

# TS1000BS

## Base Station

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## User's Menu

Revision 2.0

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## 1. OVERVIEW

Telstar's line of TS1000BS base stations and repeaters are versatile enough to allow for a variety of communications applications, and flexible enough to accommodate future requirements. The standard stations are available in a full range of RF bands and power levels. A host of operations may be added to the station to further expand its capabilities. For the most part, these options are accomplished in software to minimize hardware changes.

The TS1000BS station is a microprocessor-controlled station. Its standard features are listed as:

- Data packet transmission and receiving
- Optional RF transceiver for different bands
- Capable of 115,200 Baud Data transmission
- Extensive self diagnostics
- Solid-state, easily serviceable, modular design
- RF shielding and filtering to meet FCC Industrial Class A specifications
- Ferro-resonant power supplies which offer enhanced immunity to power line transients
- Wide operating temperature range from  $-30^{\circ}$  to  $+60^{\circ}$  C ( $-22^{\circ}$  to  $+140^{\circ}$  F)
- All assemblies are serviced, removed, and replaced through the front door of the station cabinet.

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- Field programmability with the Telstar field programmer software running on a notebook PC.

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## 2. STATION OPERATION

This section describes the station elements, station controls and indicators located on the front panel. In addition, a description of the extensive station diagnostics is included.

### 2.1 STATION ELEMENTS

#### 2.1.1 CABINET

The station cabinet is designed for indoor/outdoor installation, as shown in Figure 1, and may be stacked at site installations using an optional station stacking hardware kit.



Figure 1 TS1000BS1 station cabinet

### 2.1.2 CONTROL CIRCUIT

The control circuit is mounted in the top of station and includes a microprocessor, interface driver, RF ports and filters, as shown in Figure 2.

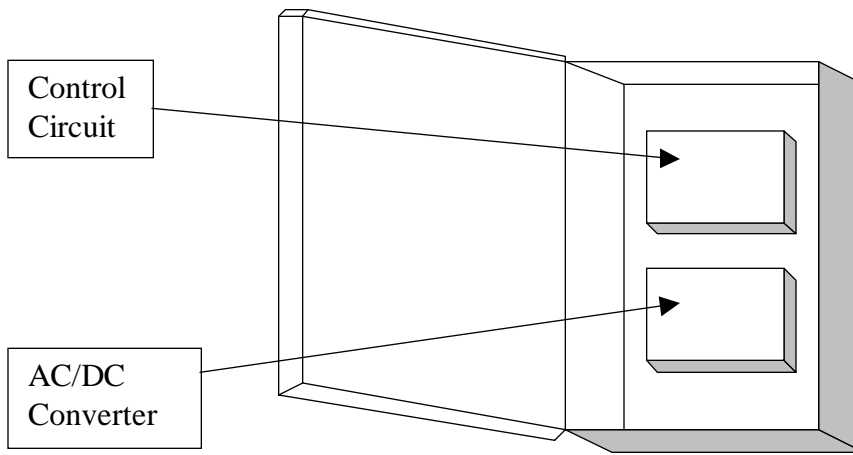


Figure 2 Control Box in cabinet

### 2.1.3 OPTIONAL TRANSCEIVER

The RF transceiver can be selected from FW900 and FW2400 optional modules according to customers' applications. The transceivers are separately certificated by FCC requirements.

### 2.1.4 AC POWER SUPPLY

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The station power supplies are mounted in the lower half of the cabinet, as shown in Figure 2. The standard power supplies are ferro-resonant types designed to operate with a nominal 220-volt, single-phase, 50 Hz AC power source and a nominal 110 volt, single-phase, 60 Hz AC power source. They also provide transient protection against line surges and lightning. The power supplies are capable of delivering up to 30 watts.

### 2.1.5 SOLAR SUPPLY

Solar supply is a self-contained, solar-powered communications system, as shown in Figure 3, and provides steady, clean power to a variety of telemetry systems, including wellhead, oil field and pipeline monitoring sites, custody transfer stations and natural gas automation projects. It is configured to meet Class I and UL requirements.



Figure 3 Solar Power Supply



## 2.2 OPERATION

TS1000BS base stations operate as data stream router with TDFH technologies. The packet data is opened and distributed into different paths. A Telstar's TDFH protocol is adopted for data communication. The block diagram is given in Figure 4.

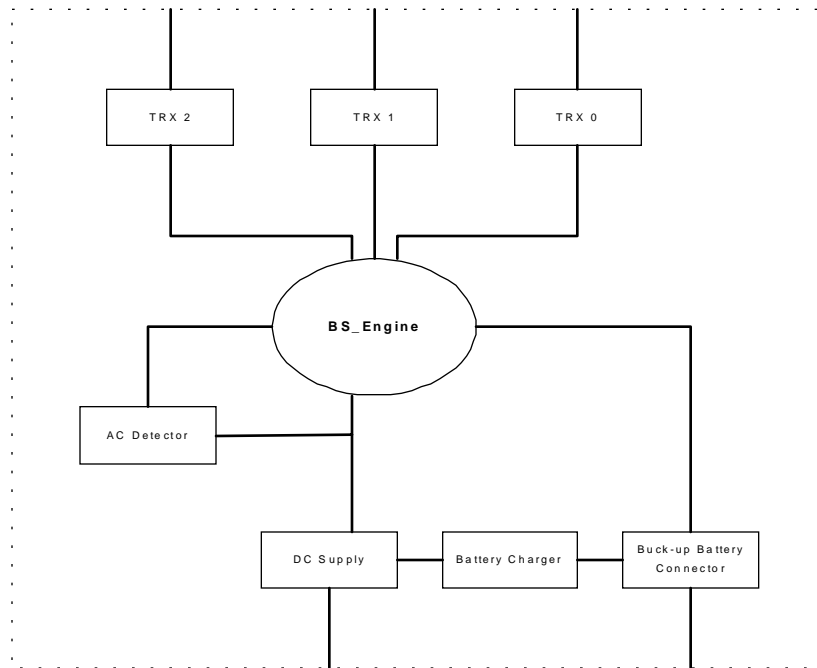


Figure 4 Base Station Block Diagram

Data Package Format:

Starter	Head	Data	CRC
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Message Flow Chart in base station is given in Figure 5.

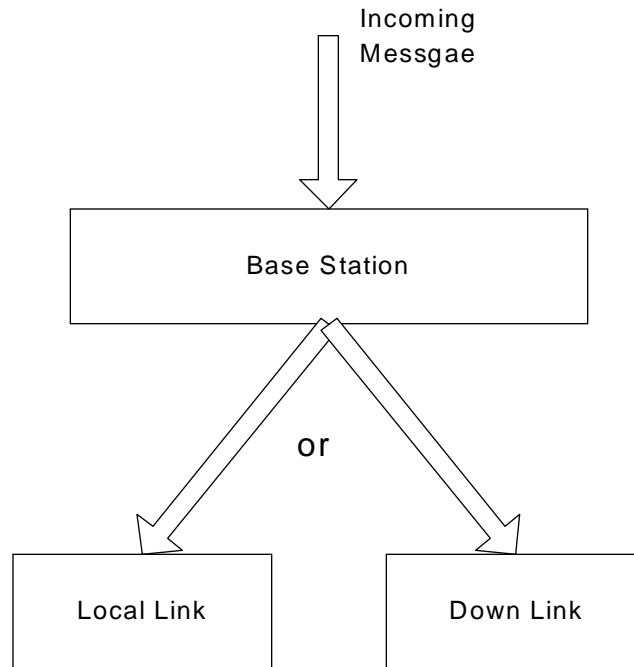


Figure 5 Data Flow Chart

### 2.3 STATION DIAGNOSTICS

This section describes the extensive diagnostic capabilities of the TS1000BS Station. These diagnostics fall into two basic categories: Power-up/Reset Diagnostics and Continuous Diagnostics. Both are described in the following sections.

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### 2.3.1 POWER\_UP/RESET DIAGNOSTICS

Upon station power-up or reset, varieties of diagnostic tests are performed to verify both that the hardware is functional and the firmware and code plug devices are correctly programmed. The hardware diagnostic tests are designed to detect a faulty device or group of components. The faulty components can be indicated to the user via a local diagnostic port and the FAIL LEDs on the board.

### 2.3.2 CONTINUOUS DIANGONSTICS

The Continuous class of diagnostics is always monitoring the status of the station. One part of the Continuous Diagnostics monitors the software program controlling the station. If abnormal operation is encountered, an error code will be sent to the Network Administration Center (NAC). The other part of Continuous Diagnostics operates by reading the eight reverse wildcard (RW) bits on the station local diagnostic port. If any of these bits active, the error messages are also sent to NAC.

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## 3. INSTALLATION

### 3.1 FCC REQUIREMENTS

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#### **IMPORTANT**

FCC regulations state that:

1. The Grantee of a license has the responsibility of assuring that all equipment operated under that license conforms to the specifications of the license.
2. The RF power output of a radio transmitter shall be no more than that required for satisfactory technical operation considering the area to be covered and local conditions.
3. The frequency, deviation, and power of a radio transmitter must be maintained within specified limits. It is recommended, therefore, that these three parameters be checked before the station is placed in service.

#### **REMEMBER**

The efficiency of the equipment depends upon a good installation. Telstar recommends that adjustments to this equipment be made **ONLY** by a certified technician.

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**CAUTION**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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The equipment accessories are approved by FCC and only accessories from Telstar Telecom Inc. are qualified for this equipment applications. Detail information see FCC part 15.27.

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**IMPORTANT**

(a) Only shielded cables, antennas, and special connectors from Telstar Telecom Inc. can be used in this system. Information detailing any alternative method used to supply the special accessories shall be must be approved by FCC and included in the application for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of the text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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(b) If a device requiring special accessories is installed by or under the supervision of the party marketing the device, it is the responsibility of that party to install the equipment using the special accessories. For equipment requiring professional installation, it is not necessary for the responsible party to market the special accessories with the equipment. However, the need to use the special accessories must be detailed in the instruction manual, and it is the responsibility of the installer to provide and to install the required accessories.

(c) Accessory items that can be readily obtained from multiple retail outlets are not considered to be special accessories and are not required to be marketed with the equipment. The manual included with the equipment must specify what additional components or accessories are required to be used in order to ensure compliance with this part, and it is the responsibility of the user to provide and use those components and accessories.

(d) The resulting system, including any accessories or components marketed with the equipment, must comply with the regulations.

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**IMPORTANT INFORMATION**  
**(FCC Part 15.105)**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
  - Increase the separation between the equipment and receiver.
  - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
  - Consult the dealer or an experienced radio/TV technician for help.
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### **3.2 INSPECTION**

Inspect the equipment thoroughly as soon as possible after delivery. If any part of the equipment has been damaged in transit, report the extent of damage to the transportation company immediately.

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#### **CAUTION**

Station contains CMOS devices. Good troubleshooting and installation techniques require proper grounding of personal prior to handling equipment.

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### **3.3 PLANNING THE INSTALLATION**

Since a good installation is important to obtain the best possible performance of the communications system, carefully plan the installation before actual work is started. Location of the station in relation to power, control lines, the antenna, and convenience and access for servicing should be considered. The cabinet dimensional detail diagrams show the size the various cabinets for planning the space requirements. Read the entire procedure and the many suggestions offered to help you plan your installation. Make sure all tools, equipment, and facilities are available when the installation is begun.

### **3.4 INSTALLATION**

Station can be installed in indoor or outdoor. The cabinet should be located on a solid, level surface convenient to the power source and the RF transmission line. The RF transmission line should be kept as short as possible to minimize line



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losses. All antenna power and control lines are connected at the junction box located at the bottom of the cabinet.

Installation procedures are listed:

- a) Install the station wall or pole with a hardware kit
- b) Connect the ground terminal to a substantial earth ground located as close as possible to the station and in as straight a line as possible.

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**WARNING**

Even if a three-wire grounded primary AC power source is available, the radio equipment must be grounded separately to prevent electrical shock hazards and provide lightning protection.

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- c) Connect the male plug of the three-wire AC line cord to the wall outlet provided near the station.

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**NOTE**

A power ON-OFF switch is not provided on the station, therefore, the equipment is immediately operational when the power cord is plugged into a live AC outlet.

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## **4. LIGHTING PROTECTION RECOMMENDATIONS**

### **4.1 GENERAL**

The conditions that make a site desirable for wireless communication are the same as those that make a site an excellent target for lightning. Proper lightning protection can completely prevent equipment damage in all but the most severe strikes, and even then, can keep the equipment damage to a minimum. Lightning protection consists of preventing the strike from entering the equipment room, and then preventing damage to the equipment from induced voltages and currents on power and control lines to the equipment. The following suggestions will help protect valuable radio facilities. Some products already incorporate certain suppressors as standard equipment. In these cases, additional protection is not normally required, unless dictated by unusual site considerations. When such unique situations occur, consult the appropriate area office for further information.

### **4.2 INSTALLATION INSTRUCTIONS**

Protection is provided by keeping the lightning strike currents in the grounding network; rather than letting it find its own way to ground through the equipment.

- a) Keep the tower grounding resistance as low as possible. The lightning stroke current belongs in the tower structure and grounding system; not on the transmission line.
- b) Use copper clad grounding rods at least eight feet long. Multiple grounding rods are better than one, especially in areas with dry climate and/or soil that is sandy, rocky, or both.
- c) Provide additional grounding to the transmission line sheath wherever possible. Make it a point to ground the transmission line where it is supported on poles and where it enters a building.
- d) Bond all equipment cabinets together at a single point. Then ground that point to a grounding rod network, using as short, straight, and heavy a

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- ground wire as possible. If bends in the ground wire are necessary, give them as large a radius as practical.
- e) Bring the transmission line off the tower with the sharpest bend permitted by the manufacturer's specifications, and make a solid bond between the tower and the transmission line sheath just prior to the bend. The sharp bend acts as high impedance to the extremely high strike current. This shunting more of the strike current into the tower ground, rather than into the equipment. Use no more and no less than the minimum bending radius wherever the transmission line changes direction, and introduce a change of direction at every reasonable opportunity; grounding the transmission line sheath solidly at the antenna side of each bend in the transmission line.
  - f) Transmission line should be brought into the equipment cabinets adjacent to the single point ground connection where a good low impedance bond can be made to the transmission line sheath.
  - g) It is wise to take at least part of the transmission line through a length of grounded conduit.
  - h) Install a gas tube protector between the equipment cabinet ground and AC-neutral where it enters the equipment cabinet. Install gas tube protectors where the control lines enter the building and at the point of entry into the equipment cabinet. Also install gas tube protectors wherever control lines enter a building, and install additional protectors as close as possible to the remote control console.
  - i) Keep ground wires from gas tube protectors to ground rods or perimeter grounds as short and straight as possible. Avoid sharp bends in ground wires.
  - j) Never bundle a ground wire with any other cabling or wiring. Also, never run as ground wire along any metal wall, along any electrical conduit, or inside a conduit.

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## 5. MAINTENANCE

The station site alignment should be performed at installation, six months after installation, and every twelve months thereafter. The following measurements are recommended:

- TX, RX, and PA Meter Reading
- Receiver Sensitivity
- Line Levels
- RF Power Level
- Battery Charger Voltage Check

The regular station maintenance is serviced by your local technical support and Telstar representative.

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