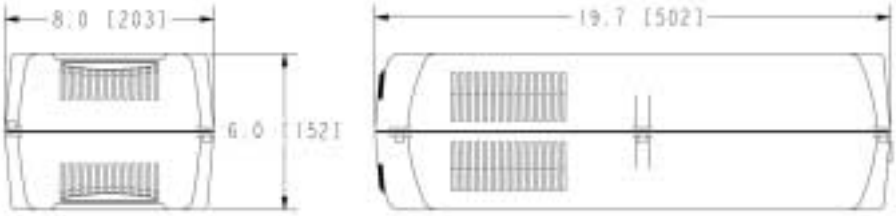
Note 1: 1500VA internal isolation transformer only provides isolation on two output receptacles and 12.5A of output current. For full and total isolation a full isolation option cabinets is required.

\Appendix G: Weights and Dimensions

Module Model No.	Module Weight		Shipping Weight	
	Pounds	Kilograms	Pounds	Kilograms
UF1A1A015C6	26	12	31	14
UF1A1A015C6T	46	21	51	23
UF1A1A024C6	30	14	35	16
UF1A1A024C6T	50	23	55	25
UF1-BC-087	51	23	56	25



Electronics Module
Dimensions are in inches [mm]



Battery/Option Module
Dimensions are in inches [mm]

TOSHIBA INTERNATIONAL CORPORATION LIMITED WARRANTY POLICY

(48 contiguous U.S. States, Canada, Mexico)
(UNINTERRUPTIBLE POWER SUPPLIES-UPS)

TOSHIBA INTERNATIONAL CORPORATION ("TIC") warrants that the 1700 Series Uninterruptible Power Supplies ("UPS") and Uninterruptible Power Supply Battery ("BATTERY") (external battery cabinet) sold by TIC to the end user ("User") shall be free of defects in material and workmanship.

Series	Capacity	UPS Unit		Battery		Toshiba Dispatch
		Warranty[1]	On-Site[2]	Warranty[1]	On-Site[2]	
1700	1.5, 2.4 kva	36 months	No, Depot	24 months	No, Depot	M-F, 8AM-5PM CT

Note 1: The warranty period begins from the shipment date. The shipment date is determined by the date on the TIC Bill of Lading.
Note 2: For the 1700 Series the warranty applies if the unit is sent and returned (paid for) by the user to/from the Toshiba plant or a Toshiba designated Authorized Service Center.

If any UPS, part of UPS, and/or BATTERY fails to conform or is defective then TIC will repair or replace it at TIC's option.

LIMITATIONS AND EXCLUSIONS

This limited warranty shall not cover the UPS, UPS part, or BATTERY during their respective warranty periods, if the following storage, maintenance, installation, operating conditions are not met throughout the warranty periods (5 conditions below):

VALVE REGUALATED LEAD ACID (VRLA) BATTERIES FOT TOSHIBA UPS REQUIRED OPERATING CONDITIONS		
1. Temperature	Annual Average Temperature 25°C (77°F)	Temperature per cell < 32°C (89°F) for more than 30 days
2. Maximum number of full charge/discharge cycles	Discharge time	Maximum Number of Cycles (24 months)
	30 minutes	69
	15 minutes	86
	10 minutes	110
	5 minutes	130
VALVE REGUALATED LEAD ACID (VRLA) BATTERIES FOT TOSHIBA UPS INSTALLATION AND MAINTENANCE CONDITIONS		
3. Storage	While UPS is in transit or storage it must always be in suitable temperature (see condition 1).	
4. External Batteries	Parallel battery string applications must be approved by TIC in writing.	
5. Idle Batteries	User must recharge the batteries if not in use (charged) for more than 6 months.	

1. This Warranty does not cover damage or defect caused by misuse, improper application, wrong or inadequate electrical current/voltage/frequency, inadequate connections, inadequate water or drain services, user negligence, repair by non-Toshiba designated personnel, accident during shipment, tampering, alterations, a change in UPS and/or BATTERY location or application, exposure to the elements, acts of God, theft, sabotage, installation contrary to TIC's recommendations or specifications (Published Operation Manuals), also if serial numbers have been altered, defaced, or removed.
2. Repair or replacement of a defective UPS, UPS part, and/or BATTERY does not extend the respective original warranty period. All defective UPS, UPS parts, and/or BATTERIES shall be the property of TIC upon replacement.
3. This warranty shall constitute the sole and exclusive remedy of all purchasers and users of the UPS, UPS part, and/or BATTERY. TIC's responsibility for UPS, UPS Parts, and/or BATTERY shall not exceed one times the net UPS and/or BATTERY purchase price. **TIC HEREBY EXPRESSLY DISCLAIMS ALL OTHER EXPRESS, STATUTORY AND IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

PROCEDURE

User must contact TIC via e-mail upsservice@tic.toshiba.com, or phone 1-800-231-1412, no later than 90 days after User's discovery of occurrence or defect in UPS, UPS part, and/or BATTERY **but in no event after the expiration of the respective warranty period**. Subject to the limitations of this policy and product type, TIC service or TIC service representative shall repair/replace the UPS/part warranted hereunder, without charge for material, labor. If TIC determines that the requested repair is not covered under this limited warranty policy, then TIC shall **advise** customer and quote cost of repair. Repair charges shall be based on service parts price and prevailing service charges at the time of repair.

If the case in process is a BATTERY (stand-alone and/or cabinet) TIC will use its published Battery Diagnostic Document to evaluate warranty applicability. First, TIC will make sure that the storage, maintenance, installation, and operating conditions were met; then the BATTERY capacity will be tested in accordance with the "performance test" guidelines IEEE Std 450. If the BATTERY fails to deliver 70% of its rated capacity it shall be deemed defective and be replaced. Either float or cyclic service will be used to determine the warranty credit (as per published Battery Diagnostic Document). The typical credit applied will be as in the following table:

Credit for Replacement Battery When Approved Warranty		
Time from Shipment	**UPS Batteries**	**Cost to Customer**
(months)	**% Credit**	**% List Price**
0-24	100	0
25-30	55	45
31-36	45	55
37-42	35	65
43-48	25	75
49-54	15	85
55-60	5	95

MODIFICATIONS

No **representative**, salesperson, agent, distributor, **or** employee of TIC is authorized to modify any of the terms of this warranty, unless modifications are made in writing and signed by an authorized TIC officer.

THIS WARRANTY REPRESENTS THE ENTIRE AGREEMENT BETWEEN TIC AND USER WITH RESPECT TO THE SUBJECT MATTER HEREIN AND SUPERSEDES ALL PRIOR OR CONTEMPORANEOUS ORAL OR WRITTEN COMMUNICATIONS, REPRESENTATIONS, UNDERSTANDINGS OR AGREEMENTS RELATING TO THIS SUBJECT

Notes:

Notes:

TOSHIBA

TOSHIBA INTERNATIONAL CORPORATION

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