



## *Installation and Operation Manual*



### **TeleSwitch Six** *Six Line Call Director*

Controller firmware version 1.08 or above  
Switch Console firmware version 1.02 or above

Manual Revised 01/16/2004

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## INTRODUCTION

Thank you for your purchase of a Broadcast Tools® TeleSwitch Six (referred to as the TS-6 throughout this manual). We're confident that this product will give you many years of dependable service.

This manual is intended to give you all the information needed to install and operate the Broadcast Tools® TS-6.

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If you would like more information about Broadcast Tools® products, you may reach us at:

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**Broadcast Tools®** Products, as with any electronic device, can fail without warning. Do not use this product in applications where a life threatening condition could result due to failure.

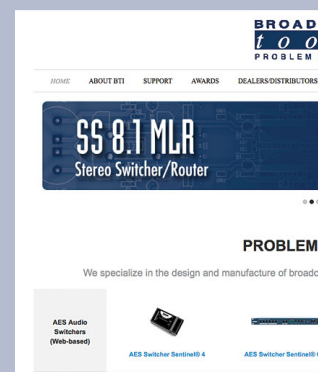


## NOTE:

This manual should be read thoroughly before installation and operation.

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## INTRODUCTION

### **PRODUCT DESCRIPTION**

The TeleSwitch Six call director offers a low cost solution to interfacing up to six telephones lines to almost any hybrid. The TeleSwitch Six is supplied with one Switch Console and Controller. The units are interconnected via CAT 5 cable. A total of four Switch Consoles may be attached to the controller. The Switch Console is equipped with push buttons for line selection and control features, dialing pad, bright LED indicators and RJ-11's for local telephone set and hybrid connections. The TeleSwitch Six is a dual-buss device, meaning that calls can be answered on the telephone set, while calls are active on the hybrid. With TeleSwitch Six, lines can be answered, placed on hold (MOH audio input), busied out and routed to a telephone set and/or hybrid. Robust switches with bright LED indicators indicate whether a line is ringing, on-hold, busied out along with other functions.

The operation of the TeleSwitch Six is similar to that of a multi-line telephone set. To answer a call directed to the hybrid, press the button of the ringing line. To answer a call with the telephone set, press the "PHONE" button and then press the button of the ringing line. To disconnect a call, press the "DROP" button, then the desired line button. The conference feature allows button mash conferencing, placing multiple lines on a single hybrid. In addition to these standard features, TeleSwitch Six offers additional special functions.

#### **Seven special function buttons:**

- NEXT selects the line on hold the longest.
- BUSY, the first press of this button all lines that are neither in use, nor on hold will be placed on hold. The next press of this button will drop all lines.
- FLASH has two functions, one to simulate hook-flash or to allow auto-answer of calls
- REC when pressed will begin flashing the red REC led. The record relay will not be engaged until a line button is pressed. When the record input goes low, the REC LED will change to solid red. The REC relay will stay energized until the STOP button is pressed. The STOP LED will flash and the record relay will turn off along with the REC LED.
- DELAY activates the DLY relay that may be used to control a remote profanity delay.
- OPT will toggle the OPT relay on and off. The yellow opt LED will not light until contacts are closed.

### FEATURES

- Interfaces to most telephone hybrids.
- Four Switch Consoles may be attached to the system controller.
- Dual-buss architecture, meaning that calls can be answered on the “Screener” telephone set, while calls are active on the hybrid. If call screening isn’t required, a second hybrid may be used.
- Easy Installation.
- Free Windows OS based “Call Screener” software, which may be downloaded from our web site.

### SWITCH CONSOLE FRONT PANEL DESCRIPTION

The Switch Console is equipped with twenty-nine durable push button switches and twenty-three bright indicator led’s.

### SWITCH CONSOLE REAR PANEL DESCRIPTION

The rear panel of the Switch Console consists of the following:

- Dual RJ-45 connectors. Attach the Controller to one connector and the second connector is provided for an additional switch console.
- Hybrid RJ-11 connector
- Screener Telephone RJ-11 connector
- Programming 8 position DIP switch
- Ring signal speaker level control (may be defeated).
- External 12-vdc-power connector. The Controller powers the Switch Consoles. **This connector is rarely used.**

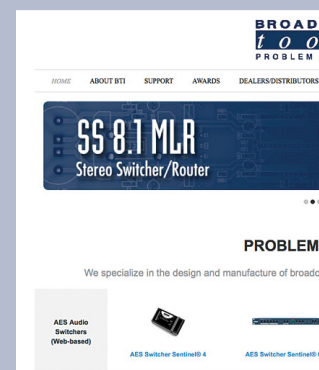
### REAR PANEL DESCRIPTION SYSTEM CONTROLLER

The Controller is equipped with the following connectors and controls:

- Six RJ-11’s. This is where the C.O. or fully functional loop start analog PBX extension lines are brought into the TS-6. The connectors are from left to right lines one through six.
- Six RJ-11’s. These are loop-thru connectors. This is where you would connect your business telephone system if you were sharing the line. These connectors are the second group of six RJ-11’s to the right of the CO modular jacks.
- The single RJ-11 is the hybrid connector.
- To the right of the hybrid RJ-11 is the Call Screener telephone RJ-11 (2nd Hybrid).
- The last two modular connectors are RJ-45’s. This is where you connect the Switch Consoles.
- MOH adjustment pot.
- Dual-row screw terminals. Relay contacts and control input connections are made here.
- RS-232 serial port. Connect to your PC along with the FREE “Call-Screener” software.

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### FEATURES

- Power LED
- Power connector. Connect the 2.1mm coaxial type power connector into the TS-6 controller and the 16 VAC @ 600 ma wall transformer into a 120 Vac 50-60 Hz power source. The rear panel power LED indicates when power is applied to the TS-6 controller, while the Switch Consoles front panel power LED indicates when power is applied to any of the Switch Consoles. (CE, 220 Vac 50-60 Hz wall transformer OPTIONAL)

**“Remote” Control Connector:** Refer to page 8 of this manual.



### INSTALLATION GUIDELINES

It is recommended that all cables connected to the TS-6 be looped through ferrite cores to suppress RF. Surge protection with RF filtering such as the Tripp Lite “ISO-BAR 4” is also suggested for the power transformer. The purchase of an inexpensive uninterruptible power supply (UPS) will provide back up in case of power outages.

1. Inspection
2. Bench test and option set-up
3. Rack mount the controller with the optional RM-3, while the Switch Console(s) are designed for desktop mounting.
4. Connect your external equipment.
5. Label the front panel of the Switch Console(s), if desired.
6. Connect the serial port to a PC's com port and load the Free Windows OS based “Call Screener” software which may be downloaded from our web site.

#### STEP 1: INSPECTION

Please examine your TS-6 carefully for any damage that may have been sustained during shipping. If any is noted, please notify the shipper immediately and retain the packaging for inspection by the shipper. The package should contain the TS-6 controller, TS-6 Switch Console, this manual, 16 VAC @ 600-ma controller power wall transformer, CAT-5/6 interconnection cable and serial cable.

#### STEP 2: BENCH TEST

**Note:** Please refer to the appendix for connector locations. Jump to STEP 4

#### STEP 3: RACK MOUNT EQUIPMENT

Rack mount the Controller. The RM-3 must be purchased to rack mount the Controller. The Switch Console should be placed near the user.

#### STEP 4: CONNECT YOUR EQUIPMENT AND TELEPHONE LINES

- 1 - Connect your “Loop Start” telephone lines to the first six RJ-11's of the Controller (As viewed from left to right). **The far left RJ-11 is line one.**  
**NOTE: It is imperative that the Tip & Rings are wired correctly for the conference operation to work.**
- 2 - If you are planning on looping-thru your business telephone lines through the TeleSwitch Six, the loop-thru RJ-11's may be used for this feature.
- 3 - Connect the first Hybrid to the RJ-11 labeled “HYBRID”(The 13th RJ-11 from the left).
- 4 - Connect the call screener telephone or the 2nd Hybrid to the RJ-11 labeled “Phone” (The 14th RJ-11 from the left).
- 5 - Connect the first Switch Console to the RJ-45 labeled “Desk Set 1”.
- 6 - Connect the second Switch Console to the RJ-45 labeled “Desk Set 2”.
- 7 - Connect the hybrids remote control according to the type of hybrid listed on the next page.



#### CAUTION!

*Installation of the TS-6 in high RF environments should be performed with care. Shielded cable is suggested for all control, audio inputs and outputs. All shields should be tied to the “CHASSIS GROUND” terminal. The station ground should be connected to the chassis ground screw located behind J17 as viewed from the rear. For lightning protection, check out [www.polyphaser.com](http://www.polyphaser.com) and [www.itwlinx.com](http://www.itwlinx.com)*

**NOTE:** We have tried to provide the most popular hybrid connection information. We will continue to update this list. If you find that your hybrid isn't on the list and need help, please don't hesitate in calling us for help.

### Hybrid Connections

**Brand/Model:**      **Connections:**

#### AEQ

**TH-02 EX Mk II**      DB-15 pin 5 (On Air Line 1) to TS-6 Controller J7 pin 6.  
DB-15 pin 3 (On Air Line 2) to TS-6 Controller J7 pin 9.  
DB-15 pin 9 (Ground) to TS-6 Controller J7 pins 5 and 8.  
**DIP 2 must be ON** to select dual-hybrid mode.  
**Note: The AEQ hybrid should be in the remote mode.**

#### Comrex

##### DH-20

DB-25 pin 1 to the **TS-6 Controller** J7 pin 6,  
DB-25 pin 25 to **TS-6 Controller** J7 pin 5.

##### DH22

Same as above for Hybrid 1.  
For Hybrid 2 connect DB-25 pin 3 to **TS-6 Controller** J7 pin 9.  
DB-25 pin 25 to **TS-6 Controller** J7 pin 8.  
**DIP 2 must be ON** to select the dual-hybrid mode.

#### Gentner

##### Digital Hybrid III

DB-25 pin 1 (Hybrid ON) to TS-6 Controller J7 pin 6.  
DB-25 pin 2 (Hybrid OFF) to TS-6 Controller J7 pin 9.  
DB-25 pin 5 (Ground) to TS-6 Controller J7 pins 5 and 8.  
DIP 7 must be ON for pulse mode.

#### JK Audio

##### Innkeeper 1 & 1R

Innkeeper pin 6 (Call) to **TS-6 Controller** J7 pin 6.  
Innkeeper pin 7 (Drop) to **TS-6 Controller** J7 pin 9.  
Innkeeper pin 4 (Ground) to **TS-6 Controller** J7 pin 5 and 8.  
**DIP 7 must be ON** for pulse mode.

#### Broadcast Host

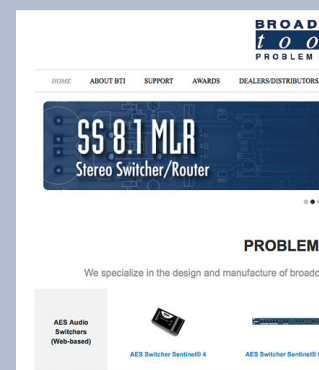
Host pin 5 (+ 4.3vdc) to **TS-6 Controller** J7 pin 6.  
Host pin 1 (Ground) to **TS-6 Controller** J7 pin 9.  
Host pin 2 (Call/Drop) to **TS-6 Controller** J7 pin 5 and 8.  
**DIP 7 must be ON** for pulse mode.

#### Telos ONE

DB-9 pin 1 (Hybrid ON) to **TS-6 Controller** J7 pin 6.  
DB-9 pin 7 (Hybrid OFF) to **TS-6 Controller** J7 pin 9.  
DB-9 pin 6 (Ground) to **TS-6 Controller** J7 pins 5 and 8.  
**DIP 7 must be ON** for pulse mode.

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## Terminal J7

----- HYBRID -----				----- OPT -----				----- DLY -----			
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
MOH In-	MOH In+	Shld	N.C.	COM	N.O.	N.C.	COM	N.O.	N.C.	COM	N.O.
N.O.	Com	N.C.	Dly In Gnd	Dly In +	Dly TTL	REC In Gnd	REC In +	REC TTL	OPT In Gnd	Opt In +	Opt TTL
<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>
----- REC -----											

- 8 - Connect the “Program on Hold” feed to the “MOH” terminals on J7.
- 9 - Set DIP switches according to the required operation, see chart below:

### DIP switch settings on the Controller unit: Firmware Version 1.08 or greater.

- DIP – 1 CPC and current monitoring is turned off. This allows for operation of the unit without any phone lines plugged in.
- DIP – 2 Two Hybrid operation. The Hybrid and OPT relays control Hybrid 1, while the DLY and REC relays control Hybrid 2
- DIP – 3 Auto-Answer. If this is on the lines will auto answer and be placed on hold. This setting supercedes DIP-4.
- DIP – 4 Re-defines the Flash button/LED as Auto-Answer on/off. DIP-3 must be off for this to work.
- DIP – 5 Hot line 5, unaffected by Busy Button.
- DIP – 6 Hot line 6, unaffected by Busy Button.
- DIP – 7 Hybrid 1 control. OFF = Latch mode, ON = Pulse mode using Hybrid and OPT.
- DIP - 8 Hybrid 2 control. OFF = Latch mode, ON = Pulse mode using DLY and REC relays.

### DIP switch settings on the Switch Console:

- DIP – 1-2 Address selection for remote Switch Consoles. Each Switch Console must have a different address: 00, 01, 10 or 11. If two or more are the same there will be data collisions and the system will not function properly.
- DIP – 3 Turns off Ringer. The ringer can be turned down with the volume control but there will still be a low audible ring, which could be distracting to the on-air talent. This setting turns it off in software.
- DIP – 4-7 Not used
- DIP – 8 Test mode. Used to test LED’s and pushbuttons on the Switch Console.

- 10 - Connect the supplied 16vac @ 600ma wall transformer to J17, the power connector on the TS-6 Controller.

**NOTE: The Controller supplies power for all Switch Consoles.**

- 11 - Follow the System operation guide below.

### SYSTEM OPERATION GUIDE

#### Answering a Ringing Line

A standard TT telephone must be plugged into the Phone RJ-11 on the control unit or on one of the Switch Console. When any line rings, the red Phone LED will begin to flash and the Switch Console ringer will sound if enabled. The call screener can answer a ringing line by pressing the Phone button followed by the line that is ringing. The Red LED will change from flashing to solid red and the phone line will be connected to the call screener phone. Note: if DIP-1 is off for normal CPC operation, a phone must be plugged into the phone jack on either the desk or control units and be off hook before selecting a line. If a line is selected without a telephone termination, no loop current can be drawn and the line will be dropped.

#### Placing a Call on Hold

To place a call on hold press the Hold button followed by the line number. The red LED will begin to blink and the caller will be connected to the music-on-hold input. When a call is placed on hold it goes into the “Next Queue”. Refer to the “Next” button operation below for selecting the caller who has been on hold the longest.

#### Connecting a Call to the Hybrid

A call can be connected to the Hybrid by pressing any of the line buttons once. If a call was on hold, is ringing or off-hook connected to the phone output it will switch to the Hybrid and the yellow LED will light. The hybrid relay output pins 5 and 6 must be connected to the Hybrid for control. When a new line is selected, the control line will turn off for 500ms and back on again in order to re-null the Hybrid. The selected line will be placed on hold for 500ms to maintain loop current on the line and give the Hybrid enough time to connect. If this were not done the phone system would detect a flash-hook signal and could switch lines.

If DIP-7 is on, the Hybrid relay is used as a pulse-ON signal and the OPT relay is used as a pulse-OFF signal.

#### Optional Second Hybrid

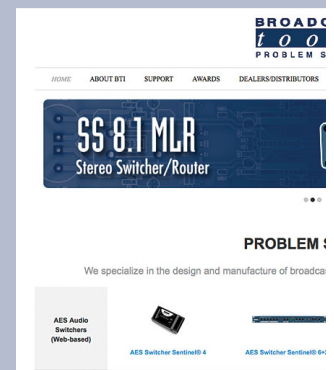
As an option, if DIP-2 is on, the phone line output can be used to connect to a second hybrid. The DLY and REC relays are used to control Hybrid 2. DIP 8 is used to select Latch or Pulse. If DIP 8 is off, the DLY relay will Latch on when Hybrid 2 is selected and turn off when the line is dropped. If DIP 8 is on, DLY will pulse when a line is selected and REC will pulse when the line is dropped. The Next feature and the Conference feature are not available on the second hybrid.

#### Selecting the Next Caller

The NEXT button is used to select the caller who has been on hold for the longest time. The next line will be selected on the trailing edge of a Next button press. Each time a caller is placed on hold that line goes into the Next Queue. If a caller on hold hangs up, and the CPC is enabled, that line will be dropped and removed from the Next Queue. A new caller on that line will go to the bottom of the list.

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### **Auto Answer**

If there is no call screener, the Auto-Answer DIP-3 switch setting can be used to automatically answer calls and place them on hold. If DIP-4 is on (DIP-3 must be off) the FLASH button / LED are changed to be used to toggle auto-answer on and off. When the green FLASH LED is lit auto-answer will be on.

### **Conference Calls**

To conference a line into the hybrid, press the CONF button followed by the line button. Note: for conferencing to work properly it is important to properly connect the telephone Tip and Ring on all six CO lines.

### **Dropping a Call**

To drop a call press the Drop button followed by the line button of the call to be dropped. If the call is on the Hybrid or connected to the phone output it will be dropped and the LED's will turn off. If DIP-1 is off and standard POT's lines are being used, the controller will monitor the lines for CPC (wink) loop control and will also drop a line on a CPC signal or no loop current.

### **Flash Hook**

A Flash Hook can be generated on any line that is either off-hook, connected to the phone output or an active Hybrid line. To generate a 500ms Flash Hook signal press the Flash button followed by the line button. This button can have an alternate use if DIP-4 is on. Refer to "Auto-Answer".

### **Record Control**

Pressing the REC button, will cause the red record led to begin flashing. The REC relay will not be engaged until a line button is pressed. When the record input goes low the REC LED will change to solid red. The REC relay will stay on until the STOP button is pressed. The STOP LED will flash and the REC relay will turn off along with the REC LED.

### **Delay Button and DLY Relay**

Pressing the DELAY button will toggle the DLY relay on and off. The green delay LED will not light until contacts are closed on the delay input between pins 16 and 17.

### **OPT Button and OPT Relay**

Pressing the OPT button will toggle the OPT relay on and off. The yellow opt LED will not light until contacts are closed on the opt input between pins 22 and 23.

### **DTMF Keypad**

The DTMF keypad can only be used on the Hybrid line connection (not the screener tele- phone). When any button is pressed, the Switch Console will generate the corresponding tone.

### Extra Switch Console

Up to four Switch Console can be connected to a control unit. Each unit must be set to a different address with DIPswitch settings 1 and 2. If multiple units are connected the control unit sees all Switch Console as if they were one unit. For example; one unit can press the DROP button and another unit can select the line to drop.

### TS-6 Status Protocol Output on RS-232 Port

Every 100ms the TS-6 will output a simple data string that will show the status of each line. The possible states are Ring, Current, Hybrid, Phone, Hold, Loop and Idle. Data protocol: 9600,8,N,1.

The string will begin with the “@”, followed by six ASCII characters, 123456, where 1 is line 1, 2 is line 2, etc. and end with an ASCII Carriage Return. The six possible states are:

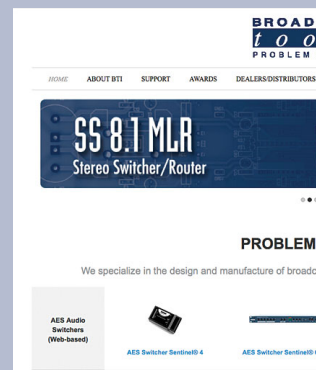
R = Ring detected  
C = Current flow detected  
Y = Hybrid  
P = Phone  
H = Hold  
L = Loop connected (Idle state)

A typical string would be @LLRYPH<cr>

Where lines 1 and 2 are idle, connected to their loop outputs, line 3 is ringing, line 4 is connected to Hybrid-1, line 5 is connected to the screener Phone (or Hybrid-2) and line 6 is on Hold. The string will be followed by a Carriage Return (0Dh). If both loop Current AND Hybrid, Phone or Hold is detected and then only the Hybrid, Phone or Hold states will be reported. If loop current is detected without any of the other three states, then the assumption is that an external phone connected to a loop output has been taken off hook. In the case of both Current and Loop states, the Current state will be reported.

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### **SPECIFICATIONS**

Switching Method:	Passive. Sealed relays utilizing 2-form-C bifurcated - crossbar silver alloy with gold overlay contacts
Logic:	Flash microcontroller, non-volatile memory
Operation Control:	Front Panel – Switch Console Switches.
Status:	Front Panel –Switch Console Indicator LED's. Serial –RS-232, Transmit only, 9600 / 8,N, 1. “Call Screener” Software.
Interfacing:	Telco & Loop - Thru - RJ-11 (LOOP-START ONLY) Switch Consoles - RJ-45 Hybrid Control - SPDT relay contacts / Screw terminals Auxiliary Control – SPDT relay contacts / Screw terminals Remote Indicators - Opto-Isolated inputs / Screw terminals MOH (Program) balanced audio input, 0dbu / 20k -Screw terminals. RS-232 – DB-9, Female. 9600,8,N,1
Power Requirements:	16 Vac, 600 ma. 120 Vac 50-60 hz transformer. (CE 240 Vac 50-60 Hz optional).
Physical Dimensions:	Controller - 16 - 5/16” x 4” x 1.00” (WDH) Switch Console - 9.25” X 6.25” X 2.75” (WDH)
Weight:	Controller - 3.0 lb. Switch Console –3.0lb.
Options:	RM-3 rack shelf for Controller. Additional Switch Consoles.

### LIMITED WARRANTY

The term "Buyer" as used in this document refers to and includes both (but only) (a) any person or entity who acquires such an item for the purpose of resale to others (i.e., a dealer or distributor of an item), and (b) the first person or entity who acquires such an item for such person's or entity's own use.

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**APPENDIX**

