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A Sierra Monitor Company

**Driver Manual**  
**(Supplement to the FieldServer Instruction Manual)**

**FS-8700-124 TIC UPS**

**APPLICABILITY & EFFECTIVITY**

**Effective for all systems manufactured after May 1, 2001**

<b>Driver Version:</b>	<b>1.01</b>
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## **1. TIC UPS Description**

The serial TIC UPS driver allows the ProtoNode to transfer data to and from devices over RS-232 using TIC UPS protocol. The ProtoNode can emulate a Client.

This driver is intended for use with Toshiba models UPS.

It is intended to do the following:

- Read information from the UPS such as battery life, voltages etc. This will be done in user mode on the UPS.
- Write information and commands such as shutdown commands to the UPS.
- Advanced options such as reading/writing EEPROM is not supported. No date/time reads or writes will be supported. No string type commands will be supported.

### **Max Nodes Supported**

<b>ProtoNode Mode</b>	<b>Nodes</b>	<b>Comments</b>
Client	1	As the Toshiba protocol only allows for 1:1 communication at this stage, only 1 client is allowed per RS-232 port.
Server	1	The server only serves for emulation purposes. It will have a static address as per Toshiba spec.

**2. Driver Scope of Supply**

**2.1. Supplied by FieldServer Technologies for this driver**

<b>FieldServer Technologies PART #</b>	<b>Description</b>
FS-8917-02	RJ45 to DB9F connector adapter.
FS-8917-03	RJ45 to DB9M connector adapter.
FS-8700-124	Driver Manual.

**2.2. Provided by the Supplier of 3<sup>rd</sup> Party Equipment**

**2.2.1. Required 3<sup>rd</sup> Party Hardware**

<b>Part #</b>	<b>Description</b>
-	TIC UPS model 1600/1800/4200/G8000/G8000MM/G9000

**2.2.2. Required 3<sup>rd</sup> Party Software**

None

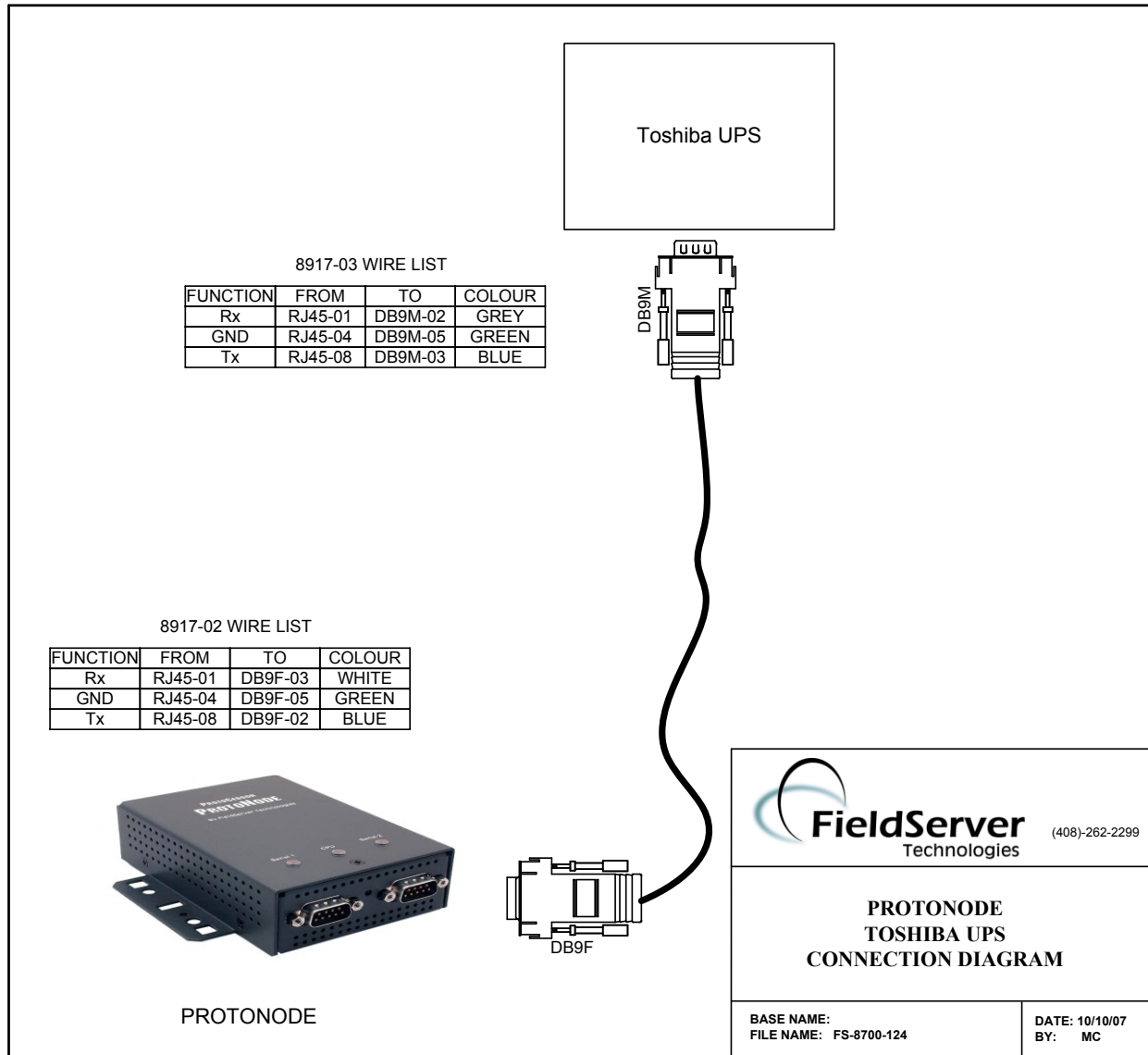
**2.2.3. Required 3<sup>rd</sup> Party Configuration**

The baud rate of the UPS must match the configuration file of the ProtoNode.

### 3. Hardware Connections

The ProtoNode is connected to the UPS as shown in connection drawing.

Configure the TIC UPS according to manufacturer's instructions.



#### 3.1. Hardware Connection Tips / Hints

- The RTS/DTS signals are not used by the driver. Make sure they are not connected and do not enable them in the configuration file.
- The cable must be a NULL modem cable, i.e. the TX must be connected to the other connector's RX.

#### 4. Configuring the FieldServer as a TIC UPS Client

For a detailed discussion on FieldServer configuration, please refer to the FieldServer Configuration Manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See “.csv” sample files provided with the FieldServer).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a TIC UPS Server.

##### 4.1. Data Arrays/Descriptors

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for TIC UPS communications, the driver independent FieldServer buffers need to be declared in the “Data Arrays” section, the destination device addresses need to be declared in the “Client Side Nodes” section, and the data required from the servers needs to be mapped in the “Client Side Map Descriptors” section. Details on how to do this can be found below.

Note that in the tables, \* indicates an optional parameter, with the bold legal value being the default.

Section Title		
Data_Arrays		
Column Title	Function	Legal Values
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Array_Format	Provide data format. Each Data Array can only take on one format.	Float, Bit
Data_Array_Length	Number of Data Objects. Must be larger than the data storage area required by the Map Descriptors for the data being placed in this array.	1-10,000

##### Example

```
// Data Arrays

Data_Arrays
Data_Array_Name,      Data_Array_Format,   Data_Array_Length
DA_AI_01,             Float,               200
DA_DI_01,             Bit,                 200
```

#### 4.2. Client Side Connection Descriptions

Section Title		
Connections		
Column Title	Function	Legal Values
Port	Specify which port the device is connected to the ProtoNode	P1-P8
Protocol	Specify protocol used	TOSHIBA_UPS, TOSH_UPS
Baud*	Specify baud rate	1200– <b>9600</b> , standard baud rates only (Vendor limitation)
Parity*	Specify parity	<b>Even</b>
Data_Bits*	Specify data bits	<b>7</b>
Stop_Bits*	Specify stop bits	<b>1</b>
Handshaking*	Specify hardware handshaking	<b>None</b>
Poll_Delay*	Time between internal polls	0-32000 seconds, <b>0.05 seconds</b>

#### Example

//	Client Side Connections					
Connections						
Port,	Protocol,	Baud,	Parity,	Handshaking,	Data_Bits	Poll_Delay
P1,	TOSH_UPS,	1200,	Even,	None,	7	0.100s

#### 4.3. Client Side Node Descriptors

Section Title		
Nodes		
Column Title	Function	Legal Values
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	Modbus station address of physical server node	1
Protocol	Specify protocol used	TOSH_UPS, TOSHIBA_UPS
Node_Type	The model of the TIC UPS	1600, 1800, 4200, G8000, G8000MM, G9000
Connection	Specify which port the device is connected to the ProtoNode	P1-P8 <sup>1</sup>

<sup>1</sup> Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

**Example**

```
// Client Side Nodes

Nodes
Node_Name,   Node_ID,   Protocol,   Node_Type,   Connection
PLC 1,       1,         TOSH_UPS,  1600,        P1
```

**4.4. Client Side Map Descriptors**

**4.4.1. FieldServer Related Map Descriptor Parameters**

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer	One of the Data Array names from "Data Array" section above
Data_Array_Offset	Starting location in Data Array	0 to maximum specified in "Data Array" section above
Function	Function of Client Map Descriptor	RDBC, WRBC, WRBX

**4.4.2. Driver Related Map Descriptor Parameters**

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the node names specified in "Client Node Descriptor" above
Toshiba_Command	Type of information on UPS	OV1, OV2, OV3 etc (Appendix A)
Length	Length of Map Descriptor	1 – All value commands 24 – All bit commands



### 4.5. Map Descriptor Example.

#### 4.5.1. Example 1

```
// Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,  Data_Array_Name,  Data_Array_Offset,  Function,  Node_Name,  Toshiba_Command,  Length,  Scan_Interval
A1,                   DA_AI_01,         0,                  RDBC,     Node_A,     OVI,              1,        5
```

For all commands except FAULT and ALARM, ensure that the Data\_Array\_Name points to an array of type float.

Make sure the Toshiba command supports the selected function.

For a list of commands, see Appendix A

All commands except ALARM and FAULT have length 1.

#### 4.5.2. Example 2

```
// Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name,  Data_Array_Name,  Data_Array_Offset,  Function,  Node_Name,  Toshiba_Command,  Length,  Scan_Interval
B1,                   DA_DI_01,         23,                 RDBC,     Node_A,     ALARM,           1,        5
B2,                   DA_DI_01,         15,                 RDBC,     Node_A,     ALARM,           4,        5
B3,                   DA_DI_01,         0,                  RDBC,     Node_A,     ALARM,           23,       5
```

For ALARM and FAULT, use bit arrays

Use the offset to read a specific bit or start reading at a specific bit. Use in conjunction with length. Max value is 23.

Specify number of bits to read. Maximum for Offset + Length is 23.

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**Appendix A. Commands Specific to Devices**

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**Appendix A.1. Client Read commands**

The following commands are supported with the RDBC function.

Command	Description
ALARM	Alarm data
BC	Battery current
BECR	Battery estimated charge remaining
BEMR	Battery estimated minutes remaining
BLR	Battery life remaining
BPV1	Bypass voltage phase 1
BPV2	Bypass voltage phase 2
BPV3	Bypass voltage phase 3
BPC	Bypass current
BPFREQ	Bypass frequency
BRHT	Battery rated holding time
BT	Battery temperature
BVP	Battery voltage percentage
DCBV	DC bus voltage
FAULT	Fault data
IC1	Input current phase 1
IC2	Input current phase 2
IC3	Input current phase 3
IFRQ	Input frequency
IV1	Input voltage phase 1
IV2	Input voltage phase 2
IV3	Input voltage phase 3
OC1	Output current phase 1
OC2	Output current phase 2
OC3	Output current phase 3
OFRQ	Output frequency
OLP1	Output load percent phase 1
OLP2	Output load percent phase 2
OLP3	Output load percent phase 3
OV1	Output voltage phase 1
OV2	Output voltage phase 2
OV3	Output voltage phase 3
SOB	Seconds on battery
SAD	Shutdown after delay
OV12	Output voltage between phase 1 & 2
OV23	Output voltage between phase 2 & 3
OV31	Output voltage between phase 3 & 1

**Appendix A.1.1. FAULT command:**

Stored in bits, make sure array's length is 24 and its type is bits.

Bit #	Function
Bit 23:	Not used
Bit 22:	1
Bit 21:	Input over current
Bit 20:	DC over current
Bit 19:	DC bus over voltage
Bit 18:	DC bus under voltage
Bit 17:	Phase rotation error
Bit 16:	DC Bus imbalance
Bit 15:	Not used
Bit 14:	1
Bit 13:	EEPROM error
Bit 12:	Battery or charger circuit fault
Bit 11:	Battery overheat
Bit 10:	UPS overheat
Bit 9:	0
Bit 8:	Fuse has opened
Bit 7:	Not used
Bit 6:	1
Bit 5:	Inverter over current
Bit 4:	UPS overload
Bit 3:	Inverter overload
Bit 2:	Inverter under voltage
Bit 1:	Overload 110% load
Bit 0:	Inverter over voltage

**Appendix A.1.2. ALARM command:**

Stored in bits, make sure array's length is 24 and its type is bits.

Bit #	Description
Bit 23:	Not used
Bit 22:	1
Bit 21:	Low battery voltage
Bit 20:	Battery replacement alarm
Bit 19:	Parallel running mode
Bit 18:	0
Bit 17:	0
Bit 16:	UPS lifetime alarm
Bit 15:	Not used
Bit 14:	1
Bit 13:	Asynchronous operation
Bit 12:	Ambient overheat
Bit 11:	Overload accumulation started
Bit 10:	0
Bit 9:	0
Bit 8:	0
Bit 7:	Not used
Bit 6:	1
Bit 5:	Countdown started for shutdown
Bit 4:	0
Bit 3:	0
Bit 2:	0
Bit 1:	0
Bit 0:	0

**Appendix A.1.3. STATUS command:**

Stored in bits, make sure array's length is 8 and its type is bits.

Bit #	Description
Bit 7:	Not used
Bit 6:	1
Bit 5:	UPS fault detected
Bit 4:	Input voltage out of spec
Bit 3:	Low battery voltage detected
Bit 2:	UPS output from bypass
Bit 1:	UPS output from inverter
Bit 0:	UPS input and output voltage sync

**Appendix A.1.4. Commands supported by Different Models**

1600:	1800	4200	G8000 & G8000MM	G9000
ALARM	ALARM	BC	BC	BC
BC	BC	BPV1	BECR	BECR
BEMR	BECR	BPV2	BPV1	
BLR	BEMR	BPV3	BPV2	
BPV1	BLR	BPC	BPV3	
BPC	BPV1	BPFREQ	BPC	BPC
BPFREQ	BPC	BRHT	BPFREQ	BPFREQ
BRHT	BPFREQ	BVP	BRHT	BRHT
BT	BRHT	DCBV	BVP	BVP
BVP	BT	FAULT	DCBV	DCBV
FAULT	BVP	IC1	FAULT	FAULT
IC1	DCBV	IC2	IC1	IC1
IFRQ	FAULT	IC3	IC2	IC2
IV1	IC1	IFRQ	IC3	IC3
OC1	IFRQ	IV1	IFRQ	IFRQ
OFRQ	IV1	IV2	IV1	IV1
OLP1	OC1	IV3	IV2	IV2
OV1	OFRQ	OC1	IV3	IV3
SAD	OLP1	OC2	OC1	OC1
STATUS	OV1	OC3	OC2	OC2
	SOB	OFRQ	OC3	OC3
	SAD	OLP1	OFRQ	OFRQ
	STATUS	OLP2	OLP1	OLP1
		OLP3	OLP2	OLP2
		OV1	OLP3	OLP3
		OV2	OV1	OV1
		OV3	OV2	OV2
		SAD	OV3	OV3
		STATUS	STATUS	OV12
				OV23
				OV31
				STATUS

**Appendix A.2. Client Write Commands**

The following commands are supported with the WRBC functions.

Command	Description
SAD	Shutdown after delay.
BTEST	Battery Test <sup>2</sup>

**Appendix A.2.1. Commands supported by different models.**

1600:	1800	4200	G8000 & G8000MM, G9000
SAD	SAD	SAD	No Write commands supported
BTEST	BTEST	BTEST	

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<sup>2</sup> Please note that due to battery health, this point can only be tested as specified by TIC

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## Appendix B. Troubleshooting Tips

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### Appendix B.1. Connection Tips & Hints

1. *What should the baud rate in my configuration file be set to?*

Consult the UPS manual for the default baud rate of your UPS.



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