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# DSU500

adpcm compact audio player

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## Features

- Cost effective
- Highly efficient 20W Class D amplifier
- Compact unit with integral fixing points
- Screw terminals for ease of installation
- Line out for driving external amplifiers
- 4 direct access trip inputs
- USB port for drag and drop data transfer
- Power Supply included
- On board memory
- USB powered for programming

[www.goldingaudio.co.uk](http://www.goldingaudio.co.uk)

## Quick start

1. Encode your audio to Microsoft ADPCM MONO .wav files and save as '001Track1.wav' etc
2. Connect the USB lead to the PC and replace the test files already preloaded on the DSU500 with your new files. **Power supply not required to load files.**
3. Disconnect USB
4. Connect speaker and any external switches to trip inputs.
5. Connect DSU500 to 12V power source and start playing.

## Files

Before operating the DSU500, it has to be loaded with sound files and control files as listed below.

001Track1.wav, 002Track2.wav, 003Track3.wav, 004Track4.wav [audio files]

INIT.txt

DSU500V1\_0.hex

The first four files listed above that end with '.wav' are the audio files and must be encoded as Microsoft ADPCM MONO files with a sample rate of either 48KHz, 44.1KHz, 32KHz or 16KHz.

For sounds with high frequency components, we recommend using either 44.1KHz or 48KHz sample rates.

Stereo files will not playback, please ensure you convert stereo files to MONO before encoding to Microsoft ADPCM.

The **INIT.txt** file is a control file and configures the DSU500's various features such as how the trip inputs operate.

This file **must** be edited with a pure text editor such as 'Notepad' in Windows.

The INIT.txt file contains the following data:

```
/Debounce      =50;      Debounce time in mS
/Invert        =0000;    Normally closed bits, inverts trips '1234'
/Oneshot       =0000;    One shot bits '1234'
/Interrupt     =1;
/SEQTRIP1     =0;      Set to 1 to sequence messages on trip1. Name tracks 101, 102 etc
/SEQTRIP2     =0;      Set to 1 to sequence messages on trip2. Name tracks 201, 202 etc
/SEQTRIP3     =0;      Set to 1 to sequence messages on trip3. Name tracks 301, 302 etc
/SEQTRIP4     =0;      Set to 1 to sequence messages on trip4. Name tracks 401, 402 etc
/RNDMIN       =10;      Random timer minimum time [1 to 36000 seconds]
/RNDMAX       =120;     Random timer maximum time [1 to 36000 seconds]
/RNDTRIP      =0;      Random timer triggers sequencer or trip input (set to 0-4)
/TIMER        =30;      Fixed timer time (set to 1 to 36000 seconds)
/TIMTRIP      =0;      Fixed timer triggers sequencer or trip input (set to 0-4)
/LCKOUT1      =0;      lockout timer,prevents new trig on trip 1 for n seconds (set to 0 - 3600)
/LCKOUT2      =0;      lockout timer,prevents new trig on trip 2 for n seconds (set to 0 - 3600)
/LCKOUT3      =0;      lockout timer,prevents new trig on trip 2 for n seconds (set to 0 - 3600)
/LCKOUT4      =0;      lockout timer,prevents new trig on trip 2 for n seconds (set to 0 - 3600)
@
      Help:
      Interrupt values:
      0      No interrupts allowed
      1      Lower trips interrupt higher ones playing
      2      Any trip can interrupt any other one playing
      3      Self-interrupting allowed as well as any other interrupt
```

## Description of commands

**/Debounce** =50;

This command configures the time that the trip inputs have to be valid and stable before the DSU500 will respond. A value of 50 means the trip has to be valid for 50mS. You may set any value from 10mS up to 5000mS. (5 seconds)

This can normally be left at 50 but if a particularly electrically noisy environment is causing false triggers, then raise this value to fix the problem.

**/Invert** =0000;

This command allows you to invert the operation of any or all of the trip inputs so that the trip is active when the trip line is open circuit or high.

*For example:*

**/Invert** =1000; Trip 1 is inverted. Message 1 plays when Trip 1 is open circuit.

The above example could be used when the DSU500 is connected to a standard PIR sensor which has a normally closed contact output that opens when the PIR detects movement.

The numbers following the '=' sign can only be '1' or '0'

Trip 1 is the first digit, Trip 2 is the second digit etc

So for example, to invert trips 3 & 4, set the command as follows:

**/Invert** = 0011; Trips 3 & 4 inverted

**/Oneshot** = 0000;

This command configures the trip inputs individually to allow one shot triggering.

One shot triggering is used to prevent a track playing continuously even if the Trip remains active at the end of the sound track.

To re-trigger the track, the Trip must be released and then re-applied after the sound track has finished playing.

This would normally be used when triggering from a contact that remains closed for longer than the sound track such as certain PIR sensors and timer switches.

*For example:*

**/Oneshot** =1000; Trip 1 is one shot enabled.

The numbers following the '=' sign can only be '1' or '0'

Trip 1 is the first digit, Trip 2 is the second digit etc

So for example, to one shot trips 1 & 4, set the command as follows:

**/Oneshot** = 1001; Trips 1 & 4 one shot enabled

**/Interrupt** = 0;

This command configures how the DSU500 responds when another trip comes in while playing.

The four options are:

**/Interrupt** = 0; **No interrupt** - While a track is playing, all trips are ignored.

**/Interrupt** = 1; **Priority interrupt** - While a track is playing, trips of a lower value will be accepted and the current track will be cancelled.

**/Interrupt** = 2; **Any other interrupt** - While a track is playing, any other trip will be accepted and the current track will be cancelled. If two trips are active at the same time, the lowest one will take priority.

**/Interrupt** = 3; **Any and self interrupt** - While a track is playing, any other trip will be accepted and the current track will be cancelled. If the same trip is released and then re-applied, the track will be restarted from the beginning. If two trips are active at the same time, the lowest one will take priority.

## **/Seqtrip**

**/Seqtrip1 =0;**        Enable sequencer on trip 1  
**/Seqtrip2 =0;**        Enable sequencer on trip 2  
**/Seqtrip3 =0;**        Enable sequencer on trip 3  
**/Seqtrip4 =0;**        Enable sequencer on trip 4

Set any of the four items above to '1' to enable a sequencer on that trip input.

The audio files need to be numbered as follows:

Trip 1 sequencer, 101name.wav, 102name.wav, 103name.wav, 104name.wav etc

Trip 2 sequencer, 201name.wav, 202name.wav, 203name.wav, 204name.wav etc

Trip 3 sequencer, 301name.wav, 302name.wav, 303name.wav, 304name.wav etc

Trip 4 sequencer, 401name.wav, 402name.wav, 403name.wav, 404name.wav etc

The sequencer will reset back to the first number when a file is not found in the sequence.

All four sequencers are totally independent and can be used with different quantities of files.

The interrupt priority (**/INTERUPT=?;**) works on the trip numbers, NOT the audio file numbers.

If a trip is held on after the end of the audio track, that same track will LOOP. To prevent this, set the ONE-SHOT bits in the init file.

Note: There is a limit to the number of files that the DSU500 will currently hold but this limit is dependent on the length of the file names. If all file names are 8 characters or less (excluding the extension) then you can have up to 64 files present in total but the total size of the files must also be under 8MB.

DO NOT USE INTERRUPT MODE 3 IF USING SEQUENCER AS THIS CAUSES  
EVERY OTHER FILE TO BE SKIPPED

## **Random timer.**

**/RNDMIN=10;**        Random timer minimum time (1 to 36000 seconds)  
**/RNDMAX=120;**      Random timer maximum time (1 to 36000 seconds)  
**/RNDTRIP=0;**        Random timer triggers sequencer or trip input (set to 0-4)

This random timer can be used to trigger one of the four trip inputs which in turn can also activate a sequencer on that trip.

The random timer is set up with a minimum time and a maximum time with the commands above.

The timer will then operate between those values. As soon as the timer times out, it will restart with a new random value.

The **/RNDTRIP** command is used to define the trip input to activate. Set it to 1 to activate trip input 1 or 2 to activate trip input 2 etc. Set to 0 to disable the timer.

The 'PLAY' LED (blue) will flash if the timer is timing and no audio is playing.

## **Fixed Timer**

**/TIMER=30;**        Fixed timer time (set to 1 to 36000 seconds)

This command defines the running time of the fixed timer. If enabled, the timer will reload with the value defined above as soon as it times out.

**/TIMTRIP =0;**        Fixed timer triggers sequencer or trip input (set to 0-4)

This command defines the trip input to activate. Set it to 1 to activate trip input 1 or 2 to activate trip input 2 etc. Set to 0 to disable the timer.

The 'PLAY' LED (blue) will flash if the timer is timing and no audio is playing.

## Lockout Timers.

**/LCKOUT1=0;** Lockout timer, prevents new trig on trip 1 for n seconds(set to 0 - 3600 seconds)  
This command is used to lock out the actual hardware trip input 1 from accepting another trigger whilst this timer is running. It starts when the trip input is received from the external input.  
The timer will not operate if the command is set to '0'.

**/LCKOUT2=0;** Lockout timer, prevents new trig on trip 2 for n seconds(set to 0 - 3600 seconds)  
This command is used to lock out the actual hardware trip input 2 from accepting another trigger whilst this timer is running. It starts when the trip input is received from the external input.  
The timer will not operate if the command is set to '0'.

**/LCKOUT3=0;** Lockout timer, prevents new trig on trip 3 for n seconds(set to 0 - 3600 seconds)  
This command is used to lock out the actual hardware trip input 3 from accepting another trigger whilst this timer is running. It starts when the trip input is received from the external input.  
The timer will not operate if the command is set to '0'.

**/LCKOUT4=0;** Lockout timer, prevents new trig on trip 4 for n seconds(set to 0 - 3600 seconds)  
This command is used to lock out the actual hardware trip input 4 from accepting another trigger whilst this timer is running. It starts when the trip input is received from the external input.  
The timer will not operate if the command is set to '0'.

If using one shot inputs, the trip input must be deactivated and reactivated after the lockout timer has expired to be able to re-trigger the input.

These lockout timers do NOT lockout the fixed timer or random timer triggers, they only work on the hardware (external) trip inputs.

## Continuous looping playback

Either connect the relevant trip permanently to ground OR set the 'invert' digit to '1' for the relevant file.

*For example:* Play track 4 looped

**/Invert =0001;** Normally closed bits, inverts trips '1234'

If you want the looping track to be interrupted by other trips, then use Track 4 for the loop as this trip has the lowest priority.

### Notes:

1. The DSU500 will default to standard settings if the INIT.txt file is corrupt or missing
2. All commands start with '/' and end with ';'
3. Any text allowed after the ';' on the same line only
4. Upper case or lower case characters allowed
5. Tabs and spaces are allowed within the command line for clarity
6. The last command must be followed with the '@' symbol.
7. Any text may be written after the '@' symbol
8. The INIT.txt file should be less than 4k bytes

## DSU500V1\_0.hex

This file contains the operating firmware of the DSU500 and is used to perform a firmware update for new features or bug fixes. This file will be available from time to time on our website.

The DSU500 does not need this file to be present to operate as it is merely used during firmware updates.

The file is named DSU500V1\_0.hex which describes the following:

DSU500	Product name
V1_0	Version 1.0
.HEX	Intel hex format of the data within the file

## Internal jumper settings

### WARNING.

**ENSURE THAT YOU HAVE NO STATIC CHARGE BEFORE REMOVING THE LID BY TOUCHING SOMETHING EARTHED SUCH AS THE CASE OF YOUR COMPUTER.**

To access the jumpers, disconnect the power and carefully remove the lid by removing the 3 screws.

The jumper block is labelled 'JP2' and jumpers are marked 1 to 5.

1	Future use
2	Future use
3	Future use
4	PERFORM FIRMWARE UPDATE (remove after use)
5	Enable USB port

### Jumper link 4

This jumper should only be fitted when performing a firmware update, see 'Firmware update' for further information. Note. This link will normally be supplied but fitted on position 1.

### Jumper link 5

This jumper link is factory fitted but can be removed to disable the USB port to prevent unauthorised access to the files within the DSU500.

## Connections

### Power

The DSU500 operates on 9 to 15V DC only such as from a regulated power supply or battery. Connect the power supply to the terminals marked +12V and GND observing correct polarity. The DSU500 has an internal self-resetting fuse in the event of the polarity being incorrectly connected.

### Trips

The four trips can be connected to external volt free contacts and the common GND. These trip inputs are used to initiate playback of the four audio files by momentarily grounding the relevant trip input. The trip inputs have internal pull-up resistors to 3.3V and are normally activated by grounding the relevant trip input.

**Warning: Do not apply more than 5V to the trip inputs if driving the DSU500 from non volt free connections, such as an external logic controller, as damage will occur.**

### USB port

This mini USB port is only used for loading the files onto the DSU500 and can be disabled after programming to prevent unauthorised use by removing JP2 link 5 (see above)

## Audio Outputs

Connect a loudspeaker with an impedance of 4 to 16 Ohms to the terminals marked Spkr + and Spkr-. For maximum output, use a 4 Ohm loudspeaker.

### **WARNING: DO NOT CONNECT EITHER LOUDSPEAKER OUTPUT TERMINALS TO GROUND**

You may alternatively connect an external amplifier to the Line out terminal and GND if required.

Note: The volume control should generally be set to between 25 and 50% to achieve 0dB output.

## Run out

This output can be used to control an external device such as a relay.

The output will pull to ground when an audio track is playing and will be open circuit when no audio is playing.

If driving a relay, you must fit a diode across the relay coil to suppress back EMF.

Maximum capacity is 30V at 500mA.

## Indicator LEDs

### Play LED (Blue)

This LED will be lit under the following conditions:

Normal operation.

This LED will be lit when audio tracks are playing.

This LED will flash if either the random or fixed timer is running while no audio is playing.

File loading.

The Play LED will light when the USB port is transferring data to the DSU500.

The USB cable should not be disconnected while this LED is lit and for 5 seconds after the LED has gone off.

Firmware update.

The Play LED will light while the firmware is being written to the internal flash memory.

### Status LED (Red)

Lit when the power is on.

This LED will flash a number of times to indicate an error code under the following conditions.

Primary error codes.

1. Not used.
2. File not found. (check naming is correct)
3. Incorrect file format. (Not Microsoft ADPCM)
4. File not encoded as MONO
5. No data chunk in file
6. Bits per sample wrong, must be 4
7. Sample rate above 48KHz

## Loading files

To load the files onto the DSU500, you will need the following:

DSU500

USB to mini USB lead (Golding Audio can provide this)

Computer

ADPCM audio files to put onto the DSU500

The DSU500 will appear as another hard disc drive when connected to the computer. Use standard drag and drop or cut and paste commands to move files between the computer and the DSU500.

## Backing up the DSU500

The DSU500 will be supplied pre-programmed with four test audio files as well as the 'INIT.txt' and 'DSU500.hex' files.

Please make a backup of these files before loading your own files by following these instructions:

- 1) Create a folder on your computer named 'DSU500 backup'.
- 2) Connect the USB lead to the computer and to the DSU500. The RED status LED should be lit steady.
- 3) Your computer will automatically load a mass storage driver for the DSU500.
- 4) Navigate to the drive named DSU500 V1.0 (version number will vary)
- 5) You should now see the six files listed above. Select all six and copy them to the folder made earlier as a backup.

You should now select the audio files (.wav) on the DSU500 and delete them before copying your own files onto the DSU500.

Ensure that the audio files that you wish to load are named with the first three characters as numbers to indicate to the DSU500 which trip input will trigger them.

Example:

Trip input	Audio file
1	001 Track1.wav
2	002 Canon.wav
3	003 Fire .wav
4	004 dog.wav

As you can see, the first three characters must always be a three digit number but the rest of the file name can be whatever you like. The extension must be '.wav'

The audio files **MUST** be encoded as Microsoft ADPCM (4 bit) in mono only and with a sample rate of either 8KHz, 16KHz, 32KHz, 44.1KHz or 48KHz. **No other formats will work.**

Either copy and paste or drag and drop your new audio files onto the DSU500.

The play LED (blue) will light while the DSU memory is being programmed.

Wait for the files to copy over to the DSU500 and check that the blue play LED has gone out.

**Do not disconnect the DSU500 while the play LED is lit during loading and for 5 seconds after the LED has gone off.**

If you need to alter the INIT.txt file to enable one shot trips or normally closed trips etc, it is best to make a copy of the 'init.txt' file located in your backup directory and save it with a different name such as: 'INIT sfx1.txt' so that you maintain a copy on your PC.

The first four characters must be 'INIT' and the extension must be .txt. Delete the current file on the DSU500 and then copy over the new one with the modified name.

## Security

To prevent anyone from accessing the files over the USB port, simply remove the link fitted to JP2 position 5 which will disable the USB port.

## Re-formatting

In the unlikely event that the memory on the DSU500 becomes corrupt and you can no longer see the files re-format the flash memory as follows:

**DO NOT use a computer format utility, it won't work.**

Unplug the USB lead if connected.

Disconnect power to the DSU500

Fit a wire link from Trip 4 to GND on the main connector (or press the external switch if there is one connected to trip 4)

While activating trip 4, insert the USB plug into the DSU500. This will power up the DSU500 from the PC and will automatically re-format the flash memory. If successful, a blank window will appear on the PC. You may now drag and drop your files back onto the DSU500. *Do not forget to remove the link on trip 4.*

## Firmware update procedure

From time to time, Golding Audio will release new firmware for the DSU500 to add more features or to fix minor bugs when found. This new firmware will be available via email directly from Golding Audio on request.

1. Obtain the new 'DSU500V?\_?.hex' from Golding Audio.
2. Remove the lid of the DSU500 and locate the position of header JP2.
3. Fit 2mm jumpers (supplied) across positions 4 & 5 of JP2.
4. Connect to the PC via the USB lead and check the red LED is on and the files are visible on the PC.
5. Delete the existing 'DSU500.hex' file from the DSU500 and copy across the new .hex file.
6. While the DSU500 is still powered, remove the two links on JP2 positions 4 & 5 and wait for the Play LED (blue) to go off and the Status LED to start flashing 'code 2' then disconnect the USB lead.
7. Refit JP2 link 5 if you wish to enable the USB port.
8. Power up and test.

## Secondary error codes

*These secondary codes are shown when updating firmware. (JP2 link 4 is fitted)*

1. Waiting for USB connection. (When performing firmware update)
2. Firmware update successful, disconnect USB and remove link 4.
3. Existing firmware is corrupt and cannot start.
4. No .HEX file exists in flash memory to update firmware.
5. .HEX file is corrupt.
6. Firmware update failed.
7. Watchdog fired. (Activate trip 1 to skip)

## Troubleshooting

1. The audio playback is jumbled up.  
This is because the DSU500 cannot play fragmented files correctly. Please delete the unwanted audio files first before adding your new files to prevent file fragmentation. If your files do not play correctly, re-format the DSU500 and copy your new files back on to the unit.
2. Have you tried turning it off and on again!!

## Exporting audio file from Audacity to Microsoft ADPCM wav

1. Ensure that your audio file is Mono with the correct sample rate that you require. If not you can find the options in the Tracks menu.
2. Click on File, then Export Audio.
3. In the Save as type option box select Other uncompressed files.
4. Now click on the Options button (This step is not needed with version 2.1.2 and above).
5. Select the following for the 2 options  
Header: WAV (Microsoft)  
Encoding: Microsoft ADPCM
6. Now click on the OK button.
7. Give your file a name as per the instructions (ensure the file extension is .wav) and click on the Save button.
8. Click the OK button if the Edit Metadata screen appears.

## Electrical specification.

Operating Voltage	12-15V DC
Current	2A peak, 100mA standby
Trips	Four active low inputs with programmable de-bounce Individual normally open or normally closed Individual one shot options
Priority options	Non interruptible Any other trip interrupt Lower trip priority Self interrupt
Run output	1 x open drain, 500mA max at 30V DC
USB input	For loading audio and control files only
Audio format	Microsoft ADPCM (MONO only)
Sample rates	48KHz, 44.1KHz, 32KHz, 16KHz, 8KHz
Memory	On board 8Mbyte flash
Storage time	Approx 5 Minutes at 48KHz sample rate ADPCM Approx 8 minutes at 32KHz sample rate ADPCM Approx 17 minutes at 16KHz sample rate ADPCM
Number of audio files	Up to 64
Digital resolution	16bit
Speaker output	Class D amplifier, push pull 20W into 4 Ohms @ 12V input
Line output	Variable to +6dB
Volume control	On board screwdriver adjustable control
Blue LED for status	On when playing On when loading files On when updating firmware Flashing when timer is running
Red LED for power status	On when powered Flashes a code to indicate any errors
Internal jumpers	1        Future use 2        Future use 3        Future use 4        PERFORM FIRMWARE UPDATE 5        Enable USB port