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Users Manual TruLink

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1. GENERAL

1.1 SCOPE

This document is the users manual for the TruLink system. The manual explains how to handle the portable transceiver, ME6820, the fixed transceiver, AP6803, and the support station, SS6819, included in the system.

The technical system description of the TruLink system can be found in [1].

1.2 DEFINITIONS AND ABBREVIATIONS

Definitions, abbreviations and acronyms used in the document are listed below:

<input type="checkbox"/> AP	Access Point Transceiver
<input type="checkbox"/> ME	Mobile Equipment
<input type="checkbox"/> NVG	Night Vision Goggles
<input type="checkbox"/> PTT	Push To Talk
<input type="checkbox"/> SS	Support Station
<input type="checkbox"/> SYNVOICE	Synthetic Voice (recorded voice message)
<input type="checkbox"/> VOX	Voice Operated Keying

1.3 REFERENCES

[1] System Description (Saab Communication, PR2060H1)

1.4 STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1.5 CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.6 NOTE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- **Increase the separation between the equipment and receiver.**
- **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.**
- **Consult the dealer or an experienced radio/TV technician for help.**

2. PORTABLE UNIT (ME6820)

2.1 OVERVIEW

The portable radio station (ME6820) is used together with a headset for audio input/output.

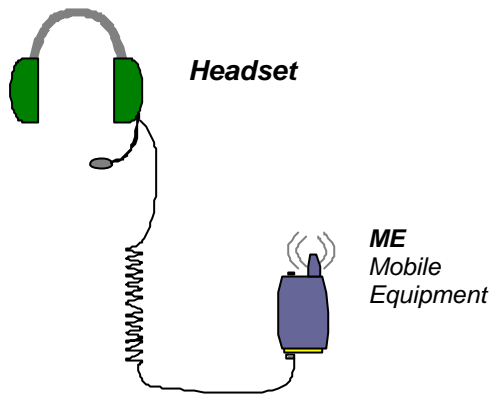


FIGURE 1. Portable unit and headset.

The user interface control consists of a number of keys and a two-coloured LED on the ME unit and a recorded voice function, SYNVOICE.

The SYNVOICE is a sampled phrase database that is used as an audio display, instead of a visible display, to indicate selections and status.

The operation of the ME is based on a few keys that are pressed in different combinations for accessing the parameter to operate/modify.

The keys on the ME unit are: *PTT*, *M*, *+*, *-*, and ***.

For every key pressed, there is a *KEY CLICK* sound generated into the headset.

2.2 STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

2.3 USER INTERFACE

2.3.1 Overview

The functions accessed by the keys on the ME unit can be listed as follows:

- ☐ Power control
- ☐ Transmitter keying
- ☐ Volume control for headset
- ☐ Menu and mode selection control

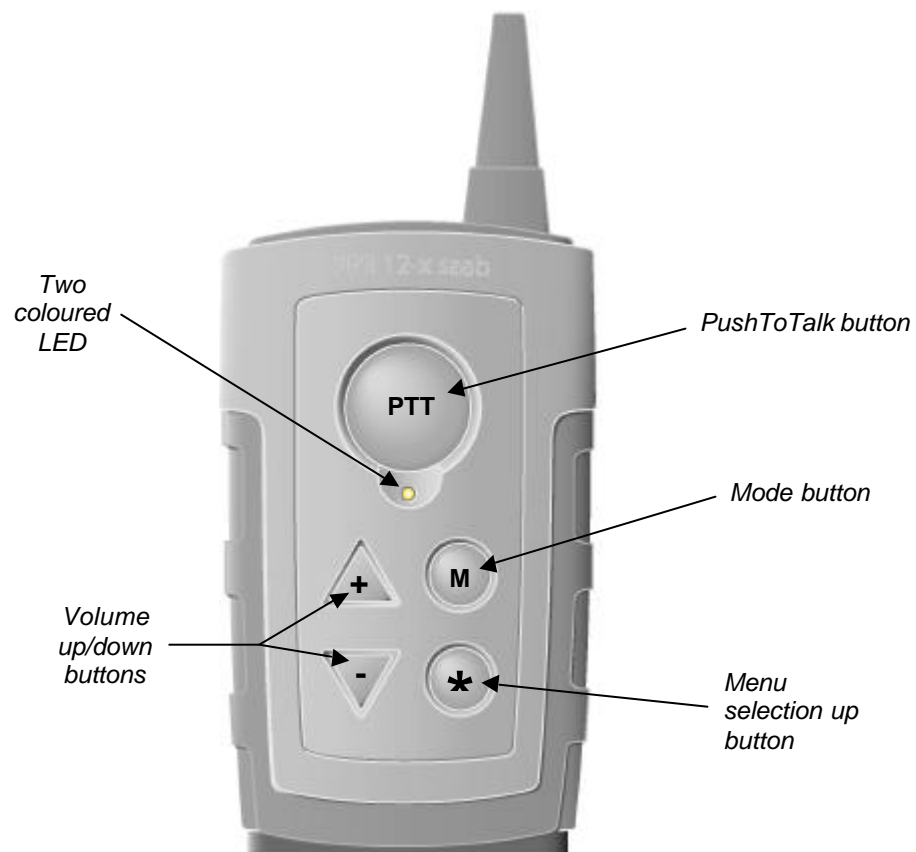


FIGURE 2. Portable unit.

The following items are denoted in the picture:

- ☐ PTT
- ☐ M key for mode selection
- ☐ +/- keys for volume adjustment
- ☐ * key for menu selection
- ☐ Power LED for power and battery indication and operator type indicator

2.3.2 Power ON/OFF

To switch the power on or off, the + and - keys are used together and held for about 1 second until the LED is steady green. When the unit has been powered on the user can start a network or logon to a network.

2.3.3 Start menu

When ME unit is powered on the user enters the start menu. The selected items in the start menu are listed by the SYNVOICE function. It is configurable which modes should be included in the start menu but the modes in the start menu can at most be:

- ☐ CHANNEL [channel list]
- ☐ UNIT MODE [master/slave]
- ☐ USER TYPE [list]
- ☐ ORDER SYNCHRONISE AP

In the start menu key *PTT* is used for confirming settings. To browse through the menu the *M* key is used and the * key is used to change a setting. If the start menu looks like the list above *M* is pressed twice to select USER TYPE, to change the settings of mode USER TYPE the * key is used. If *PTT* is pressed the changed setting is saved and the SYNVOICE function again lists the settings in the menu. If the setting is not confirmed within a configurable time the setting is changed back to default mode.

If the user any time in the start menu presses *PTT* when no changes have been done to the settings since last time they were listed the logon procedure starts immediately. The logon procedure will also be activated if no action is taken within a configurable time, the unit then starts to logon with the default settings listed.

A successful logon is announced with SYNVOICE message "LOG ON OK". If the unit has received information of external connections during the logon procedure the user will be notified with SYNVOICE message "EXTERNAL AVAILABEL". If destination by default is one of the external connections, 2.3.4.1, this is announced by message "EXTERNAL" plus the name of the external.

If UNIT MODE is included in the start menu the user can choose to either start a new network as a Master, 2.3.3.1, or to logon to an existing network as a Slave, 2.3.3.2.

2.3.3.1 Starting a network

To start a new network UNIT MODE must be set to "MASTER". If the default setting is "SLAVE" the setting is changed with keys *M* and * and confirmed by pressing *PTT*. When the logon procedure starts the unit will start a new network with the selected channel in the start menu. A successfully started network is announced to the user by SYNVOICE message "LOG ON OK".

2.3.3.2 Logging on to a network

To be able to logon to an existing network UNIT MODE must be set to "SLAVE", there can only be one "MASTER" in a network. The network can be selected by the mode "CHANNEL", the slave must have same channel number as the master of the network.

When the logon procedure starts the unit will try to logon to the Master of the network. A successfully logon to a network is announced to the user by SYNVOICE message "LOG ON OK".

If no network is available a "NEG RESPON" sound, 2.3.8.8, is heard and then a "NO SERVICE" tone, 2.3.8.8, is repeated until next logon attempt.

If logon fails due to mismatch of system configuration SYNVOICE message "CONFIGURATION ERROR" is heard in the headset and then the "NO SERVICE" tone is turned on until next logon try.

The unit tries to logon for a configurable time and then power is automatically turned off. The user can access the start menu and change settings either until the unit successfully logs on to the network or until power down.

2.3.4 Normal menu

When the unit has logged on or started a network the user can access the normal menu with the *M* key. It is configurable which modes should be included in the normal menu but the modes in the normal menu can at most be:

- ☐ DESTINATION [list] – if connected to external connections
- ☐ CHANNEL [channel list]
- ☐ VOX [on/off]
- ☐ UNIT MODE [master/slave]
- ☐ USER TYPE [list]
- ☐ KEY LOCK [on/off]
- ☐ LED [on/off/nvg/timer]
- ☐ ORDER VOX [on/off]
- ☐ ORDER POWER OFF
- ☐ ORDER SLEEP MODE
- ☐ ORDER MERGE CHANNEL [channel list]
- ☐ ORDER CHANNEL [channel list]
- ☐ ORDER RELAY [on/off]
- ☐ ORDER CHANGE MASTER
- ☐ ORDER SYNCHRONIZE AP

The *M* key is used for cycling between the modes in the menu and * is used for changing the settings of the selected mode. When the menu has been accessed *PTT* is used for confirming the settings. When a setting has been confirmed a "CONFIRMED" tone is heard in the headset and the unit exits the menu.

If no action is taken, when the menu has been accessed, within a configurable time the unit exits the menu again, a "MENU EXIT" tone is then generated.

Mode DESTINATION will only be available if the unit has access to any external connections, DESTINATION is then the default mode and can be changed directly with *. I.e. the menu does not have to be accessed to change the DESTINATION setting. If no external connections are available pressing * has no effect when the menu has not been accessed.

2.3.4.1 DESTINATION

The DESTINATION mode is available if the user has access to any external connections. The setting of the mode specifies where the audio from a *PTT* request should be routed. Changing the setting alters destinations of the audio from the unit when *PTT* is used.

2.3.4.1.1 Change setting of mode DESTINATION

- ❑ If the menu has not been accessed this point can be skipped. Press and release *M* until SYNVOICE announce the DESTINATION mode, e.g. “DESTINATION NORMAL”.
- ❑ Press * to cycle through the selection list of mode DESTINATION, one key click corresponds to one step in the selection list. When * is released a SYNVOICE message informs of selected setting, e.g. “DESTINATION EXTERNAL FIVE”. If the selected setting is not the wanted one, press * again.
- ❑ To confirm the setting press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.2 CHANNEL

When the CHANNEL setting is changed the unit enters the start menu and a new logon process is started. The unit will try to start/connect to a new network with the specified channel.

Changing channel when the unit is master of the network is not recommended since the action will have serious effects for all slaves logged on to the network, all units will be disconnected from the network. If all users in the network should change channel MERGE CHANNEL, 2.3.4.11, or CHANGE CHANNEL, 2.3.4.12, should be used instead.

2.3.4.2.1 Change setting of mode CHANNEL

- ❑ Press and release *M* until SYNVOICE announce the CHANNEL mode, e.g. “CHANNEL ONE”.
- ❑ Press and release * to step through the channel list. If * is held down for more than 0.5 seconds a “LONG KEY CLICK”, 2.3.8.8, will be heard instead of the ordinary key click. One long key click corresponds to ten steps in the channel list. When * is released a SYNVOICE message informs of selected setting, e.g. “CHANNEL THREE ONE”. If the selected channel is not the wanted one, press * again.
- ❑ To confirm the selected channel press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.3 VOX

The setting of mode VOX specifies whether the voice operated keying is turned on or off.

2.3.4.3.1 Change setting of mode VOX

- ❑ Press and release *M* until SYNVOICE announce the VOX mode, e.g. “VOX ON”.
- ❑ Press and release * to change setting to ON or OFF. When * is released a SYNVOICE message informs of selected setting, e.g. “VOX OFF”. If the selected setting is not the wanted one, press * again.
- ❑ To confirm the setting press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.4 UNIT MODE

The UNIT MODE specifies if the unit is operating as Slave or Master.

Changes of this setting should be cautiously considered. If the unit is operating as Slave and the mode is changed to Master the unit will be disconnected from the net and the unit will start a new network. However the consequences will be more serious if the unit is operating as Master. All slaves will be disconnected from the network and the unit, the former Master, will try to log on to the disconnected network.

2.3.4.4.1 Change setting of mode UNIT MODE

- ❑ Press and release *M* until SYNVOICE announce the UNIT MODE mode, e.g. “SLAVE”.
- ❑ Press and release * to change setting to MASTER or SLAVE. A SYNVOICE message informs of selected setting, e.g. “MASTER”. If the selected setting is not the wanted one, press * again.
- ❑ To confirm the setting press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.5 USER TYPE

The setting of the mode specifies the user type of the unit. The user type decides how to receive and transmit audio on the network.

2.3.4.5.1 Change setting of mode USER TYPE

- ❑ Press and release *M* until SYNVOICE announce the USER TYPE mode, e.g. “USER TYPE ONE”.
- ❑ Press * to cycle through the selection list of mode USER TYPE, one key click corresponds to one step in the selection list. When * is released a SYNVOICE message informs of selected setting, e.g. “USER TYPE FIVE”. If the selected setting is not the wanted one, press * again.
- ❑ To confirm the setting press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.6 KEY LOCK

If the key lock is turned on activating a key will generate SYNVOICE message “KEY LOCK ON”, however Emergency PTT will still work correctly. The key lock is turned off by pressing *M* and *** in sequence.

2.3.4.6.1 Turn on key lock

- ❑ Press and release *M* until SYNVOICE announce the KEY LOCK mode, i.e. “KEY LOCK OFF”.
- ❑ Press and release *** once to turn on key lock. When *** is released a SYNVOICE message informs of selected setting, e.g. “KEY LOCK ON”. If the selected setting is not the wanted one, press *** again.
- ❑ To confirm the setting press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.7 LED

With this function a user can control the two coloured LED on the portable unit. The LED can be set in normal mode, in high mode for intense sunlight, it can be turned off, it can be set in NVG mode, or it can be turned off after a configurable time after power up.

2.3.4.7.1 Change setting of mode LED

- ❑ Press and release *M* until SYNVOICE announce the LED mode, e.g. “LED NORMAL”.
- ❑ Press *** to cycle through the selection list of mode LED, one key click corresponds to one step in the selection list. When *** is released a SYNVOICE message informs of selected setting, e.g. “LED NVG”. If the selected setting is not the wanted one, press *** again.
- ❑ To confirm the setting press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.8 ORDER VOX

This function is used to turn on or off the VOX function of all units.

Users that are ordered to turn on/off the VOX are notified with SYNVOICE message “AUTO VOX ON/OFF”.

When all units have obeyed to the order the order maker is notified with SYNVOICE message “ORDER VOX OK”. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER VOX LOST”.

After a unit has answered to the order the user can override the order by manually turning on/off the vox with mode VOX in the menu.

2.3.4.8.1 Turn on/off all units VOX

- ❑ Press and release *M* until SYNVOICE announce the ORDER VOX mode, e.g. “ORDER VOX ON”.
- ❑ Press and release * to change setting to ON or OFF. A SYNVOICE message informs of selected setting, e.g. “ORDER VOX OFF”. If the selected setting is not the wanted one, press * again.
- ❑ To confirm the setting press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.9 ORDER POWER OFF

Using this order means that all units in the network will be turned off.

The ordered users are notified with SYNVOICE message “AUTO POWER OFF” and then power will be turned off automatically.

When all units have obeyed to the order the order maker is notified with SYNVOICE message “ORDER POWER OFF OK” and then the power of the unit is turned off automatically. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER POWER OFF LOST” and then power will be turned off automatically anyway.

2.3.4.9.1 Turn off all units power

- ❑ Press and release *M* until SYNVOICE announce the ORDER POWER OFF mode, i.e. “ORDER POWER OFF”.
- ❑ To confirm the order press *PTT*. If the order is not confirmed the menu will be exited without any actions taken.

2.3.4.10 ORDER SLEEP MODE

Using this order means that all units in the network will enter sleep mode to save power.

The ordered users are notified with SYNVOICE message “AUTO SLEEP MODE” and then sleep mode will be entered automatically.

When all units have obeyed to the order the order maker is notified with SYNVOICE message “ORDER SLEEP MODE OK” and then the unit will enter sleep mode automatically. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER SLEEP MODE LOST” and then the unit will enter sleep mode automatically anyway.

2.3.4.10.1 Order “sleep mode”

- ❑ Press and release *M* until SYNVOICE announce the ORDER SLEEP MODE mode, i.e. “ORDER SLEEP MODE”.
- ❑ To confirm the order press *PTT*. If the order is not confirmed the menu will be exited without any actions taken.

2.3.4.10.2 Wake up from “sleep mode”

Any user can “wake up” the network by pressing PTT or using the VOX function.

2.3.4.11 ORDER MERGE CHANNEL

With this function it is possible to merge two networks.

A user of one of the networks selects same channel as another network from the list in mode ORDER MERGE CHANNEL. The order is sent to all users in the order makers network.

Upon reception of the order the units try to log on to the selected network as slaves. The ordered users are notified with SYNVOICE message “AUTO MERGE CHANNEL” plus the channel number of the other network.

When all ordered users have answered to the order the order maker is notified with SYNVOICE message “ORDER MERGE CHANNEL OK” and then the unit tries to logon as slave to the other network. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER MERGE CHANNEL LOST” and then the unit anyway tries to logon as slave to the other network.

2.3.4.11.1

Merge two networks

- ❑ Press and release *M* until SYNVOICE announce the ORDER MERGE CHANNEL mode, e.g. “ORDER MERGE CHANNEL ONE”.
- ❑ Press and release * to step through the channel list. If * is hold down for more than 0.5 seconds a “LONG KEY CLICK”, 2.3.8.8, will be heard instead of the ordinary key click. One long key click corresponds to ten steps in the channel list. When * is released a SYNVOICE message informs of selected setting, e.g. “ORDER MERGE CHANNEL THREE ONE”. If the selected channel is not the wanted one, press * again.
- ❑ To confirm the selected channel press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.12 ORDER CHANNEL

ORDER CHANNEL is used for changing channel of the network while keeping the network intact with same Master and slaves.

A new channel is selected from the list in mode ORDER CHANNEL.

When the users receives this order they are notified with SYNVOICE message “AUTO CHANNEL” plus the number of the new channel and then the units try to logon to the new channel.

When all ordered units have answered to the order the order maker is notified with SYNVOICE message “ORDER CHANNEL OK” and then the unit tries to logon to the new channel. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER CHANNEL LOST” and then the unit anyway tries to logon to the new channel.

2.3.4.12.1 Change channel of the network

- ❑ Press and release *M* until SYNVOICE announce the ORDER CHANNEL mode, e.g. “ORDER CHANNEL ONE”.
- ❑ Press and release * to step through the channel list. If * is hold down for more than 0.5 seconds a “LONG KEY CLICK”, 2.3.8.8, will be heard instead of the ordinary key click. One long key click corresponds to ten steps in the channel list. When * is released a SYNVOICE message informs of selected setting, e.g. “ORDER CHANNEL FOUR ONE”. If the selected channel is not the wanted one, press * again.
- ❑ To confirm the selected channel press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

2.3.4.13 ORDER RELAY

Mode ORDER RELAY is used when a unit temporarily needs to take over as Master in the network.

The old master and the slaves of the network are notified with SYNVOICE message “AUTO RELAY ON” and then try to log on to the new Master as Slaves.

When the old Master has answered to the order the order maker change to Master of the network, the users are notified with SYNVOICE message “AUTO RELAY ON”.

When all ordered units have answered to the order the order maker is notified with SYNVOICE message “ORDER RELAY OK” and then the unit takes over as Master. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER RELAY LOST” and then the unit starts as Master anyway.

No other unit except the order maker can use the order when the mode is in RELAY ON.

When the order maker sets the mode in RELAY OFF the old master takes over as master again and the users are notified with SYNVOICE message “AUTO RELAY OFF”.

When all ordered units have answered to the order the order maker is notified with SYNVOICE message “ORDER RELAY OK” and then the unit tries to log on to the old Master. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER RELAY LOST” and then the unit tries to log on to the old Master anyway.

2.3.4.13.1 Change relay

- ❑ Press and release *M* until SYNVOICE announce the ORDER RELAY mode, i.e. “ORDER RELAY ON”.
- ❑ To confirm the order press *PTT*. If the order is not confirmed the menu will be exited without any actions taken.

2.3.4.14 ORDER CHANGE MASTER

Mode ORDER CHANGE MASTER is used when a unit wishes to take over as Master in the network.

The old master and the slaves of the network are notified with SYNVOICE message “AUTO CHANGE MASTER” and then try to log on to the new Master as Slaves.

When all ordered units have answered to the order the order maker is notified with SYNVOICE message “ORDER CHANGE MASTER OK” and then the unit takes over as Master. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER CHANGE MASTER LOST” and then the unit takes over as Master anyway.

2.3.4.14.1 Change master

- ❑ Press and release *M* until SYNVOICE announce the ORDER CHANGE MASTER mode, i.e. “ORDER CHANGE MASTER”.
- ❑ To confirm the order press *PTT*. If the order is not confirmed the menu will be exited without any actions taken.

2.3.4.15 ORDER SYNCHRONIZE AP

Mode ORDER SYNCHRONISE AP is used to synchronize an AP to a network.

The AP will take over as Master of the network.

Before the order is performed the channel set key should be pressed on the AP to prepare the AP for the synchronization, see chapter 3.3.3.

The users of the network are notified with SYNVOICE message “AUTO SYNCHRONIZE ACCESS POINT” and then try to log on to the AP as Slaves.

When all ordered units have answered to the order the order maker is notified with SYNVOICE message “ORDER SYNCHRONIZE ACCESS POINT OK” and then starts the synchronisation of the AP. If all units do not confirm the order the order maker is notified with SYNVOICE message “ORDER SYNCHRONIZE ACCESS POINT LOST” and then starts the synchronisation of the AP anyway.

The users become aware of a successful synchronisation whit the log on message “LOG ON OK”. When a synchronisation fails the slaves will not be able to log on to the network. To start a new network one of the users must actively set his unit to Master, 2.3.4.4.

2.3.4.15.1 Synchronize AP

- ❑ Press and release *M* until SYNVOICE announce the ORDER SYNCHRONIZE AP mode, i.e. “ORDER SYNCHRONIZE ACCESS POINT”.
- ❑ To confirm the order press *PTT*. If the order is not confirmed the menu will be exited without any actions taken.

2.3.5 Monitor mode

In normal mode the user transmits and receives audio from other users and external equipments. In Monitor mode the users audio will not be transmitted to external equipments but the user still receives all radio traffic, including traffic from external equipments.

- ❑ To enter Monitor mode *M* is pressed and held down until SYNVOICE announce “MONITOR MODE”, approximately four seconds.
- ❑ To exit Monitor mode *M* is pressed and held again until SYNVOICE announce “NORMAL MODE”.

2.3.6 Keying of transmission

When the user wants to speak to conferences the ME has to be keyed for transmission.

The following three ways to get a user allocation exists:

- ❑ Using the VOX function (voice triggered keying)
- ❑ Using the *PTT*
- ❑ Using the emergency PTT

If the request is rejected the user gets a negative response by means of a tone in the headset.

When the connection is granted the transmitter sends the outgoing speech and a side tone is heard in the user headset.

The VOX function is keyed when the user speaks.

When the PTT is pressed twice within 500 ms the emergency PTT function is activated.

Emergency PTT means that an access of a voice channel is guaranteed.

2.3.7 Volume adjustment

The + and – keys are used to adjust the volume. A “KEY CLICK” sound, 2.3.8.8, indicates a change of volume level.

The volume is never completely shut off. If the user tries to decrease the volume lower than the minimum level, the “KEY CLICK LOW” sound, 2.3.8.8, is heard instead of the normal key click.

If the user tries to increase the volume higher than the maximum level, the “KEY CLICK HIGH” sound, 2.3.8.8, is heard instead of the normal key click. To increase the volume one more step the + key is held for three seconds; the limiter value is then set to the LIMITER HIGH limit. At the same time a repeating warning signal is started to alert the user of the overridden limiter limit. If the – key is pressed the volume is reduced one level and the limiter is again set to the LIMITER NORMAL limit.

2.3.8 Status indications

The unit's status and operation are indicated with audio, tones and SYNVOICE, and visually with LEDs.

2.3.8.1 Out of range

If the unit operate as Slave and the radio connection with the Master is lost, a “NO SERVICE” sound, 2.3.8.8, is heard in the headset. At the same time the LED indicates OUT_OF_RANGE, 2.3.8.7.

The Slave automatically tries to re-login to the Master, i.e. if the user temporarily is out of range. It is configurable if same Master is required, this requirement can be overridden by pressing *M*. Overridden requirement is notified to the user with SYNVOICE message "ANY MASTER".

If the re-login attempts fails a "NEG RESPONSE" sound, 2.3.8.8, is heard in the headset.

The user can anytime change network to log on by using the *M* and * keys and confirm change with *PTT*. A new user activated log on attempt does not require same Master.

If the unit does not successfully logon to a network within a configurable time the Slave's power is automatically turned off. Before turning off the power the user is notified with SYNVOICE message "AUTO POWER OFF".

2.3.8.2 Low battery warning

When 20-40 minutes is the estimated remaining operation time of the battery in the ME a warning message, "BATTERY" is given regularly, to alert the user of an empty battery. At the same time the LED changes to LOW_BATT, 2.3.8.7.

When 5-10 minutes is the estimated remaining operation time of the battery in the ME the warning message changes to "BATTERY EMPTY".

When the battery in the unit is starting to be charged by an external power supply the LED changes to CHARGE_BATT, 2.3.8.7, and the warning messages stops.

2.3.8.3 Transmission rejection

When the user wants to transmit by pressing *PTT* or activating the VOX function and don't get a granted voice slot, a "NEG RESPONSE" sound, 2.3.8.8, is given to the user.

2.3.8.4 Transmission indication

When the user transmits, a side tone is generated to the users headset.

2.3.8.5 Key-click

Every key pressed generates a key-click sound to the headset.

2.3.8.6 Power-on BIT failure

If any errors are encountered during the power-on BIT testing, the LED indicates MALFUNCTION.

2.3.8.7 Summary of LED indications

The LED indicates status according to the table:

<i>Status</i>	<i>Colour</i>	<i>On time [ms]</i>	<i>Off time [ms]</i>
BATT_OK, Slave logged on to network	GREEN	100	1900
LOW_BATT, Slave logged on to network	RED	100	1900
CHARGE_BATT, Slave logged on to network	RED+GREEN	50+50	1900
NORMAL, Master logged on to network	GREEN	100/100	150/1650
LOW_BATT, Master logged on to network	RED	100/100	150/1650
CHARGE_BATT, logged on to network	RED+GREEN	50+50/50+50	150/1650
CONNECTED_BATT_OK, Slave connected to airplane etc.	GREEN	200/100	800/900
CONNECTED_LOW_BATT, Slave connected and low battery	RED	200/100	800/900
CONNECTED_CHARGE, Slave connected and charging battery	RED+GREEN	100+100 / 50+50	800/900
CONNECTED_BATT_OK, Master connected to airplane etc.	GREEN	200/100/100	800 / 150 / 650
CONNECTED_LOW_BATT, connected and low battery	RED	200/100/100	800 / 150 / 650
CONNECTED_CHARGE, connected and charging battery	RED+GREEN	100+100 / 50+50 / 50 + 50	800 / 150 / 650
OUT_OF_RANGE, normal battery	GREEN	500	500
OUT_OF_RANGE, low battery	RED	500	500
OUT_OF_RANGE, charging battery	RED+GREEN	250+250	500
POWER_UP_BOOT	RED	1000	0
POWER_UP	RED	1000	0
MALFUNCTION (BIT failure, fatal error)	RED	1000	0
SW_DOWNLOAD_READY	GREEN	200	200
SW_DOWNLOADING	GREEN	10	100







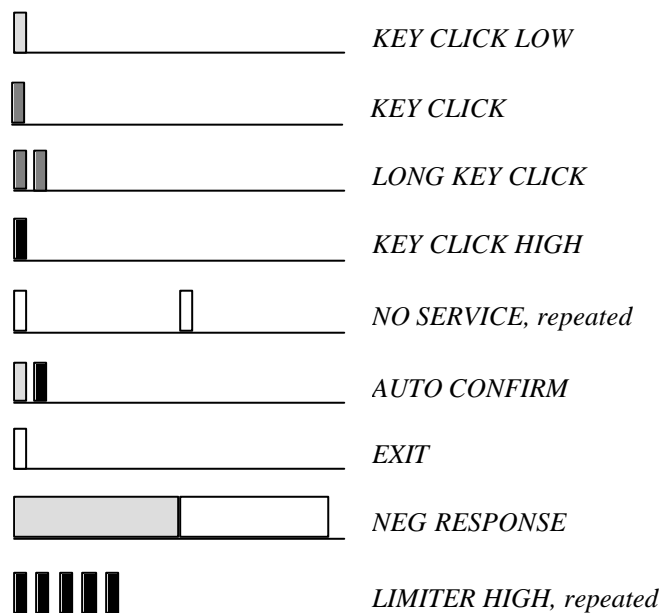
	Batt OK, Slave logged on to network
	Batt LOW, Slave logged on to network
	Batt CHARGING, Slave logged on to
	Batt OK, Master
	Batt LOW, Master
	Batt CHARGING, Master
	Batt OK, CONNECTED Slave logged
	Batt LOW, CONNECTED Slave logged
	Batt CHARGING, CONNECTED Slave
	Batt OK, CONNECTED Master
	Batt LOW, CONNECTED Master
	Batt CHARGING, CONNECTED
	Batt OK, Out of Range
	Batt LOW, Out of Range
	Batt CHARGING, Out of Range
	POWER_UP or MALFUNCTION
	SW DOWNLOAD READY
	SW_DOWNLOADING

2.3.8.8 Summary of available sounds

A number of sounds can be generated into the user headset. The table below shows what sounds are implemented and for what events.

<i>Sounds</i>	<i>Explanation</i>
KEY CLICK LOW	A special warning key click at some occasions
KEY CLICK	Short tone sound for every key press
LONG KEY CLICK	Short two-tone sound for some long key press
KEY CLICK HIGH	A special warning key click at some occasions
NO SERVICE	No net selected or available
EXIT	Exit from any mode to default mode
AUTO CONFIRM	Automatically confirmed menu parameter
NEG RESPONSE	Connection reject or undefined operation
LIMITER HIGH	Warning sound for setting of raised limiter value

 Lowest tone
  Low tone
  Mid tone
  High tone



2.3.8.9 Summary of available SYNVOICE phrases

<i>Phrase no</i>	<i>SYNVOICE phrase</i>	<i>Comment</i>
1	"CHANNEL ZERO"	
...	...	
54	"CHANNEL FIFTYTHREE"	
55	"USER TYPE ZERO"	
...	...	
70	"USER TYPE FIFTEEN"	
71	"MASTER"	
72	"SLAVE"	
73	"EXTERNAL AVAILABLE"	The destination mode is now available in the menu
74	"DESTINATION NORMAL"	
75	"DESTINATION ONE"	Audio will be routed to external with logical number 1 when pressing PTT.
...	...	
79	"DESTINATION FIVE"	Audio will be routed to external with logical number 5 when pressing PTT.
80	"DESTINATION LOCAL"	Audio will be routed to external connected to the unit when pressing PTT.
81	"LED NORMAL"	
82	"LED HIGH"	LED setting for intense sunshine
83	"LED NVG"	
84	"LED TIME"	LED will be turned off after a configurable time
85	"LED OFF"	
86	"LOW MASTER BATTERY"	Low battery warning for a master that has been configured for using an external instead of the headset at the headset connection. The battery warning is heard by the slaves.
87	"ME CONNECTED TO AP"	When an ME has been connected to an AP to change menu settings for the AP.
88	"ME DISCONNECTED FROM AP"	
89	"LOGGED ON"	Successfully logged on or started a network.
90	"CONFIGURATION ERROR"	The unit has a different system configuration than the Master of the network. The unit will not be able to log on to this Master.
91	"VOX OFF"	
92	"VOX ON"	

93	"KEY LOCK OFF"	
94	"KEY LOCK ON"	
95	"ORDER VOX OFF"	
96	"ORDER VOX ON"	
97	"ORDER POWER OFF"	
98	"ORDER SLEEP MODE ON"	
99	"ORDER MERGE"	
100	"ORDER CHANGE CHANNEL"	
101	"ORDER RELAY OFF"	
102	"ORDER RELAY ON"	
103	"ORDER CHANGE MASTER"	
104	"ORDER SYNCHRONISE AP"	
105	"FAST KEY M OFF"	Normal mode
106	"FAST KEY M ON"	Monitor mode
107	"LOW BATTERY WARNING 1"	First battery warning level reached
108	"LOW BATTERY WARNING 2"	Second battery warning level reached
109	"LOG ON ANY MASTER"	Unit is configured for logging on to same Master that was last used. A key has been pressed to override this requirement.
110	"AUTO POWER OFF"	
111	"ACCESSPOINT"	
112	"ORDER"	
113	"ORDER VOX LOST"	Order maker is informed that all units did not answer to the order.
114	"ORDER VOX OK"	Order maker is informed that all units have answered to the order.
115	"ORDERED VOX OFF"	Unit is informed that another unit, the order maker, has turned off the unit's vox function.
116	"ORDERED VOX ON"	Unit is informed that another unit, the order maker, has turned on the unit's vox function.
117	"ORDER POWER OFF LOST"	Order maker is informed that all units did not answer to the order.
118	"ORDER POWER OFF OK"	Order maker is informed that all units have answered to the order.
119	"ORDERED POWER OFF"	Unit is informed that another unit, the order maker, will turn of the unit.
120	"ORDER SLEEP MODE LOST"	Order maker is informed that all units did not answer to the order.

121	"ORDER SLEEP MODE OK"	Order maker is informed that all units have answered to the order.
122	"ORDERED SLEEP MODE"	Unit is informed that another unit, the order maker, has entered the unit in sleep mode.
123	"ORDER MERGE CHANNEL LOST"	Order maker is informed that all units did not answer to the order.
124	"ORDER MERGE CHANNEL OK"	Order maker is informed that all units have answered to the order.
125	"ORDERED MERGE"	Unit is informed that another unit, the order maker, has merged the network with another channel.
126	"ORDER CHANGE CHANNEL LOST"	Order maker is informed that all units did not answer to the order.
127	"ORDER CHANGE CHANNEL OK"	Order maker is informed that all units have answered to the order.
128	"ORDERED CHANGE CHANNEL"	Unit is informed that another unit, the order maker, will change the channel of the unit.
129	"ORDER RELAY LOST"	Order maker is informed that all units did not answer to the order.
130	"ORDER RELAY OK"	Order maker is informed that all units have answered to the order.
131	"ORDERED RELAY OFF"	Unit is informed that the old Master of the network will take over as Master again.
132	"ORDERED RELAY ON"	Unit is informed that another unit, the order maker, will temporarily take over as Master of the network.
133	"ORDER CHANGE MASTER LOST"	Order maker is informed that all units did not answer to the order.
134	"ORDER CHANGE MASTER OK"	Order maker is informed that all units have answered to the order.
135	"ORDERED CHANGE MASTER"	Unit is informed that another unit, the order maker, will take over as Master of the network.
136	"ORDER SYNCHRONISE AP LOST"	Order maker is informed that all units did not answer to the order.
137	"ORDER SYNCHRONISE AP OK"	Order maker is informed that all units have answered to the order.
138	"ORDERED SYNCHRONISE AP"	Unit is informed that an AP will try to take over as Master of the network.

For each phrase a maximum of five SYNVOICE words can be linked to the phrase, i.e. for SYNVOICE phrase "FAST KEY M ON" SYNVOICE words "MONITOR" and "MODE" may be linked to the phrase.

The available SYNVOICE words that can be linked to the phrases are:

No.	Message
1	"ONE"
2	"TWO"
3	"THREE"
4	"FOUR"
5	"FIVE"
6	"SIX"
7	"SEVEN"
8	"EIGHT"
9	"NINE"
10	"ZERO"
11	"CHANNEL"
12	"VOX"
13	"OFF"
14	"ON"
15	"BATTERY"
16	"MASTER"
17	"SLAVE"
18	"USER TYPE"
19	"NORMAL"
20	"EXTERNAL"
21	"AUTO"
22	"ACCESS POINT"
23	"RADIO"
24	"NONE"
25	"KEY LOCK"
26	"AVAILABLE"
27	"ERROR"
28	"EMPTY"
29	"CONNECT"
30	"SLEEP"
31	"MODE"
32	"USER"
33	"ORDER"
34	"LOST"
35	"CONFIGURATION"
36	"POWER"

37	"LOGGED"
38	"LOCAL"
39	"MERGE"
40	"SYNCHRONIZE"
41	"DATA"
42	"OK"
43	"TIME"
44	"RELAY"
45	"CHANGE"
46	"MONITOR"
47	"LED"
48	"NVG"
49	"COMPANY"
50	"VHF"
51	"COTHE"
52	"HEADSET"
53	"SHOULDER"
54	"ANY"
56	"BASE STATION"
57	"VOLUME"
58	"SIDE TONE"
59	"USED"
60	"LOW"
61	"HIGH"
62	"NEW"
63	"AND"
64	"NOT"
65	"OR"
66	"DRIVER"
67	"LOADER"
68	"GUNNER"
69	"SOLDIER"
70	"COMMANDER"
71	"GROUP"
72	"RANGE"
73	"LIMITER"
74	"NO"

75	"FAILURE"
76	"BAD"
77	"ALARM"
78	"LEVEL "
79	"ALL"
80	"CONNECTION"
81	"CHARGING"
82	"YES"
83	"NO"
84	"CONFIRM"
85	"TYPE"

3. ACCESS POINT TRANSCEIVER (AP6803)

3.1 OVERVIEW

An AP, Access Point Transceiver, is used when there is a need to have a fixed installation of a TruLink transceiver, e.g. in a vehicle, vessel or airborne platform.

It basically has the same functionality and ability as the portable unit but has an increased audio capability for up to three analogue interfaces.

An ME with two connectors can be connected to the AP. The keys on the ME can then be used for configuring the AP.

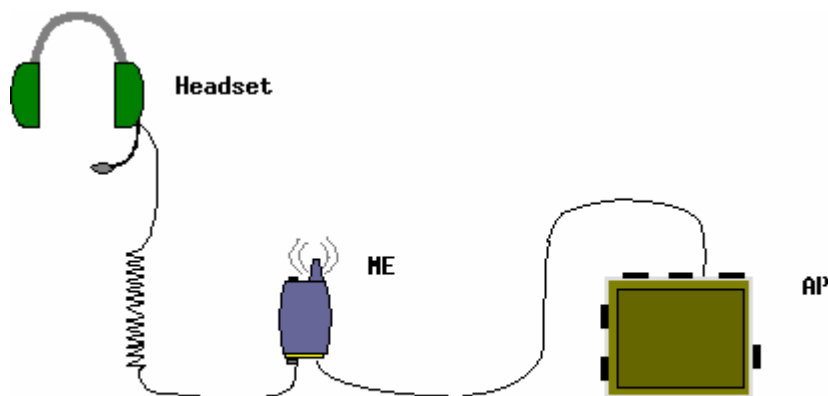


FIGURE 3. Portable unit connected to an AP.

The user interface control consists of a two-coloured LED and two keys on the AP unit and a number of keys and a recorded voice function, SYNVOICE, on a connected ME.

The SYNVOICE is a sampled phrase database that is used as an audio display, instead of a visible display, to indicate selections and status.

The operation of the AP is based on a few keys, of a connected ME, that are pressed in different combinations for accessing the parameter to operate/modify.

The keys on the ME unit are: *PTT*, *M*, *+*, *-*, and ***.

For every key pressed, there is a *KEY CLICK* sound generated into the headset.

3.2 STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

3.3 USER INTERFACE

3.3.1 Overview

The functions accessed by the keys on the AP unit can be listed as follows:

- ☐ LED on/off
- ☐ Set channel

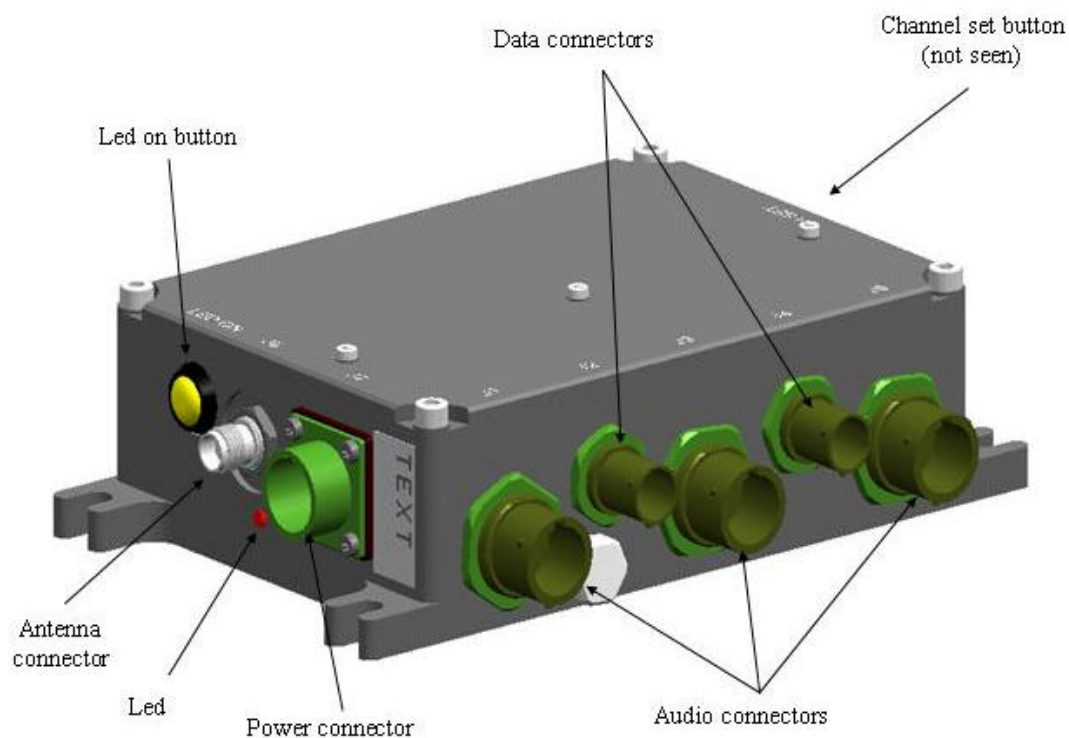


FIGURE 4. Access point transceiver.

3.3.2 LED on/off

The LED on the AP can be turned on or off with the LED key.

3.3.3 Set AP channel

To synchronize an AP to an existing network the channel set key should be pressed. The network must actively choose to synchronize the AP as well, see chapter 2.3.4.15.

3.3.4 Menu setting of AP

When an ME unit is connected to an AP the user can control the menu and mode selections of the AP with the keys of the ME. The control is basically the same as controlling a stand-alone ME except for some not available functions e.g. no transmission request with the *PTT* key.

3.3.4.1 Start menu of connected AP

When AP unit is powered on the user enters the start menu. The selected items in the start menu are listed by the SYNVOICE function. It is configurable which modes should be included in the start menu but the modes in the start menu can at most be:

- ☐ CHANNEL [channel list]
- ☐ UNIT MODE [master/slave]

Key *PTT* is used for confirming settings. To browse through the menu the *M* key is used and the * key is used to change a setting. If the start menu looks like the list above *M* is pressed one time to select UNIT MODE, to change the settings of mode UNIT MODE the * key is used. If *PTT* is pressed the changed setting is saved and the SYNVOICE function again lists the settings in the menu. If the setting is not confirmed within a configurable time the setting is changed back to default mode.

If the user any time in the start menu presses *PTT* when no changes has been made to the settings since last time they were listed, the logon procedure starts immediately. The logon procedure will also be activated if no action is taken within a configurable time; the unit then starts to logon with the settings listed last time.

A successful logon is announced with SYNVOICE message “ACCESS POINT”.

If UNIT MODE is included in the start menu the user can choose to either start a new network as a Master, 3.3.4.1.1, or to logon to an existing network as a Slave, 3.3.4.1.2.

3.3.4.1.1 Starting a network

To start a new network UNIT MODE must be set to “MASTER”. If the default setting is “SLAVE” the setting is changed with keys *M* and * and confirmed by pressing *PTT*. When the logon procedure starts the unit will start a new network with the selected channel in the start menu. A successfully started network is announced to the user by SYNVOICE message “ACCESS POINT”.

3.3.4.1.2 Logging on to a network

To be able to logon to an existing network UNIT MODE must be set to “SLAVE”, there can only be one “MASTER” in a network. The network can be selected by the mode “CHANNEL”, the Slave must have same channel number as the Master of the network.

When the logon procedure starts the unit will try to logon to the Master of the network. A successfully logon to a network is announced to the user by SYNVOICE message “ACCESS POINT”.

If no network is available a “NEG RESPON” sound, 2.3.8.8, is heard and then a “NO SERVICE” tone, 2.3.8.8, is repeated until next logon try.

If logon fails due to mismatch of system configuration SYNVOICE message “CONFIGURATION ERROR” is heard in the headset and then the “NO SERVICE” tone is turned on until next logon try.

The unit tries to logon until it succeeds. The user can access the start menu and change settings until the unit successfully logs on to the network.

3.3.4.2 Normal menu of connected AP

When the unit has logged on or started a network the user can access the normal menu with the *M* key. It is configurable which modes should be included in the normal menu but the modes in the normal menu can at most be:

- ❑ CHANNEL [channel list]
- ❑ UNIT MODE [master/slave]

The *M* key is used for cycling between the modes in the menu and * is used for changing the settings of the selected mode. *PTT* is used for confirming the settings. When a setting has been confirmed a “CONFIRMED” tone is heard in the headset and the unit exits the menu.

If no action is taken, within a configurable time, when the menu has been accessed the unit exits the menu again, a “MENU EXIT” tone is then generated.

Pressing * or *PTT* has no effect when the menu has not been accessed.

3.3.4.2.1 Mode CHANNEL

When the CHANNEL setting is changed the unit enters the start menu and a new logon process is started. The unit will try to start/connect to a new network with the specified channel.

Changing channel when the unit is master of the network is not recommended since the action will have serious effects for all slaves logged on to the network, all units will be disconnected from the network.

3.3.4.2.1.1 Change setting of mode CHANNEL

- ❑ Press and release *M* until SYNVOICE announce the CHANNEL mode, e.g. “CHANNEL ONE”.
- ❑ Press and release * to step through the channel list. If * is hold down for more than 0.5 seconds a “LONG KEY CLICK”, 2.3.8.8, will be heard instead of the ordinary key click. One long key click corresponds to ten steps in the channel list. When * is released a SYNVOICE message informs of selected setting, e.g. “CHANNEL THREE ONE”. If the selected channel is not the wanted one, press * again.
- ❑ To confirm the selected channel press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

3.3.4.2.2 Mode UNIT MODE

UNIT MODE specifies if the unit is operating as Slave or Master. Changing's of this setting should be cautiously considered. If the unit is operating as Slave and the mode is changed to Master the unit will be disconnected from the net and the unit will start a new network. However the consequences will be more serious if the unit is operating as Master. All slaves will be disconnected from the network and the unit, the former Master, will try to log on to the disconnected network.

3.3.4.2.2.1 Change setting of mode UNIT MODE

- ❑ Press and release *M* until SYNVOICE announce the UNIT MODE mode, e.g. “SLAVE”.
- ❑ Press and release * once to change setting to MASTER or SLAVE. A SYNVOICE message informs of selected setting, e.g. “MASTER”. If the selected setting is not the wanted one, press * again.
- ❑ To confirm the setting press *PTT*. If the setting is not confirmed the menu will be exited without any changes.

3.3.5 Status indications

The unit's status and operation are indicated visually with LEDs on the AP. If an ME is connected to the AP some indications also appears as sounds and SYNVOICE messages in the ME connected headset.

3.3.5.1 Connected AP Out of range

If the unit operate as Slave and the radio connection with the Master is lost, a “NO SERVICE” sound, 2.3.8.8, is heard in the headset. At the same time the AP LED indicates OUT_OF_RANGE, 2.3.8.7.

The Slave automatically tries to re-logon to the Master, i.e. if the user temporarily is out of range. It is configurable if the same Master is required this requirement can be overridden by pressing *M* of a connected ME.

If the re-logon attempts fails a “NEG RESPONSE” sound, 2.3.8.8, is heard in the ME connected headset.

If an ME is connected the user can anytime change network to log on by using the *M* and * keys and confirm change with *PTT*. A new user activated log on attempt does not require same Master.

If the unit does not successfully logon to a network within a configurable time the AP starts a network at last used channel.

3.3.5.2 Connected AP Key-click

Every key pressed on a connected ME generates a key-click sound to the headset.

3.3.5.3 Power-on BIT failure

If any errors are encountered during the power-on BIT testing, the LED indicates MALFUNCTION, 2.3.8.7.

4. SUPPORT STATION (SS6819)

4.1 OVERVIEW

The Support Station SS6819 is used for supporting ME's with NEXUS plug connectors. Up to six ME's can be supported simultaneously.

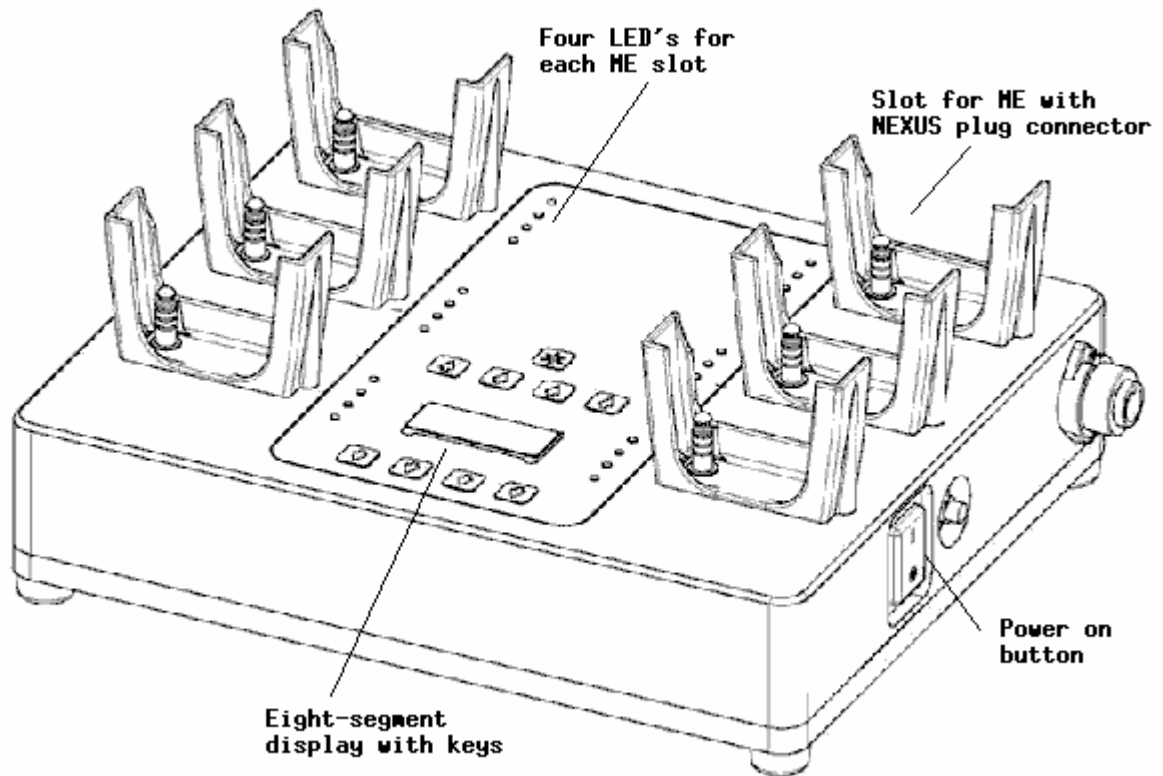


FIGURE 5. Support station.

The user interface control consists of a total of 24 LED's, nine keys, and one four digit eight-segment display. Every ME slot has two green and two red LED's each to display status of each ME.

The keys on the SS unit are:

- ☐ Increase digit1
- ☐ Increase digit2
- ☐ Increase digit3
- ☐ Increase digit4
- ☐ Decrease digit1
- ☐ Decrease digit2
- ☐ Decrease digit3
- ☐ Decrease digit4

- ❑ Set channel

4.2 STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

4.3 USER INTERFACE

4.3.1 Overview

The functions of the SS unit can be listed as follows:

- ☐ Feed charge voltage to connected ME's
- ☐ Show current charge status of connected ME's
- ☐ Set channel of connected ME's
- ☐ Display BIT result for connected ME's

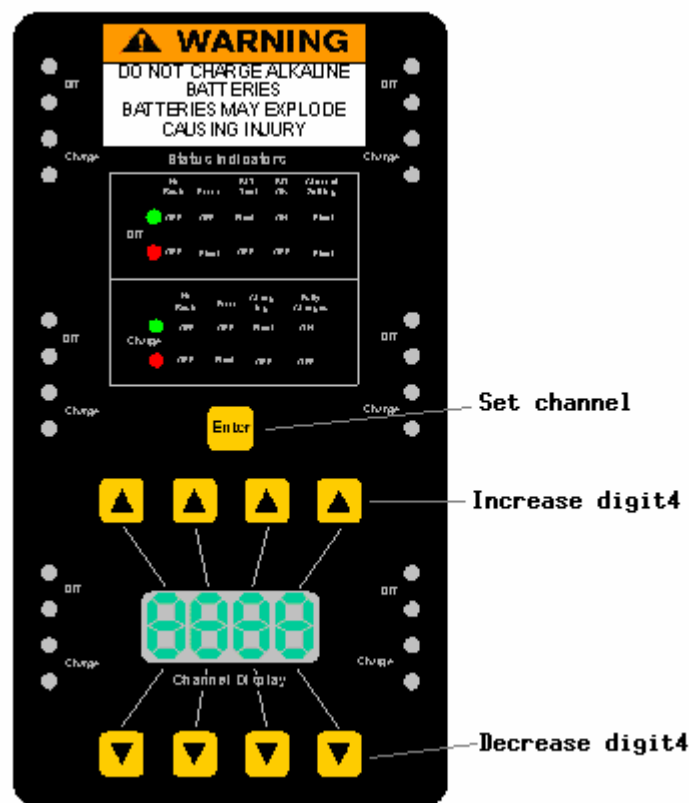


FIGURE 6. SS overlay.

4.3.2 Power On/Off

To switch the power on or off the power on/off button is pressed. When the unit has been powered on the eight-segment display is lit.

4.3.3 Connect ME's

The ME's should be turned off prior to connecting them to the SS. If an ME has not been turned off noise might be transmitted to other users for a few seconds when the ME is connected to the SS.

When an ME has been detected by the SS all four LED's of the ME slot will flash, 4.3.5, until the SS has established communication with the ME. When communication has been established the BIT and charge status is shown. As soon as an ME is detected charge voltage is applied to the ME slot.

4.3.4 Set channel

The channel is selected with the *Increase* and *Decrease digit* keys. When the required channel is shown in the eight-segment display the *Set channel* key is pressed. Do not remove connected ME's while the LED's are indicating setting of channel, 4.3.5.

4.3.5 LED indications

The four LED's of each ME indicates BIT status, charge status, detection of ME, and setting of channel. Below is the possible indications listed.

Current status	BIT		Charge	
	Red LED	Green LED	Red LED	Green LED
No ME	OFF	OFF	OFF	OFF
Detection of ME	FLASH 50%	FLASH 50%	FLASH 50%	FLASH 50%
Performing BIT	OFF	FLASH 50%	-	-
BIT OK	OFF	ON	-	-
BIT Error	FLASH 50%	OFF	-	-
Setting of channel	FLASH 50%	FLASH 50%	-	-
Charging	-	-	OFF	FLASH 50%
Fully charged	-	-	OFF	ON
Charge error	-	-	FLASH 50%	OFF