

# NETSTREAMS®

## MUSICA™

### NS-MU4602 Audio Distribution System



## Integration & Design Guide

The IP-Based Audio Distribution Company.

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**THIS DOCUMENT WAS WRITTEN BY THE TECHNICAL SERVICES  
DEPARTMENT AT:**



*This document will explain how to connect and control the  
Musica™ professional audio distribution system from an  
external control system.*

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# INTRODUCTION

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*NetStreams Musica™* NS-4602 is a multi-source multi-zone audio distribution system that may be integrated to work with external control systems and servers. This can be accomplished via direct control through the RS-232 port on the rear of the *Musica™* preamp or by means of infrared commands issued by the controlling system to the IR receivers built into the *Musica™* keypads. The IR commands can be issued from the controlling system via its own remote control or an IR flasher placed in the room used to trigger the *Musica™* keypad via its IR receiver may issue them.

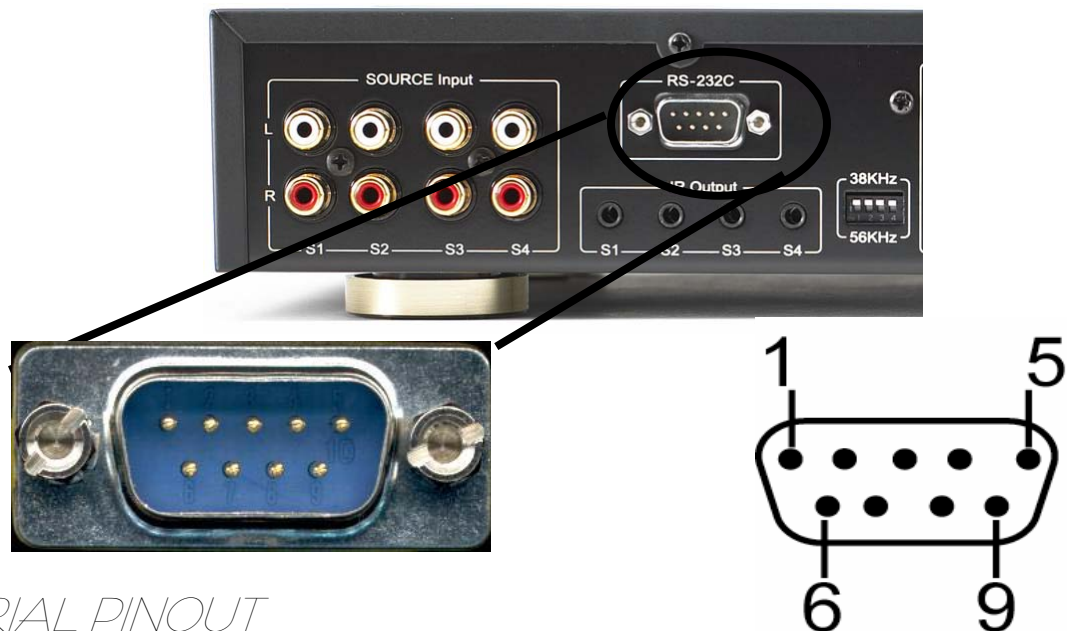
The most common way for these controllers and servers to control the audio system would be through the use of the one-way infrared control commands. These commands can be taught to other controllers and used to create and extended remote control scenarios.

The remote control supplied with the *Musica™* system can also provide a way to teach these commands into a learning universal remote such as the Philips Pronto. These commands can also be taught to the learning devices for control systems such as the CRESTRON CNXLIR or the AMX IRIS.



# SERIAL PORT PARAMETERS AND PIN-OUT

Command Standard:	RS-232c
Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	N
Pacing:	None
Hardware Handshaking:	None
Software Handshaking:	None



## SERIAL PINOUT

PIN	FUNCTION	ABBREVIATION
1	NOT USED	
2	Received Data	RD / RX / RXD
3	Transmitted Data	TD / TX / TXD
4	NOT USED	
5	Signal Ground	GND
6	NOT USED	
7	NOT USED	
8	NOT USED	
9	NOT USED	

# IR CODES

---

The system uses NEC remote codes.

Command	4601 (12 BUTTON)	4602 (10 BUTTON)	DATA
ON	POWER ON	POWER ON	0FH
OFF	POWER OFF	POWER OFF	0DH
MUTE TOGGLE	MUTE	MUTE	14H
SOURCE RING COUNTER	SOURCE	SOURCE	05H
BACK LIGHT C1	AMBER	C1	0BH
BACK LIGHT C2	GREEN	C2	17B
MENU TOGGLE	MENU	MENU	07H
PAUSE	#1	#1	08H
STOP	#2	#9	04H
PLAY	#3	#2	0CH
REW	#4	#3 (SHUFFLE)	02H
UP ARROW	#5		0AH
FFW	#6	#4 (REPEAT)	06H
LEFT ARROW	#7	#7	0EH
DOWN ARROW	#8	“#”	01H
RIGHT ARROW	#9	#8	09H
PREV	*	#5	03H
NEXT	#	#6	1DH
SOURCE POWER	POW	* (MODE)	00H
VOLUME (MENU) UP			1CH
VOLUME (MENU) DN			12H
VOLUME (MENU) L		MACRO 1	18H
VOLUME (MENU) R		MACRO 2	10H

# RS<sub>232c</sub> CONTROL

---

The protocol described in this document provides the following commands, which are described in detail below:

- **Status(Stat)** –Doorbell(Door), Phone, Switched Outlet(SwOu),
- **Change** – Amp, Balance(Bal), Bass, Backlight Color(BaCo), Backlight Level(BaLi), Doorbell(Door), Loud, Phone, mute, Switched Outlet(SwOu), Source(Src), Treble(Treb), and Volume(Vol)
- **Nudge** – Single adjustments in one direction, Bass, Balance(f), Backlight Level(l), Loud, Source, Treble(t), and Volume(v)
- **Execute(Exe)** – The selected keypad button action Press, and Hold
- **IR-** Allows uploading and Downloading of IR commands
- **All Off** – All zones off command
- **Event** – These commands control the unsolicited data; Source, Source Name, Button Press, Room Data

The system will send unsolicited data after any changes in the system are made. Input lines are to be terminated with a CR or a CR/LF combination.

# COMMAND PARAMETERS AND RANGES

---

The following parameter types are used in the command table below. Parameters are entered and returned as ASCII strings.

Parameter	Description
Z	Zone number. Range is 0-6. The 0 parameter is for all zones.
S	Source. 0 = Off. 1 to 4 = source number
V	Volume 0 - 35
B	Bass 1- 15
T	Treble 1- 15
X	Logic Level Parameter. Values are 0=Off, and 1=On. (Loudness use the X parameter in 2.0)
D	Direction to ramp. 0=down, 1=up
P	Page Group to enable/disable.
C	Registered Source Command
F	Balance 1- 15
R	Source Names 1-30 (see list page 10)
L	Brightness Level 1-15
A	Room = 0, Room+EXT= 1, EXT=2
E	Enable = 1/ Disable =0

# NS-MU<sub>4602</sub> COMMAND SET

All Commands are sent and received as ASCII characters.

1st	2rd	3th	Action	Parameter(s)	Example String
Stat	Door		StatDoor	-	StatDoor
	Phone		StatPhone	-	StatPhone
	SwOu		StatSwOu	-	StatSwOu
	Ver	/	StatVer/	Z	StatVer/0
	Amp	/	StatAmp/	Z	StatAmp/1
AllOff	AllOff		AllOff	-	AllOff
Change	Src	/	ChangeSrc/	Z/S	ChangeSrc/1/2
	Bass	/	ChangeBass/	Z/B	ChangeBass/1/15
	Treb	/	ChangeTreb/	Z/T	ChangeTreb/1/15
	Bal	/	ChangeBal/	Z/F	ChangeBal/1/7
	Loud	/	ChangeLoud/	Z/X	ChangeLoud/1/1
	Vol	/	ChangeVol/	Z/V	ChangeVol/1/11
	Mute	/	ChangeMute/	Z/X	ChangeMute/1/0
	BaCo	/	ChangeBaCo/	Z/X	ChangeBaCo/1/0
	BaLi	/	ChangeBaLi/	Z/L	ChangeBaLi/1/0
	Door	/	ChangeDoor/	X	ChangeDoor/0
	Phone	/	ChangePhone/	X	ChangePhone/0
	SwOu	/	ChangeSwOu/	X	ChangeSwOu/0
	Store	/	ChangeStore/	S/N	ChangeStore/1/30
	Amp	/	ChangeAmp/	Z/A	ChangeAmp/1/1 or 0
Nudge	Bal	/	NudgeBal/	Z/D	NudgeBal/1/0
	Src	/	NudgeSrc/	-	
	Bass	/	NudgeBass/	Z/D	NudgeBass/1/0
	Treb	/	NudgeTreb/	Z/D	NudgeTreb/1/0
	Vol	/	NudgeVol/	Z/D	NudgeVol/1/0
	BaLi	/	NudgeBaLi/	Z/D	NudgeBaLi/1/0
Exe	Press	/	ExePress/	S/C	ExePress/1/12
	Hold	/	ExeHold/	S/C	ExeHold/1/12
	Menu	/	ExeMenu/	Z/C	ExeMenu/1/1
	Lock	/	ExeLock/	Z/E	ExeLock/1/1
IR_	Dn	/	IR_Dn/	S/N	IR_Dn/1/23/130....
	Up	/	IR_Up/	S/N/File	IR_Up/1/24/130....

# SAMPLE COMMANDS

The following commands are examples of the control and status functions for the NS-MU4602.

Action	# Params	Parameter(s)	Description	Example String
ChangeSrc/	2	Z/S	Changes Zone Z to Source S	"ChangeSrc/1/2"
ChangeSrc/	2	Z/S	Turn ON all zones to source 3	"ChangeSrc/0/3"
ChangeVol/	2	Z/V	Changes Zone Z's volume. Volume immediately changes to volume V. NudgeVol described below can also be used to ramp volume.	"ChangeVol/1/11"
ChangeSrc/	2	Z/S	Turn OFF all zones	"ChangeSrc/0/0"
NudgeVol/	2	Z/D	Ramp zone Z's volume in direction D one step.	"NudgeVol/1/0"
ChangeBass/	2	Z/B	Changes Zone Z's bass.	"ChangeBass/1/15"
ExePress/	2	S/C	Send pause button command to source 2	"ExePress/2/1"
NudgeBass/	2	Z/D	Ramp zone Z's bass in direction D one step.	"NudgeBass/1/0"
ChangeTreb/	2	Z/T	Change Zone Z's treble	"ChangeTreb/1/15"
ExeMenu/	2	Z/C	Launch Macro 1 from zone 2	"ExeMenu/2/4"
NudgeTreb/	2	Z/D	Ramp zone Z's treble in direction D one step.	"NudgeTreb/1/0"
ChangeMute/	2	Z/X	Change Zone Z's mute	"ChangeMute/1/0"
ExeMenu/	2	Z/C	Send menu command on zone 4	"ExeMenu/4/1"
ExePress/	2	S/C	Execute source S's registered command C. This is the equivalent function to pressing one of the keypad source transport buttons.	"ExePress/1/12"
ExeHold/	2	S/C	Execute source S's registered command C.	"ExeHold/1/12"
AllOff	0		Turn off all zones	"AllOff"
ChangeBaCo/	2	Z/X	Changes Zone Z's Backlight Color. (0=Green, 1=Amber)	"ChangeBaCo/1/0"
ExeMenu/	2	Z/C	Launch Macro 2 from zone 5	"ExeMenu/5/5"
ChangeDoor/	1	X	Doorbell mode 0=Off, 1=On	"ChangeDoor/0"
StatDoor	0	-	Status of Doorbell mode	"StatDoor"
ChangeBal/	2	Z/F	Changes Zone Z's Balance	"ChangeBal/1/7"
StatVer/	1	Z	Sends ADC Firmware version	"StatVer/0"
NudgeBal/	2	Z/D	Ramp Zone Z's Balance in direction D one step.	"NudgeBal/1/0"
ChangePhone/	1	X	Phone mode 0=Off, 1=On	"ChangePhone/0"
StatPhone	0	-	Status of Phone mode	"StatPhone"
ChangeBaLi/	2	Z/L	Changes Zone Z's Backlight Level (L). 0=off	"ChangeBaLi/1/0"
StatVer/	1	Z	Sends Zone 3 Keypad Firmware Version	"StatVer/3"
NudgeBaLi/	2	Z/D	Ramp Zone Z's Backlight Level in direction D one step.	"NudgeBaLi/1/0"
ChangeSwOu/	1	X	Switched Outlet mode 0=Off, 1=On	"ChangeSwOu/0"
StatSwOu	0	X	Status of Switched Outlet	"StatSwOu"
ChangeStore/	2	S/N	Changes source name for source on all keypads.	"ChangeStore/1/12"
ChangeLoud/	2	Z/U	Changes Zone z's Loudness, Loudness immediately changes to Loud U.	"ChangeLoud/1/1"

# UNSOLICITED DATA COMMAND SET

---

1st	2rd	3th	Action	Parameter(s)	Example String
Event	Src	/	EventSrc/	E	EventSrc/1
	Store	/	EventStore/	Z/E	EventStore/3/1
	Press	/	EventPress/	E(0 or 1)	EventPress/1/1~24
	Data	/	EventData/	Z/E	EventData/2/1

**EXPLANATION:** Subscribing to these commands will render unsolicited data which can be used to update status feedback on touch panels, software, or keypads.

- i. e. EventData/2/1 – this command subscribes you to Room #2 so that any data point that changes, such as volume, treble, bass, etc., is reported, at time of change, unsolicited.
- To unsubscribe to Room #2, in our example above, simply send an EventData/2/0 command.

## EVENTSTORE VALUES\* (FM KEYPADS)

---

Return value	Store name	Return value	Store name	Return value	Store name
1	CD	15	DVD	29	SOUL
2	AUX	16	LIGHTS	30	CD2
3	TAPE	17	INTERNET	31	TALK
4	TUNER	18	JAZZ	32	NEWS
5	TUNER2	19	REQUEST	33	SIRIUS
6	AM	20	MOM	34	TRAFFIC
7	FM	21	XM RADIO	35	WEATHER
8	MP3	22	POP	36	SPORTS
9	BLUES	23	R&B	37	NPR
10	CHILDREN	24	RAP	38	DSS
11	CLASSIC	25	RADIO	39	M-SERVER
12	COUNTRY	26	ROCK	40	DISH
13	DAD	27	SAT	41	(Null)
14	DANCE	28	SAT2		

For older series keypads Event Store values please refer to the 4601 Integration Manual.

# EVENTPRESS

**EXPLANATION:** The EventPress allows you to integrate button presses from both 10 and 12 button keypads.

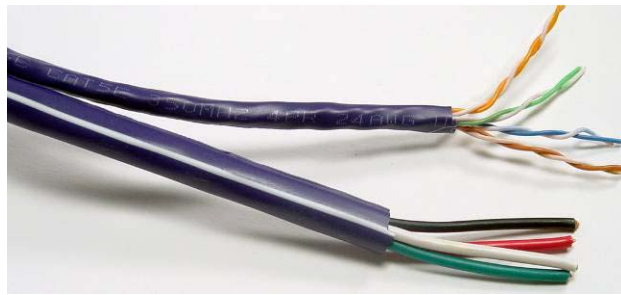
Returned Value	12 Button ICON PRESS	12 Button 10 # key PRESS	10 Button ICON PRESS	10 button 10 # key PRESS	12 button Remote
EventPress/S/1/Z		1		1	
EventPress/S/2/Z	■	2	■	9	■
EventPress/S/3/Z	▶ (Play)	3	▶ (Play)	2	▶ (Play)
EventPress/S/4/Z	◀◀	4	◀◀ [Shuffle]	3	◀◀
EventPress/S/5/Z	▲	5			▲
EventPress/S/6/Z	▶▶	6	▶▶ [Repeat]	4	▶▶
EventPress/S/7/Z	◀	7	◀	7	◀
EventPress/S/8/Z	▼	8			▼
EventPress/S/9/Z	▶	9	▶	8	▶
EventPress/S/10/Z	◀◀	*	◀◀	5	◀◀
EventPress/S/11/Z	(Power ICON)	0	* [Mode]	0	(Power ICON)
EventPress/S/12/Z	▶▶	#	▶▶	6	▶▶
	<b>12 Button HOLD</b>	<b>12 Button HOLD</b>	<b>10 Button HOLD</b>	<b>10 button HOLD</b>	
EventPress/S/13/Z	1		1		
EventPress/S/14/Z	2	■	9	■	■
EventPress/S/15/Z	3	▶	2	▶ (Play)	▶ (Play)
EventPress/S/16/Z	4	◀◀	3	◀◀ [Shuffle]	◀◀
EventPress/S/17/Z	5	▲			▲
EventPress/S/18/Z	6	▶▶	4	▶▶ [Repeat]	▶▶
EventPress/S/19/Z	7	◀	7	◀	◀
EventPress/S/20/Z	8	▼			▼
EventPress/S/21/Z	9	▶	8	▶	▶
EventPress/S/22/Z	*	◀◀	5	◀◀	◀◀
EventPress/S/23/Z	0	(Power ICON)	0	* [Mode]	(Power ICON)
EventPress/S/24/Z	#	▶▶	6	▶▶	▶▶

# PRE - WIRING

Pre-wiring for *NetStreams* products is easy once the architecture is understood. Think of the devices below like computers in a sense or a device that needs a network connection and power.

1. *NS-MU4602KP25*
2. *NS-MU4602KP50*
3. *NS-MU4602KP50FM*

These devices require power and data so it is recommended that a CAT5e and a 16/4 or 14/4 Siamese cable be run to them from the Audio/Video head end. These devices can be placed anywhere in the home as long as they have access to the network.



EIM devices such as the *Audio Port* or MU290 amplifier only require a CAT5e to be run from the *Keypad* device to the EIM devices. The MU290 has a loop through of the EIM bus. This will allow all products to be linked with one CAT5e in a local area.

## Terminating wires

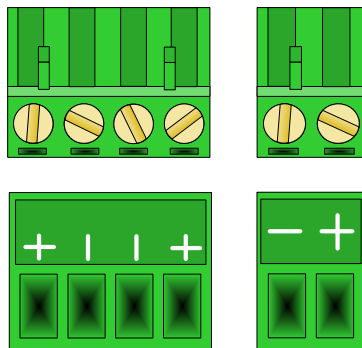
### Tools needed

- a. RJ45 crimpers
- b. CAT5 Stripper
- c. Wire cutters/stripper
- d. Small flat head scr



### Parts needed

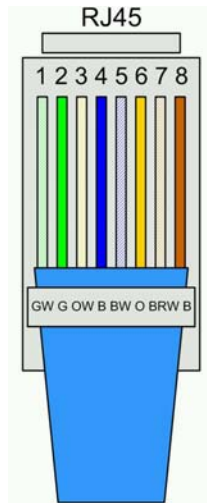
- e. RJ45 connectors
- f. Quick Connectors for power and speaker connections are provided.



# TERMINATE WIRES

---

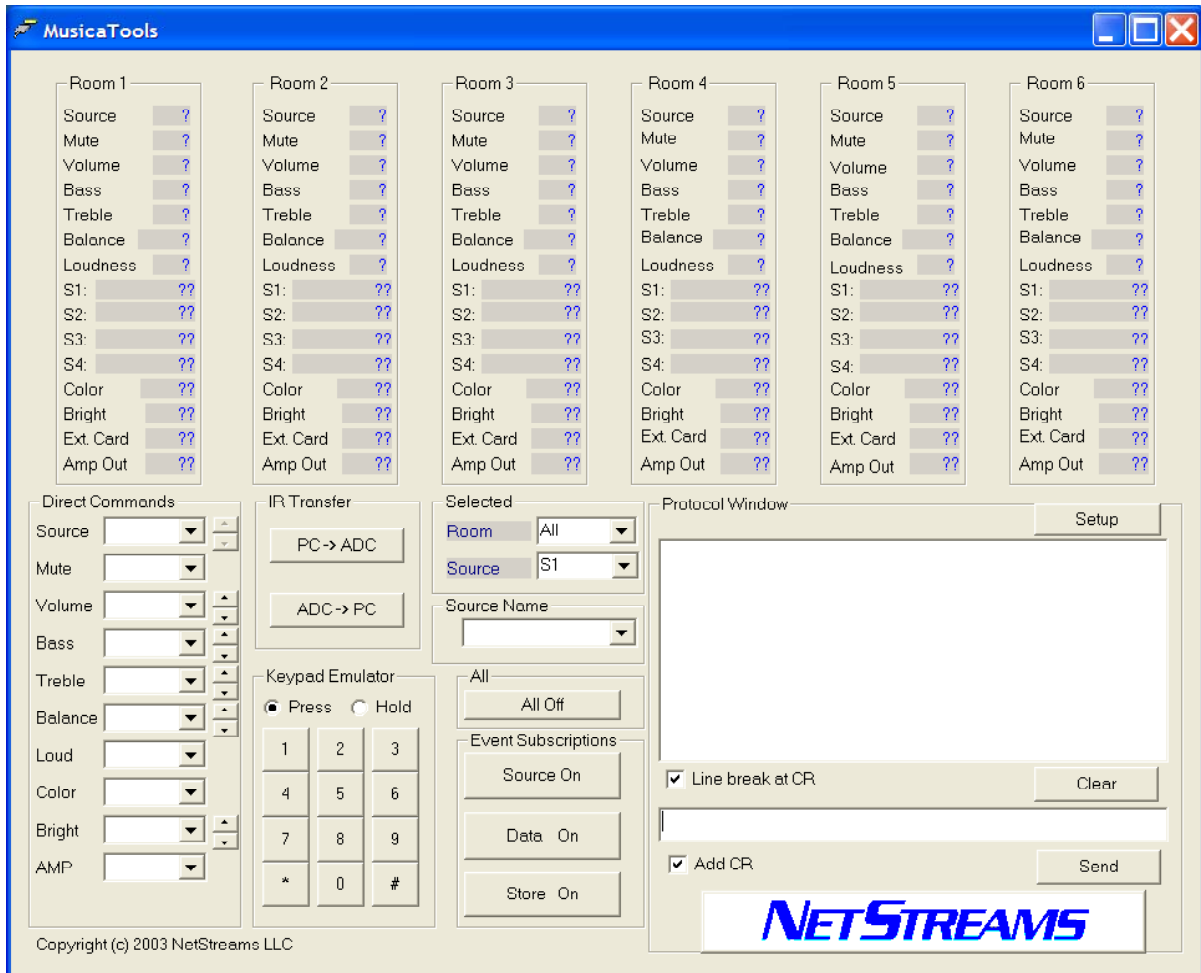
## How to Terminate Wires



Pin 1	Green/ White
Pin 2	Green
Pin 3	Orange/ White
Pin 4	Blue
Pin 5	Blue/ White
Pin 6	Orange
Pin 7	Brown/ White
Pin 8	Brown

TIA/EIA 568a

# MUSICATOOLS



MusicaTools is a diagnostic program used to help in setting up and integrating with external controllers.

th

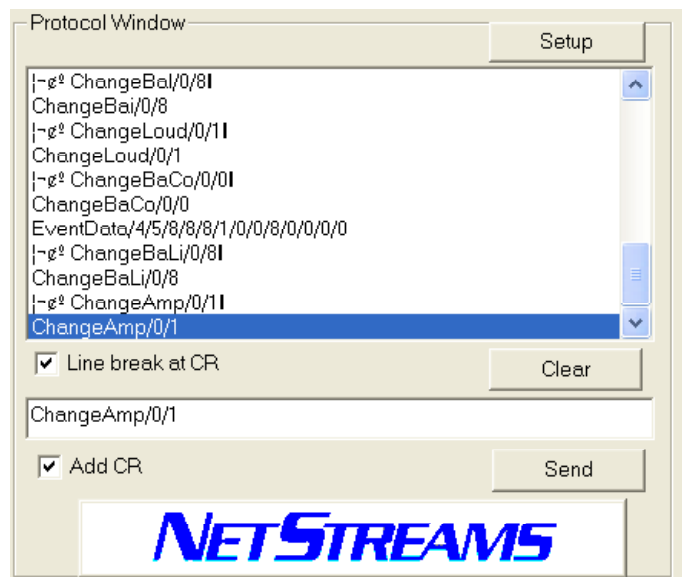
**Keypad emulation**

Allows any zone keypad button press or hold to be executed from

# MUSICATOOLS

## Protocol Window

Displays messages sent to and received from the ADC. Command line allows manual entry of strings.



# MUSICATOOLS

**Com Port 1 Configuration**

BaudRate: 9600

Parity: NONE

Databits: 8

Stopbits: 1

Sendbuffer: 512

Events:

- Detect break on input
- Clear To Send changed state
- Data Set Ready changed state
- Line status error occurred
- Ring detected
- Receive Line Signal changed state
- Character was received
- Event character was received
- Last character in outputbuffer sent

**NETSTREAMS**

MusicaTools Version 2.20

NetStreams LLC  
3600 West Parmer Lane #100  
512-977-9393  
www.NetStreams.com

OK Cancel

## Com 1 Setup page.

**Direct Commands**

Source: S1

Mute: OFF

Volume: 5

Bass: 0

Treble: 0

Balance: Center

Loud: ON

Color: Green

Bright: 100%

AMP: R + E

**Direct Command Entry**  
Quick send commands

Selected

Room: All

Source: S1

Source Name

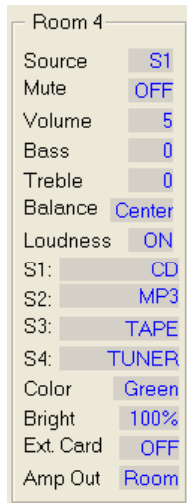
Select a room or all rooms and a source before issuing a command with the room and source selection window.

# MUSICATOLS

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## All Off and Event Subscription Quick keys

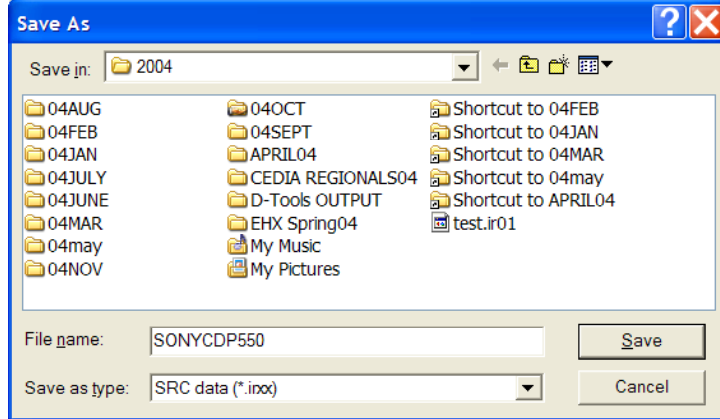
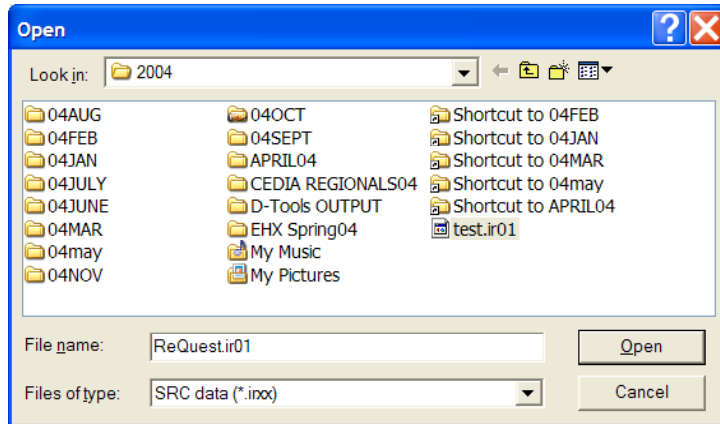
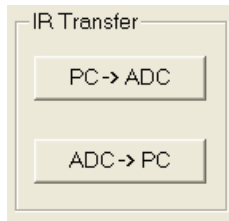


## Real Time Zone Status Display

Current zone information

# MUSICATOLS

## IR UPLOAD AND DOWNLOAD UTILITY







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