

WIRELESS SERIES

USER MANUAL

FOR THE

WS 400

FOUR UNIT WIRELESS BASE STATION



CONTENTS

1.0	GENERAL DESCRIPTION.....	3
2.0	UNPACKING.....	3
3.0	INSTALLATION.....	3
4.0	FRONT PANEL CONTROLS	4
5.0	REAR PANEL CONNECTORS	6
6.0	SETTING UP A CONNECTION	8
7.0	COMMUNICATION MODES	9
8.0	PRINCIPLES OF OPERATION.....	10
9.0	CABLING	11
10.0	PARTYLINE TECHNICAL CONCEPT	11
11.0	WARRANTY	11
12.0	TECHNICAL SPECIFICATIONS	11

1.0 GENERAL DESCRIPTION

The WS 400 is a four unit, wireless base station housed in a strong steel 19" housing.

On the front panel four sections of TX/RX units with channel selectors, antennas and LED indicators.

Special attention has been paid to the intelligibility of speech. By applying low noise/high speed op-amps, a speech presence filter and a specially developed amplifier, communication is very comfortable even in environments with a very high background noise level.

The unit is designed to be the base station for the wireless beltacks WS 19 and WS 29. Each of the four TX/RX units can maintain a full duplex connection with a beltack and have separated XLR connectors at the rear panel. The interface to the wired system can be switched as partyline or 4-wire mode.

2.0 UNPACKING

The shipping carton contains the parts listed below:

- The WS 400
- User manual
- Four antenna's
- Power cord

If any are missing, contact your dealer.

ASL has taken great care to ensure this product reaches you in flawless condition. After unpacking the unit please inspect for any physical damage, and retain the shipping carton and relevant packing materials for use should the unit need returning.

If any damage has occurred, please notify your dealer immediately so that a written claim can be initiated. Please also refer to the guarantee section of this manual.

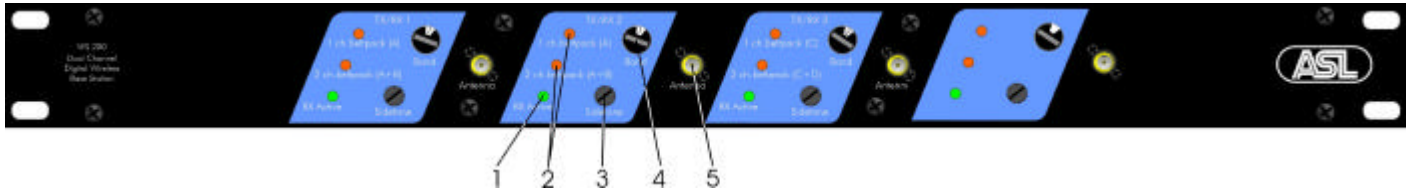
3.0 INSTALLATION

This WS 400 will form the base station for a WS 19 or WS 29 beltack and the interface for that beltack to the wired intercom system. The unit has it's own mains power supply and will therefore not be any load to the wired intercom system.

Adjust the 'channel select' switch to match the selected channel on the beltack. After switching on the unit with the power

switch at the rear panel, the unit should have contact with the beltack(s). To check this simply push the CALL or TALK button on the beltack and the "RX ACTIVE" LED's should indicate any activity of the beltack.

4.0 FRONT PANEL CONTROLS



1 RX active LED

This LED will be lit when the RX/TX Unit receives data from an active beltpack. When the beltpack is talking or sending a CALL the led will be lit. When a beltpack is only listening it will not be lit.

2 BELTPACK MODE LED'S

These LED's will show the setting of the audio interface. In case of a WS 19, the top LED, 1 ch. Beltpack (A), will be lit indicating that a single channel beltpack is using this connection and that the audio of that beltpack is routed to the XLR connectors of channel A.

In case of a WS 29, the bottom LEDs, 2 ch. Beltpack (A+B) or 2 ch. Beltpack (C+D), will be lit indicating that a dual channel beltpack is using this connection and that the audio of that beltpack is routed to the XLR connectors of channel A + B or to channel C + D. Please make sure that a WS 29 is connected to either channel A + B or to channel C + D.

3 SIDE TONE TRIMMER

This trimmer adjusts the level of your own voice as you hear it in your headset. The operating area is between fully clockwise and minimum level. Adjusting this signal does not affect the level of your voice as it is heard by other stations.

Adjustment procedure:

Turn down the OWN VOICE volume trimmer at the side panel of the beltpack. (counter-clockwise)

Switch on the TALK function of the beltpack (TALK button).

Talk into the microphone and listen to your own voice, you might hear a small delay in the signal.

Now turn down the volume of your own voice by adjusting the SIDE TONE trimmer at the base station of the TX/RX unit to which the beltpack is connected.

Adjust the trimmer so that the level of your own voice is as low as possible. Now turn up the volume of your own voice by adjusting the OWN VOICE trimmer to a level that you like.

4 CHANNEL SELECT SWITCH

With this switch the channel is selected on which the base station will communicate with the beltpack. The selected channel must match the channel set at the beltpack.

5 ANTENNA CONNECTOR

On this connector the supplied antennas are to be connected.

Please read the section PRINCIPLES OF OPERATION very carefully to be sure of optimum performance of your base station.

5.0 REAR PANEL CONNECTORS



1 INTERFACE MODE SWITCH

This switch determines the mode of the audio interface and the function of the XLR connectors 3 and 4.

When the switch is not pushed the XLRs are both partyline connectors (input and link) and the beltpacks audio is sent to this partyline. In this mode the base station will also handle all CALL functions to and from the wired intercom, and MIC MUTE functions from the wired intercom.

When this switch is pushed the audio interface is in 4-wire mode, this means that the male connector outputs the audio signal from the beltpack as an electronically balanced signal, and the female connector is the electronically balanced input connector for audio to the beltpack.

2 OUTPUT LEVEL TRIMMER

This trimmer adjusts the output level of the audio signal that comes from the beltpack.

3 OUTPUT/LINK CONNECTOR

When the interface is in partyline mode: This male XLR-3 connector is the link/out connector and is connected parallel to the female XLR-3 (4).

When the interface is in 4-wire mode: This male XLR-3 connector is the electronically balanced audio signal from the beltpack.

4 INPUT CONNECTOR

When the interface is in partyline mode: This female XLR-3 connector is the input connector and is connected parallel to the male XLR-3 (3).

When the interface is in 4-wire mode: This female XLR-3 connector is the electronically balanced audio signal input that is sent to the beltpack.

5 INPUT LEVEL TRIMMER

This trimmer adjusts the input level of the audio signal that is sent to the beltpack.

6 SUB-D LINK CONNECTOR

This connector contains all signals that need to be interchanged when two base stations are to be used in the same space. Only use the special cable that ASL-Intercom supplies as an option.

7 MAINS SWITCH

With this mains switch the unit can be switched on or off.

8 MAINS INPUT

This mains input accepts 90 – 240 V AC, at 50 – 60 Hz. This part also holds the fuse and a spare fuse on the bottom part. The fuse needs to be 1,25 Amp of the slow blow type.

6.0 SETTING UP A CONNECTION

6.1 BASE STATION SETTINGS

A) The base station must be set up properly according to the user manual. Give each TX/RX unit of the base station its own channel by rotating the Channel select switch.

Try to avoid concurrent channels to be physically next to each other, e.g. in a setting of two WS 400's try to set them in this order : 2, 4, 6, 8, 1, 3, 5, 7

If you use a WS 200 with only two beltpacks use channels 1 and 6.

B) Connect the base station to the partyline intercom or 4 wire system and make sure the interface mode switch at the back is set accordingly.

C) turn the sidetone trimmers counter clockwise.

6.2 BELTPACK SETTINGS

Select with the 'Channel select' switch at the rear of the beltpack the channel to match the WS 200 or WS 400 setting.

Connect a headset to the beltpack and insert fully charged batteries.

When the beltpack is switched on then a single short tone should be heard and both LEDs on the front panel of the unit will flash for half a second. This indicates that the beltpack is functioning okay.

If you press the CALL or TALK button the LEDs on the front panel will be lit and the corresponding TX/RX unit of the base station will show a green ACTIVE LED. This means that the beltpack has connection with the base station.

6.3 SIDETONE ADJUSTMENT

Turn down the OWN VOICE volume trimmer at the side panel of the beltpack. (counter-clockwise)

Switch on the TALK function of the beltpack (TALK button).

Talk in the microphone and listen to your own voice, you might hear a small delay in the signal.

Now turn down the volume of your own voice by adjusting the SIDE TONE trimmer at the base station of the TX/RX unit to which the beltpack is connected.

Adjust the trimmer so that the level of your own voice is as low as possible.

Now turn up the volume of your own voice by adjusting the OWN VOICE trimmer to a level that you like.

6.4 FULL DUPLEX AND HALF DUPLEX USE

Although the system is designed to be used in full duplex use, there is a possibility to use the system in half duplex mode, too.

Half duplex allows more than 1 beltpack on the same frequency and therefore, on one TX/RX unit of a base station.

Every beltpack will be able to listen to the base station, but only one of the listening beltpacks can talk at a time and have a full duplex connection. As long as one of the beltpacks has a full duplex connection, the other beltpacks will not be able to CALL or TALK.

In this mode it is useful not to adjust the sidetone trimmer on the base station, turn it fully counter clockwise.

Read the next chapter about communication modes carefully.

7.0 COMMUNICATION MODES

This system is designed to offer a maximum of 8 wireless, full duplex, beltpacks. Each beltpack may be a single channel beltpack WS 19 or a dual channel beltpack WS 29.

Each beltpack needs to be assigned to a unique channel. On this channel the communication between the beltpack and the base station will take place. If another base station is set to the same channel the communication will be garbled and will result in a non functioning connection.

The base station will automatically select the right mode for a WS 19 or WS 29 beltpack. A WS 19 beltpack will always be connected to one channel at the base station, a WS 29 beltpack will be assigned to two channels on the base station.

7.1 FULL DUPLEX

A connection of one WS 19 on e.g. Channel 1 will be accomplished by selecting channel 1 on the beltpack, and channel 1 on TX/RX unit 1 of the base station. The connection is a dedicated and full duplex connection.

The sidetone needs to be adjusted at the front of the base station and the user of the beltpack can adjust his own voice at the beltpack with the designated trimmer.

7.2 HALF DUPLEX

A connection of several WS 19 beltpacks on e.g. Channel 1 to a TX/RX unit of a base station (also channel 1 selected) results in a half duplex connection.

This means that all the beltpacks can listen to the same TX/RX unit of the base station. Only one beltpack can TALK to the base station.

The beltpack that selects TALK mode will occupy the connection, and the TALK function of all other listening beltpacks is disabled.

The same applies for sending CALL signals, only one beltpack may send a call signal but all of them will receive it.

There is one major drawback to half duplex mode, due to the principle of the partyline concept.

In case of a very good adjusted sidetone trimmer at the base station this effect will be noticed :

When 2 or more beltpacks are using the same TX/RX unit of a base station (listening to the same signal), and one of the beltpacks is talking to the base station, the listening beltpack will not be able to hear the talking beltpack.

This effect is caused by the adjusted sidetone that prevents the microphone signal of a beltpack to be heard by himself, and therefore, also heard by other beltpacks on the same TX/RX unit.

To solve this, the sidetone trimmer of the TX/RX unit should be turned fully counter clockwise.

This has one disadvantage too, if a beltpack talks to the base he will hear his own voice in his headset with a delay of 24 ms. The other listening beltpacks will not notice this delay.

By adjusting the OWN VOICE trimmer at the beltpack the effect can be made less.

8.0 PRINCIPLES OF OPERATION

The wireless system uses the 2,4 GHz band, which is freely available for WLAN (Wireless Local Area Networks).

The ASL-intercom system divides the available bandwidth into 16 overlapping parts, 8 of them are being used as upload channel from the beltacks and the other 8 are being used as download channel to the beltacks.

With the channel select switch you actually select an upload and download channel pair to be used for that beltack. On every channel **only one** section of a base station may be working.

More than one beltack on the same channel is possible as described in section 8.2.

8.1 HF FREQUENCIES

Due to the fact of the very high frequency the user must take precautions in placement.

The frequency of 2,4 GHz is known to have difficulty in penetrating concrete walls, steel walls and other obstructions. Behind obstructions like these an "HF shadow" may occur where no communication is possible.

Another point of interest is that this frequency may have reflections more easily than lower frequencies. You might experience a dropout on a very specific spot in a building, moving the beltack only a few inches can be enough to solve the problem.

Because of the use of the WLAN frequencies the units might experience interference from units like mobile telephones with bluetooth, computers with bluetooth or WLAN cards.

Try to change channels if you experience problems with these.

8.2 ANTENNA'S

Another point of interest is placing the unit in a 19" rack. The user needs to pay special attention to the placement of the antenna. The antenna of the base station needs to have a "line of sight" to the antenna of the beltack.

All objects that are within that path will make the connection less reliable.

This starts with the 19" rack itself, the maximum available distance behind the rack will be less than in front of the rack. The base stations WS 200 and WS 400 are available in versions with the antenna connectors at the front or at the rear panel. Choose whichever version is the most convenient to you.

All base stations are equipped with SMA connectors, female at the base station and male at the antenna.

If the antennas are not to be directly connected to the front or the rear panel, the user must take care of the right type of cable to be used; it needs to be of the 50 ohm type. The 2,4GHz frequency experiences a big loss in any cable, e.g. a RG58 cable of 3 meters has a loss of 3 dB, so make sure that your cable is suited for this frequency, and the cable is as short as possible.

Make the cables in lengths that can be divided by 12cm. e.g. 24cm, 48cm, 120cm, 240cm.

9.0 CABLING

For the PRO Series Intercom system the interconnecting cables are of the shielded two-conductor microphone cable type and the intercom line connectors are of the XLR-3 type. Audio and Call signals are on XLR pin 3, DC power is on XLR pin 2. XLR pin 1 is connected to the shield of the cable, which functions as the common return for audio and power.

Since the audio signal is transferred in an **unbalanced** ★ way, certain rules have to be obeyed when installing the cables of an intercom network. This is to avoid earth loops and to minimize power loss and the possible effect of electromagnetic fields.

These rules are:

- **Use high quality (multipair) cable.**
For interconnecting user stations, power supplies and accessories in an ASL Intercom network, use high quality shielded two-conductor (minimum 2x 0.30 mm²) microphone cable only.
In case of a multi channel intercom network, use high quality microphone 'multipair' cable only, each pair consisting of two conductors (minimum 2x 0.15 mm²) with separate shield. Multipair cable should also have an overall shield.
- **Use flexible cables.**
Use flexible single and multipair microphone cable instead of cable with solid cores, especially when the cable is subjected to bending during operation or installation.
- **Separate cable screen to XLR pin 1.**
The screen of each separate microphone cable and/or the screen of each single pair in a multipair cable, should be connected to pin 1 of each XLR-3 connector. Do not connect this cable screen to the metal housing of the connector or to metal wall boxes (outlets).
See page 12 for Earthing Concept.
- **Cable trunks, connection boxes and overall multipair cable screen to clean earth.**
Metal cable trunks, metal connection boxes and overall multipair cable screen should be inter-connected and, at one point (the 'central earthing point') in the intercom network only, be connected to a clean safety earth.
See page 12 for Earthing Concept.
- **Keep metal connection boxes and cable trunks isolated from other metal parts.**
Metal housings for intercom cables and connectors should be mounted in such a way that they are isolated from other metal cable and connector housings and from any other metal construction parts.
- **Keep cables parallel as much as possible**
When two (multi channel) units in a network are connected by more than one cable, make sure that these cables are parallel to each other over the whole distance between those units. When using multipair cable, parallelism is ensured in the best possible way.
- **Avoid closed loops.**
Always avoid that cables are making a loop. So-called 'ring intercom' should not physically be cabled as a ring. All cable routes should have a 'star' configuration, with the central earthing point (usually close to the power supply position) as the centre of the star.
- **Keep cables away from electromagnetic sources.**
Keep intercom cables away from high-energy cables, e.g. 110/220/380V mains power or dimmer controlled feeds for spotlights.
Intercom cables should cross high-energy cables at an angle of 90° only.
Intercom cables should never be in the same trunking as energy cables.
- **Place power supplies in a central position.**
In order to avoid unacceptable power losses, place the power supplies as close as possible to where most power consumption occurs or, in other words, most user stations are placed.
- **Connect ASL power supply to a 'clean' mains outlet.**
The ASL power supply may be connected to the mains power outlet to which other audio equipment is connected. Avoid using mains outlets, which also power dimmer controlled lighting systems.

In case of more complex installations, don't hesitate to contact us. Please send us a block diagram of the planned network with a list of all user stations and their positions, and we are happy to advise you on cabling layout.

★ See Party Line, Technical Concept

10.0 PARTY LINE, TECHNICAL CONCEPT

ASL's WIRELESS Series offers a complete two way ('full duplex') communication system. Users of the system are connected via a 'party line' base station (with built-in power supply); belt packs and power supplies are interconnected via standard microphone cable. One wire is used as an audio line, one as a power line and the screen of the cable functions as earth/return.

Current drive is used for signal transfer. Each station utilizes a current amplifier to amplify the microphone signal and place it on the common audio line where, due to the constant line impedance (situated in the power supply between XLR pin 3 and 1), a signal voltage is developed which can be further amplified and sent to the headphones.

This principle has three advantages:

- the use of a single audio line allows several stations to talk and listen simultaneously.
- due to the high bridging impedance offered by each station, the number of stations 'on line' has no influence on the level of the communications signal.
- power and audio to the intercom stations use the same cable.

The Call signal is also sent as a current on the audio line. It develops a DC potential over the line impedance, which will be sensed by each station and interpreted as a Call signal.

11.0 WARRANTY

ASL Intercom warrants this unit to the original end-user purchaser against defects in workmanship and materials in its manufacture for a period of two years from date of shipment to the end-user.

Faults arising from misuse, unauthorized modifications or accidents are not covered by this warranty. If the unit is faulty, it should be sent in its original packing to the supplier or your local ASL dealer, with shipping prepaid. A note must be included stating the faults found and a copy of the original suppliers invoice.

THIS PRODUCT WAS DESIGNED, DEVELOPED AND MANUFACTURED BY:

ASL Intercom
UTRECHT, HOLLAND.
<http://www.asl-inter.com>

12.0 TECHNICAL SPECIFICATIONS WS 400

MAINS POWER

Mains power	90 – 240 V AC
	50 – 60 Hz
Fuse	1250 mA T
Max Consumption	25 Watt

4-WIRE MODE: INPUT AMPLIFIER

input impedance	min. 10Kohm
input level	+30 to - 10 dBm
frequency response	60Hz - 20KHz (-3dB)

OUTPUT AMPLIFIER

output impedance	< 25 ohms
maximum load	600 ohms
max. output level	+20 to -20 dBm
frequency response	40 Hz - 20 KHz

PARTYLINE MODE: INTERCOM LINE DRIVER

Max. output current	3mA rms
output impedance	> 150 Kohm

SIDETONE

rejection	min. 20 dB (20Hz - 20 KHz)
audio line level	-18dBm (max. 0dBm)
signal-to-noise	70dB
station bridging impedance	>150 Kohm

DIMENSIONS AND WEIGHT

width	480 mm
height	44 mm
depth	165 mm
weight	2300 grams

GENERAL SYSTEM SPECIFICATIONS

dynamic range	70 dB
Transceiver frequency	2400 – 2483.5 MHz
Transmit Power	10 mW E.I.R.P.
Number of channels	8
Channel separation	7 MHz

Note : 0dBu = 775 mV into open circuit

ASL reserves the right to alter specifications without further notice.

