



Installation and Operation Manual



PS-99 ***Programmable Scheduler-99***

PS-99 firmware version 2.30 or greater

Manual Revised 08/18/2005

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INTRODUCTION

Thank you for your purchase of a Broadcast Tools® **PS-99, Program Scheduler** (referred to as the PS-99 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® PS-99.

SAFETY INFORMATION

Only qualified personnel should install Broadcast Tools® products. Incorrect or inappropriate use and/or installation could result in a hazardous condition.

WHO TO CONTACT FOR HELP

If you have any questions regarding your product or you need assistance, please contact your distributor from whom you purchased this equipment.

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

Broadcast Tools, Inc.

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BROADCAST TOOLS® BRAND PRODUCTS!***

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Designed, Assembled and Supported in WA State, USA



CAUTION!

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.

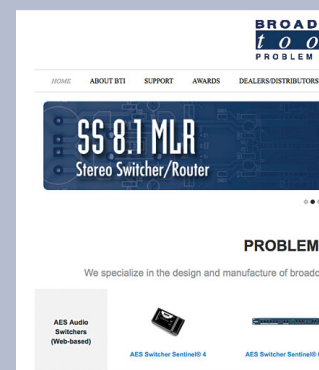


NOTE:

This manual should be read thoroughly before installation and operation.

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INTRODUCTION

PRODUCT DESCRIPTION

The Programmable Scheduler (PS-99) can store and control up to 99 events. Events may be programmed with Hour/Minutes/Seconds and Day/Month/Year or Day of Week. Each event may control the RS-232 serial data port and/or any of the six SPDT one amp relays. Thirty serial macro strings of up to 96 ASCII, HEX and/or control characters may be stored and scheduled at specific times.

Events are scheduled using a front panel "PGM" RS-232 serial port and a standard terminal program such as Windows HyperTerminal or Tera-Term Pro. The PS-99 supports 99 scheduled events. An event can consist of turning a relay on or off, triggering a relay momentarily for 750 ms and/or sending serial control macros out the rear panel EXT Serial port. Macros can be any ASCII or HEX value, along with control characters.

Programming is accomplished with any non-dedicated computer and off-the-shelf communication software.

Features

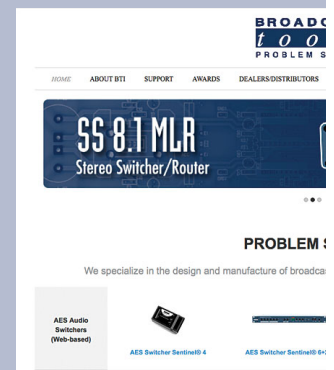
- Six SPDT one amp relays, with up to sixteen character labels. These may be configured for either momentary or latched contact closures.
- Thirty, ninety-six (96) character ASCII, HEX and/or control character serial control macro strings.
- Optically isolated Sync input with LED indicator, allowing clock updates any minute and second within each hour from an external source, such as NIST, Program Networks or master clock systems.
- Lithium battery backup keeps the clock processor operating during power outages. 10 plus year life expectancy.
- Stable crystal time-based clock processor.
- Flash based microprocessor with non-volatile memory.
- Field-programmable with a non-dedicated PC.
- Auto leap year correction.
- 24-hour time format.
- Daylight Saving Time programming. Y2K compliant.
- Removable screw terminals for easy connection to your external circuits.

Applications

AM power change, directional array switching, control of satellite receivers;, analog/AES-EBU/Video switchers, VTR's or any other device that accepts RS-232 ASCII and/or HEX control strings and/or relay contact closures.

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DESCRIPTION

OPERATIONAL FUNCTIONS

EVENTS

Program up to 99 events to any one of six relays and/or 30 serial control macros. The programming is accomplished when the PS-99 is connected to the serial port of any non-dedicated computer running off the shelf communication software in either the DOS, Windows or Windows 95/98/2000/NT/XP based platforms. The PS-99 may also be programmed remotely, when is connected to an optional external modem.

RELAYS

The PS-99 is supplied with six SPDT one-amp relays. The relays may be configured to latch, unlatch or give 750 ms momentary contact closure. Each relay may be assigned a sixteen-character label.

EXTERNAL SERIAL CONTROL

The PS-99 provides transmit only RS-232 EXT serial port. Baud rates may be set to any of the following: 300, 600, 1200, 2400, 4800, 9600, 19.2K, 38.4K and configured to transmit up to thirty, ninety-six (96) character ASCII/HEX control macro strings.

PGM SERIAL PORT

The PS-99 provides a front panel "PGM" RS-232 serial port. The port is used to program the PS-99 from a computer. Baud rate is fixed at 9600, N81.

TIME

The PS-99 uses the 24-hour time format.

SYNC INPUT

This input is only active +/- 20 seconds within any programmed minute and second. The PS-99 ignores this input during all other times. With this in mind, ANY event scheduled during these times may be SKIPPED.

INSTALLATION

Installation of the PS-99 is simple. The sync input, relay outputs are connected via removable screw terminals, while the front and rear panel serial ports are equipped with male and female DB-9 D-Sub connectors. Installation of the PS-99 consists of four steps: 1 – Inspection, 2 – Bench Test and Programming, 3 – Mounting, 4 – Equipment Connection.

STEP 1: INSPECTION

Please examine your PS-99 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 PS-99, 9 volt AC @ 1 amp wall transformer, this manual, and two male/female straight-thru serial cables.

STEP 2: BENCH TEST and PROGRAMMING

Place the PS-99 on a workspace. Connect the supplied serial cable to the PS-99's front panel male DB-9 D-sub connector labeled "PGM" and the other end into your computer's com port. Plug the supplied 9 volt AC @ 1 amp wall transformer into a stable source of 117vac @ 60 Hz and the cable end of the wall transformer into the rear panel 2.1mm power receptacle (J1). Verify that the power LED is lit. The PS-99's "PGM" port is fixed at 9600 baud, with 8 data bits, no parity and one stop bit. Load the communication software package (MS Windows 95/98/ME/2000/NT/XP HyperTerminal, Tera-Term, etc.) using the protocol of 9600-N-8-1. Set the mode to DIRECT, Flow Control to NONE, and emulation to ANSI with ECHO ON.

NOTE: To enter the program mode, press the front panel recessed "PGM" button with a non-metallic object or enter *MM from the PC keyboard.

The following menu will appear

MAIN MENU:

<Esc> to e(X)it	(P)arameters
(V)ersion	(R)elays & Labels
(T)ime & Date	(C)ontrol Macros
(M)enu	(E)vent Records
PS99>	

NOTE: Wherever a command letter is called for, such as M to redraw the (M)enu, the lower case letter value (in this case 'm') will also be accepted.

NOTE: The Menu will time out after 60 seconds of inactivity. While in menu mode, events will not be performed.



NOTE:

Installation of the PS-99 in high RF environments should be performed with care. Shielded cable is suggested for all connections. Shields and station ground should be tied to the chassis screw, located on the far right side of the PS-99 as viewed from the rear. It is recommended that all cables connected to the PS-99 be looped through ferrite cores to suppress RF. Surge protection with RF filtering such as the Tripp Lite "ISOBAR 4" is also suggested for the wall transformer.

BENCH TEST and PROGRAMMING

<Esc> to e(X)it

The Esc key or an X will exit the menu or back up one level throughout the different menus.

(V)ersion – From main menu

Displays the Version:

PS99 VERSIONS:

Firmware: PS99 2.30

EEProm: PS99 2.30

(T)ime & Date– From main menu

Selecting a T will display:

DATE & TIME:

<Esc> to e(X)it; (S)et:

01/01/00 01:23:43 > It will display the current time and allow you to set it.

The program will show the real-time date and time until it times out after 60 seconds of inactivity, and redraws the main menu (which will also time out after additional inactivity). To keep the date: time display active longer, pressing any non-command key (such as space bar) will re-load the timeout timer with an additional 60 seconds.

To set, enter an S

SET DATE & TIME:

<Esc> to e(X)it; Type new value; <Enter> to accept.

Month 01 > Enter the two-digit month followed by a CR, example: 02(CR)

Date 01 > Enter the two-digit day of the month, example: 05(CR)

Year 00 > Enter the two-digit year, example: 04(CR)

Hour 01 > Enter the two-digit hour, example: 17(CR) –
Always use 24-hour time format.

Minute 28 > Enter the two digit minute, example: 02(CR)

Second 07 > Enter the two digit second, example: 15(CR)

If you leave before reaching this point, the entries will not be saved. Upon entering a (CR) after the seconds entry, the clock will be set and the data saved. When you enter the seconds value, it will not be set until you press the Enter key. This allows you to enter a value that is ahead in time and hit the Enter key when the desired second rolls over.

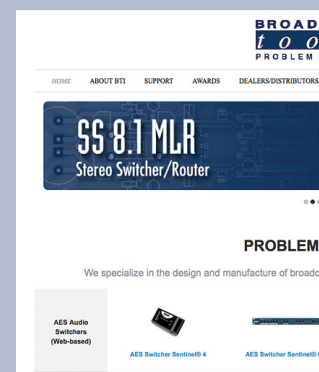


NOTE:

The time should be set using a stable time reference. You may use your Program Network, or call the National Institute of Science and Technology (NIST) at 1-303-499-7111.

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INSTALLATION

(P)arameters– From main menu

PARAMETERS:

<Esc> to e(X)it; (D)ST: No; (S)ync: 00:00; (B)aud: 9600;
(R)eset ALL (Params, Relay Labels, Macros, Events):
PS99>

(D)ST: No

Entering a D will toggle the “Daylight Savings” flag on and off. Doing this does not change the time. With DST set to No, it allows you to select Spring Ahead as an event option. With DST set to Yes, it allows you to select Fall Back as an event option. When Spring Ahead or Fall Back events are executed, the DST flag will automatically change. For example, if you are currently in standard time and have the DST option set to No, you could set up a Spring Ahead event to occur at 0200 hours on 05/01/2004. At that time, the clock will be set one hour ahead and the DST flag will be changed to Yes.

(S)ync: 00:00; Selecting an S will display:

EDIT SYNC

Sync 00:00 > Enter 4 digits (without a colon) to indicate the minute and second that the sync pulse is received from your sync source. For example, if the sync pulse is sent every hour at 54 minutes and 30 seconds, enter 5430(CR). Do not schedule any events for the same second that a Sync pulse is to be received, or they may be missed since the time may be slightly adjusted. When a sync input is received, the real time clock will sync up to the time specified. For example, if the sync is set for 54 minutes, 30 seconds and the clock is reading 54:29d when a sync pulse is received, it will immediately be adjusted to 54:30. Sync pulses that are received outside of the “Sync Window” of +/- 20 seconds will be ignored. So if there are multiple sync pulses during the hour, only the pulse that is detected within 20 seconds of the target time will be acted upon.

(B)aud: 9600

With each entry of the B key, the baud rate for event macros will cycle through the various baud rate selections. The possible values are 300, 600, 1200, 2400, 4800, 9600, 19.2K and 38.4K. The menu selection will be re-written each time with the new value. This only affects the setting of the event macro output port, the data coming out of the DB-9 male connector on the rear panel. Data is always output at 8,N,1, regardless of the baud rate. The programming port is always set to 9600 baud.

(R)eset ALL (Params, Relay Labels, Macros, Events)

PS99> Enter an R to reset to factory defaults. Warning: This will erase all macros and events.

(C)onfirm RESET ALL ? > It gives you a chance to back out. A C must be entered to execute the reset all command.

(R)elays & Labels – From main menu

An **R** allows you to edit and test relays. The following menu will be displayed:

RELAYS:

-Relay Label-- # *-Relay Label--*

1 Relay 1 4 Relay 4

2 Relay 2 5 Relay 5

3 Relay 3 6 Relay 6

<Esc> to e(X)it; (M)enu; All relays of(F);

1-6 = Select Relay; (R)eset Labels:

PS99>

All relays of(F); An **F** will turn all relays off.

Entering a numerical value 1-6 will select the corresponding relay. For example, entering a 1 will display:

RELAY 1 "Relay 1": <Esc> to e(X)it; (M)enu;

1-6 = Select Relay; (E)dit Label; of(F); (P)ulse; o(N);

PS99>

An **E** will display:

EDIT RELAY 1 "Relay 1": <Esc> to exit; <Enter> to accept:

Type New Value> Now you can enter a new label for Relay 1. For example, enter "High Power"(CR). The label can be up to 16 characters long.

o(N): **N** Will turn on the selected relay.

of(F): **F** Will turn off the selected relay.

(P)ulse: **P** Will pulse the selected relay.

(R)eset Labels: **R** will reset all of the relay labels back to factory defaults.

(C)ontrol Macros– From main menu

Entering a **C** will display the first of six Macro pages, 32 characters per line, 3 lines per macro with 96 total characters for each of 30 macros:

CONTROL MACROS:

-----ASCII Macro Data-----

01 Now is the time for all good men

01 to come to the aid of their cou

01 ntry. Peter Piper picked a peck

02

02

02

03

03

03

04

04

04

05

05

05

(P)age(1-6); (H)ex; (S)elect; (C)lear Page; <Esc> to e(X)it:
PS99>

(P)age; Displays the next page of 5 macros.

(H)ex; / (A)SCII; Toggles back and forth between displaying the macro data in ASCII and Hex values.

(C)lear Page; erases all macro data on the selected page.

(S)elect; An S will display:

SELECT MACRO:

Number> Enter a two digit macro number. For example, to edit macro 1, you must enter 01. The following will be displayed:

CONTROL MACRO 01: "Now is the time for all good men"

" to come to the aid of their cou"

"ntry. Peter Piper picked a peck"

00-----07 08-----0F 10-----17 18-----1F

4E6F77206973207468652074696D6520666F7220616C6C20 676F6F64206D656E

20746F20636F6D65 20746F2074686520 616964206F662074 6865697220636F75

6E7472792E202050 6574657220506970 6572207061636B65 642061207065636B

(P)revious; (E)dit; (N)ext; (C)lear; (S)end; <Esc> to e(X)it:

PS99>

The ASCII value of the macro will be displayed on the top line with the corresponding Hex values below. The 00-----07, etc, are place markers that show the locations of the Hex digits.

(P)revious; Selects the previous macro, for example, if macro 01 is selected, previous will select macro 30.

(E)dit; will display:

EDIT MACRO 01: <Enter> ends the macro; <Esc> to exit;

To embed chars, type: \\ \bs \esc \cr \lf \<hex> \ctl<A-z>:

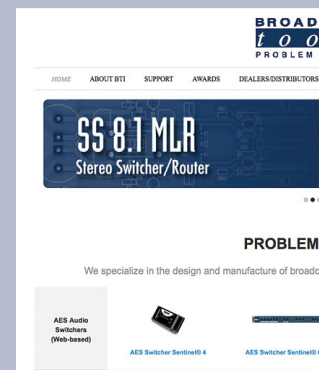
Macro 01: 1 = 01-08>Now is t
 2 = 09-16>he time
 3 = 17-24>for all
 4 = 25-32>good men
 5 = 33-40> to come
 6 = 41-48> to the
 7 = 49-56>aid of t
 8 = 57-64>heir cou
 9 = 65-72>ntry. P
 A = 73-80>eter Pip
 B = 81-88>er picke
 C = 89-96>d a peck
 A = 73-80>eter Pip
 B = 81-88>er packe
 C = 89-96>d a peck

Select Start-Edit Line (1-9,A,B,C)>

Enter New Macro>Enter New Macro> Select a line number to edit, 1-9 or A,B,C,D.
e-mail: support@broadcasttools.com voice: 360.854.9559 fax: 866.783.1742

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INSTALLATION

Macros are edited in sections of 8 characters so that you can easily edit long hex strings. When entering macros longer than 8 characters, select the starting point and begin typing. The program will automatically increment to the next segment. So if you are entering a long ASCII string select "1" and begin typing.

Enter the new macro data followed by a (CR). Control or Hex characters can be embedded in an ASCII or HEX data string. Possible values are: \bs = Back Space, \esc = Escape Control Character, \cr = Carriage Return, \lf = Line Feed, \<hex> = Enter any Hex value after the "\", 00 – FF, \ctl = any CTL + A through Z for standard control characters, for example, CTL-C = \ctlC

(C)lear; Will clear or erase the macro

(S)end; Will send the macro out the data port so you can test it.

(P)revious; Selects previous macro

(N)ext; Selects next macro

(E)vent Records – From Main Menu

An E will display one of nine event pages with 11 events displayed on each page.

EVENT RECORDS:

SMTWTFS

mm/dd/yy hh:mm:ss *-----Action-----*

01 01/01/00 00:00:00 No Action

02 01/01/00 00:00:00 No Action

03 01/01/00 00:00:00 No Action

04 01/01/00 00:00:00 No Action

05 01/01/00 00:00:00 No Action

06 01/01/00 00:00:00 No Action

07 01/01/00 00:00:00 No Action

08 01/01/00 00:00:00 No Action

09 01/01/00 00:00:00 No Action

10 01/01/00 00:00:00 No Action

11 01/01/00 00:00:00 No Action

(P)revious; (C)lear Page; (N)ext; (S)elect; <Esc> to e(X)it:

PS99>

(P)revious; Display previous page

(C)lear Page; Clear all macros on the page and set back to No Action

(N)ext; Display next page

(S)elect; will display:

SELECT EVENT:

Number> Enter two digit event number

EVENT RECORD:

SMTWTFS

mm/dd/yy hh:mm:ss *-----Action-----*

01 01/01/00 00:00:00 No Action

(P)revious; (C)lear; (N)ext; (E)dit; <Esc> to e(X)it:

PS99>

(E)dit; An “E” will display:

EDIT EVENT RECORD 01:

(A)ll; (P)revious; (C)urrent; (N)ext; Type new value; <Enter> to accept.

DAY/DATE = DATE > Use the space bar to toggle between DATE and DAY then press the Enter key. If you select **DATE** (CR) for setting up an event or events to happen on a specific date, you will see:

Month 01 > Enter a two digit month value, example: 02(CR)
Date 01 > Enter a two digit date, example 25(CR)
Year 00 > Enter a two digit year, example 04(CR)
Hour 00 > Enter a two digit hour, example 20(CR) – use 24 hour time
Minute 00 > Enter a two digit minute, example 35(CR)
Second 00 > Enter a two digit second, example 00(CR)

The **A** for All or Wild Card can also be used to select All Months, Days, Years, Hours, Minutes or Seconds. For example, you could set up an event to be generated every hour on July 4th.

DAY/DATE = DAY > If **DAY** is selected, the following will be displayed:

WeekDay -----S > Enter 1-7 (Sunday being 1, Saturday 7) to set or toggle days of the week on or off, for example to set it to trigger an event every Sunday, Monday and Tuesday, enter 123. To turn off Saturday, if it is already set, enter a 7. To select All days, use the A to toggle the “All” Days wild card values (*****) on and off. Note: If the wild card “*” values have been selected, they must first be de-selected with an A before new numeric values can be entered.

The Hour, Minutes and Seconds will also be displayed and can be changed as in the above examples.

The next selection for both Day and Date is the Action to take place:

Action: No Action > Hitting the space bar will cycle through the possible options, selecting one of the relay options; Relay Off, Relay On, Relay Pulse (CR) will bring up:

RELAYS:

-Relay Label-- # *-Relay Label--*

1 Relay 1 4 Relay 4

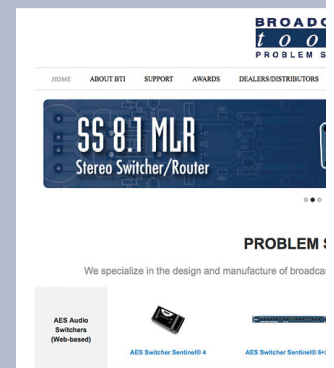
2 Relay 2 5 Relay 5

3 Relay 3 6 Relay 6

Relay 1 > Enter the relay number followed by a return. This will select the relay to be turned off, pulsed or turned on.

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If the Macro action is selected, it will prompt you for the macro number:

Action: Macro 07 >

Action: Spring Ahead – Will set the PS-99 to transition from Standard to Daylight Savings time at the specified event time. For this option to work, the DST setting in the Parameters Menu (from the Main Menu) must be set to No, showing that the PS-99 is currently operating in Standard time.

Action: Fall Back > – Will set the PS-99 to transition from Daylight to Standard time. For this option to work, the DST setting in the Parameters Menu (from the Main Menu) must be set to yes, showing that the PS-99 is currently operating in Daylight Savings time.

After you have finished entering the event record, the individual record will be displayed. Hitting the Esc key will display all the records for the current page.

After you are finished editing Events, escape out of the menu and exit. If sixty seconds elapse without any data entry, the menu will time out and the PS-99 will go back into operational mode. You must exit the menu, or time out, before events will be generated.

STEP 3: MOUNTING

Mount the unit on a rack shelf, such as the Broadcast Tools RA-1, allowing adequate airflow for cooling. The optional RA-1 may be ordered separately for rack mounting.

STEP 4: EQUIPMENT CONNECTION

The PS-99 interfaces to your equipment through the rear panel connectors. Follow the rear panel labels for the sync input and relay connections. Connections to the removable screw terminals should be made using 22 AWG or smaller solid or stranded wire. Strip off approximately 3/16" from the connection end of the wire. Remove the plug from the connector and insert the wire into the plug. With a small screwdriver, tighten the setscrew. Reinstall the plug into the appropriate connector. Connect the computer and external serial device to the desired connectors.

EQUIPMENT CONNECTION

SYNC INPUT

Determine if your sync source is of the dry or wet format. A wet source would be something supplying voltage, and the dry source would be the following: Relay or switch contacts, Open collector, etc. The PS-99 is shipped set up for dry operation (JP-1, both jumpers in place). The sync input may be tested by shorting the TS INA (Gnd or anode) and TS INB (cathode) terminals together. Verify this by the GREEN "SYNC" LED lighting. To change the Sync input to wet operation, remove both jumpers and install one jumper on pins 2 & 3 of JP-1. The source voltage may range from 5 to 24 volts DC. To use the 5-volt TTL compatible sync input, connect the external contact between the TS INC and GND. The correct polarity must be observed.

RELAY OUTPUTS

Follow the labels on the rear panel for the desired relay connections. Each relay is described with the relay number denoting the Common (wiper), Normally Open or Normally Closed contacts. When the desired relay is programmed, the PS-99 will perform the command which is selected, either latch, unlatch or a 750 ms momentary closure.



NOTE:

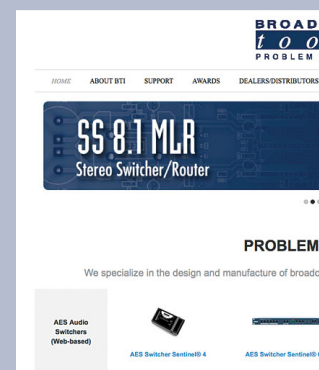
The PS-99 is not connected to the power-line ground, since the AC wall transformer is isolated; however, the PS-99 is internally connected to the circuit ground and the metal enclosure of the PS-99 via a parallel .001 uf cap and 10 ohm resistor. The station ground should be connected to the chassis mounting screw.

SPECIFICATIONS

Logic:	Flash microprocessor, non-volatile event and macro programming memory.
Time Base:	Stable crystal time-based clock processor. Stability at approximately fifty seconds per month. NOTE: We recommend using an accurate external time sync source, such as the tiny TOOLS "Time Sync Plus" to insure network timing stability.
Sync input:	Optically isolated wet or dry input, 5 to 24vdc and/or 5 volt TTL compatible. Sync input with front panel LED indicator. Clock updates may be set for any minute and second within each hour.
Backup System:	Lithium battery. 10 plus year life expectancy.
PGM Serial Communication:	Serial - Asynchronous, Fixed, 9600 baud, 8N1. Level: RS-232C. Front panel LED data indicator.
EXT Serial Communication:	Serial - Asynchronous, 300, 600, 1200 2400,4800,9600.19.2K, 38.4K baud, 8N1. Level: RS-232C. Factory default 9600,8N1. Front panel LED data indicator.
Relays:	Sealed relays, utilizing SPDT Bifurcated-Crossbar Silver alloy with gold overlay contacts. 1 Amp/30 vdc. CAUTION!: For safety, do NOT connect 120 Volt circuits to the relays.
Connectors:	Relay/Sync Opto - Removable screw terminals. Serial - EXT, Male DB-9 Serial - PGM, Female DB-9 Two - Straight-thru male/female cables supplied.
Power Requirements:	9 Vac @ 500 ma or 1 amp, 120 Vac 50-60 hz wall transformer supplied. (CE 240 Vac 50-60 hz optional)
Size:	5.65" x 6.50" x 1.55" (WDH)
Weight:	2.0 lbs.
Options:	RA-1 rack shelf for mounting up to three units in 1-RU, Tiny TOOLS™ Time Sync Plus Broadcast Tools® ESS-1, Ethernet to Serial Server. Broadcast Tools® USB-RS232, USB to Serial converter.

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SPECIFICATIONS

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.

Broadcast Tools warrants to each Buyer of any item manufactured by Broadcast Tools that the item will be free from defects in materials and workmanship at the time it is shipped by Broadcast Tools if the item is properly installed, used and maintained.

EXCLUSIVE REMEDIES

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