

V.A.D.E.R.

VOICE-ACTIVATED DIGITALLY ENHANCED RADIO

PROFESSIONAL SECURE RADIO SYSTEM

USER'S MANUAL

ABOUT THE V.A.D.E.R. SYSTEM



The V.A.D.E.R. communication system was developed for professional use in mobile communications within a small group that has tasks requiring high confidentiality.

To secure the communication, the V.A.D.E.R. radio features a scrambling transmission along with a high-speed frequency scanning that makes group's communication hard to be intercepted.

The RF output power is selectable between LO (100mW) and HI (1W) according to the group's range of activities. Minimizing the RF output power prevents detection and interception from outside of the group.

The V.A.D.E.R. radio does not come with a built-in microphone or a speaker. You can use this radio by connecting the external audio device either a Headgear or an Ear Microphone both applies Temco's bone conduction technology.

Neither the Headgear nor the Ear Mic prevents you from wearing a helmet. Furthermore, neither device sets its microphone near your mouth. The system's complete face-free configuration assists your active tasks.

A remarkable feature of the V.A.D.E.R. radio is to have the DSP (Digital Signal Processor) that makes VOX (Voice Activation)

work steadily even in highly noisy condition. This achieved to offer the enhanced VOX that first meets the tasks of professional communications. The DSP activates the VOX circuitry only when the input signal is recognized as the human voiced sounds, and switches the radio to the transmit mode.

The DSP also enables to temporarily store the speech on memory and send them to transmit with a slight delay. This completely prevents clipping the voice syllable at the beginning of speech that the conventional VOX currently in use could never achieve. You can also enjoy the noise cancellation function featured by the DSP that suppresses noise elements through digital processing and creates the clear audio to transmit. Along with Temco's noise-resistant bone conduction microphones, the higher the ambient noise level is, the more you can feel its excellent performance.

The Radio Housing is made from aluminum alloy that allows the unit to be light but sturdy.

An easy detachable battery housing is made from reinforced polycarbonate resin that resists against heat and shock. You can fill size AA dry batteries or same-sized rechargeable cells into the pack.

Both the radio transceiver and the battery pack are submersible. You can use the V.A.D.E.R. radio under any weather conditions in outdoors.

The V.A.D.E.R. secure radio system is the most suitable equipment for professional tasks requiring high security and confidentiality.

FEATURES

- Hands-free, Face-free
- Waterproof, submersible radio (in 6.5 feet / 30 minutes)
- Waterproof Headgear HG17 and Body PTT Switch BP210
- Enhanced DSP VOX. No clipping the speech. No miss-operation by ambient noise.
- DSP noise canceling
- Channel Hopping (High speed channel scanning)
- Scrambling transmission
- Emergency signal alerting function
- Small & light-weight, no user adjustment required

INSPECTION

When you receive your packaged V.A.D.E.R. system, inspect the shipping carton for any signs of damage. Then, remove and check the contents of the packing case to be certain that all items ordered have been included. Contents of the packing case may be different from those listed below if optional accessories were ordered.

Standard kit	Optional accessories
1. Radio Transceiver SR21A-01 2. Antenna AT20A-XX* 3. Battery Clip BC20A-01** 4. Headgear HG17A-01 5. Body PTT Switch BP210A-01 6. Ear Mic EM7A-05 7. Replacement Ear tip, size L 8. User's Manual	1. Programming Cable CA01A-01 2. Cloning Cable CA02A-01 3. Programming Software 4. Headset with Boom Mic 5. Remote Speaker Mic

* One of the following Antenna is enclosed in the package according to the preset frequencies as below.

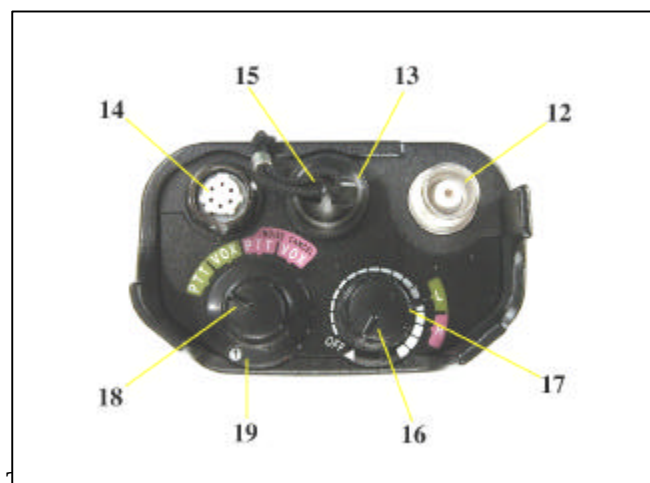
AT20A-01 for 150-158MHz, AT20A-02 for 158-166MHz, AT20A-03 for 166-174MHz.

** No battery cell is enclosed in the package. Prepare 6pcs of AA Alkaline battery for starting to use the system.

Inspect the equipment thoroughly. If any part of the equipment has been damaged in transit, report the extent of the damage to Temco Japan Co., Ltd., or Temco Communications, Inc. immediately.

NAME OF PART & CONTROLS

- ①. V.A.D.E.R. radio transmitter/receiver
- ②. Headgear
- ③. Ear Mic
- ④. Body PTT Switch
- ⑤. PTT Button
- ⑥. Monitor/ Emergency Button
- ⑦. Latch Lever
- ⑧. Battery Clip
- ⑨. Battery Housing
- ⑩. Battery Cap
- ⑪. Clamp
- ⑫. Antenna Connector
- ⑬. Program Connector
- ⑭. AF Connector
- ⑮. Water-seal Plug
- ⑯. Power/Volume Switch
- ⑰. RF Output Power Selector
- ⑱. Mode Selector Switch
- ⑲. Group Selector Switch



BATTERY INSTALLATION (OR REPLACEMENT)

1. Press and hold the 2 Latch Levers on the side of Radio Housing at the same time and pull down the Battery Clip to remove from the Radio Housing.



2. Release the Clamp located at both sides of Battery Cap by using the right hand side of Latch Lever on the Radio Housing.



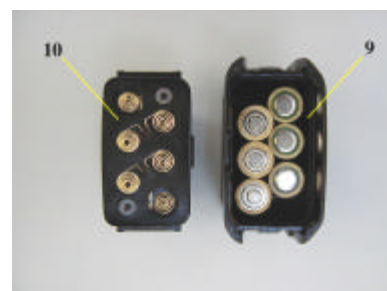
Remarks: The left hand side of Latch Lever is wider than the right hand side, so it is not convenient to use for releasing the Clamp.

3. Pull the Battery Cap to remove from Battery Housing.



4. Insert 6 cells of fresh AA Alkaline battery in the Battery Housing. Remember to install the batteries with correct direction of polarity as shown on the figure.

Caution: DO NOT use Manganese battery.



5. Align the Battery Cap and Battery Housing and press down until the Cap is firmly seated in the Housing.

Caution: Ensure that the O-ring gasket on Battery Clip and inside of Battery Housing is clean. Sticking of dirt on this area may cause improper performance of waterproof.

6. Fasten the Clamps at both sides of Battery Cap and ensure being tightly closed by hearing “click”.
7. Align the Battery Clip and Radio Housing (recessed grooves along the right hand side of Radio Housing and Battery Clip are to be linked) and press in the Battery Clip to the Radio Housing. The Latch Levers guide a right positioning of Battery Clip to the Radio Housing. Ensure to firmly attach the Battery Clip on to the Radio Housing by hearing “click!” at both Latch Levers.

Remarks: The Battery Clip cannot be attached if it is aligned at the opposite side to the Radio Housing.

Caution: Ensure that the O-ring gasket on Radio Housing and inside of Battery Cap is clean. Sticking of dirt on this area may cause improper performance of waterproof.

Warning: DO NOT THROW AWAY THE USED BATTERIES INTO FIRE. Please dispose the used batteries in ecological manner.

FUNCTIONING METHOD OF V.A.D.E.R. SR21 RADIO

The SR21 radio has multiple programmable functions such as Simplex, Semi-Duplex, Channel Hopping, Scrambling, setting of Priority Channel, setting of ID code (code squelch), time-out-timer, etc. by using optional programming software. Refer the details on separate Programming Manual.

For your communication security

When the Channel Hopping function is set on the SR21 radio, the Tx (Transmit) frequency on each time of pressing the PTT button (or triggering the PTT by VOX) is randomly selected within pre-set 10 frequencies and sends the ID code on FSK signal. The other radios in the same Group# search the FSK signal in 10 frequencies by high speed scanning all the time while the radios are in stand-by mode, and lock on one of the frequency when the ID Code coincides, and start to engage in the Rx (Receive) mode. By applying this function, the communication frequency changes on each Tx/Rx session, so that it is hardly traceable by the third party to prevent from undesired monitoring. Furthermore, in combination with the Scrambling transmission (Frequency Conversion), a degree of communication security comes up to the highest level.

1. The SR21 radio has programmable frequencies in 1-16 Groups. Each Group #1 to #15 has max. 11 channels where appropriate frequencies can be programmed. When the radio is to be programmed for use in Semi-Duplex operation, the Tx frequency is set on channel #0 and the Rx frequency is set on channel #1. When the radio is programmed for use in Simplex operation with Channel Hopping function, the same frequency is to be set on both channel #0 and channel #1, and appropriate frequencies are to be set on other 9 channels within the bandwidth preferred. In Group #16 (in other words, position #16 at the Group Selector Switch), the Emergency signal alerting frequency is to be programmed. The frequency for Priority channel can also be set in this Group #16.
2. When the radio is powered ON by turning the Power/Volume Switch to clockwise, and when the Hopping command is programmed "1", an immediate scanning of each channel (max. of 10) within the Group being selected by the Group Selector Switch is commenced to search any transmission of carrier wave on the destined frequencies. When the Hopping command is programmed "0", the radio receives the carrier wave on the frequency set on the channel #1. When any frequency programmed on Group #16 for Emergency alerting signal or for Priority channel, the radio also receive the carrier wave on this frequency.
3. When the carrier wave is detected on one of the destined frequencies, the radio immediately stops scanning to recognize the ID code and compares it with the radio's preset ID. If the ID in the received carrier wave coincides with the preset ID of the radio, squelch is opened and the radio is engaged in the Receive mode. If no ID is detected, or if the detected ID does not coincide with the radio's preset ID, then the radio keeps on scanning the destined frequencies in the Group. Though the Hopping command is programmed "0", means that the Channel Hopping function is not in use, the squelch can be opened only when the ID is recognized as coincident to the pre-set ID.
Caution: If the ID is programmed "000", the squelch can be opened for any carrier wave that the radio receives. When the Hopping command is programmed "1", means that the Channel Hopping function is in use, the ID must be set other than "000", otherwise the frequency scanning cannot work.
4. Monitor/Emergency button provides either of the following function.

Monitor Short pressing of Monitor/Emergency button

By short pressing of Monitor/Emergency button (less than 2 seconds), the radio opens the squelch and receives the carrier waves in transmission on the channel where the scanning stops. This is to be used for checking whether the channel is open or in use.

Emergency Long pressing of Monitor/Emergency button

By prolong pressing of Monitor/Emergency button (more than 2 seconds), the radio keeps on transmitting the Emergency alerting signal until the Power Switch is turned OFF. The Emergency alerting signal can be selected from 10 types of tones and duration/interval is also programmable.

Important: While the Emergency alerting signal is being transmitted, the Mic line of SR21 radio is also in active, so that you can override your message over the alerting tone for letting a Group member know of your location and emergency message. For facilitating this function, it is important that the duration of alerting tone transmission should be programmed to hold sufficient time for enabling to transmit the message at the same time. While any one of the SR21 radio in a Group is transmitting the Emergency alerting signal, all other radios in the same Group coinciding the ID are kept on capturing the signal (and message), and are unable to communicate with others. For not blocking the Group's communication, it is important that the interval of Emergency alerting signal should be programmed to hold sufficient time for enabling other radios in a Group to maintain the communication for the rescue order in the interval of Emergency alerting tone. The default setting of signal interval is 5 seconds.

5. When PTT Button is pressed, or when the radio PTT is triggered by VOX, channel scanning is immediately stopped and searches the existence of any carrier wave in that frequency in air. If no carrier wave is detected in that frequency, the radio is engaged in Tx status and starts to transmit its Group's ID code. When the Tx status is engaged, the operator can hear a short "Pip!" tone via his speaker or Headgear or Ear Mic for letting him know that his transmission becomes established. If the existing carrier wave from other transmission is detected in that frequency, no Ready-to-Tx tone as "Pip!" is heard, and Tx status cannot be engaged. In this case, release the PTT Button for making the radio restart to scan the channels, and press the PTT Button once again, or make voiced sound again after 0.7 second in VOX mode, to catch the "open" channel.

Remarks: If the Hopping command is programmed "0", the Tx frequency is fixed, as it is pre-set on Channel #1.

Remarks: Engaging the Tx status by neglecting the existence of other carrier wave in air can be programmed.

6. When sending the ID is completed, the Mic line to process the audio signals from Headgear or Ear Mic is turned to be ON, and the operator can start to transmit speech message in air. Virtually, the time required for sending the ID is very small, so that the operator can start to speak right after hearing of Ready-to-Tx tone via his Headgear or Ear Mic.
7. When PTT Button is released, or when the radio is turned to Receive/Stand-by status by no detection of voiced sounds to trigger the VOX, the Mic line is to be OFF and send the End-of-Transmit signal for indicating to terminate transmission. When the Tx status is disengaged, the operator can hear a short "Pip! Pip!" tone via a speaker or Headgear or Ear Mic for letting him know that his transmission is now terminated, and the radio returns to scan the channels for receiving.

Remarks: If the Hopping command is programmed "0", the radio returns to the Channel #1 for Receive/Stand-by status after sending the End-of-Transmit signal.

Caution: If the Tx status keeps on engaging for more than 30 seconds*, the transmission is automatically shut off and the radio returns to scan the channels for receiving, or returns to Channel #1 when the Hopping command is programmed “0”. (*programmable factor)

8. On the radios that have been receiving the message, the channel scanning is restarted when they receive the End-of-Transmit signal. If the radio(s) can not, or failed to, receive the End-of-Transmit signal, the channel scanning starts after 2.5 seconds* from the end of carrier wave being tuned in. (*programmable factor)
9. When the Group #16 is selected by Group Selector Switch, and when either the frequency for Emergency alerting signal or Priority channel is programmed, the radio can be used as a conventional two-way transceiver by simple PTT or VOX operation on this channel. This function can be used for All Call of all radios in a Group.
10. To deactivate particular Group(s) for Tx/Rx can be programmed though the frequencies are programmed on all Groups’ channels. When the Group Selector Switch selects the inactive Group #, the operator hears alerting signal as “Boop, Boop” signaling the user that the Group selected is out of order.
11. When the battery runs low (voltage detection), the operator can hear short alerting tone such as “Pu!, Pu!” for signaling the user of low battery life. When this tone is heard, replace the battery **immediately**.

Remarks: This Low Battery alerting tone can be heard only in the Transmit status and may be resumed in the Receive/Stand-by status. This is due to high current consumption required for transmission. In any status when the Low Battery alerting tone is heard, it is requested to replace the battery.

SET-UP

1. Hand tighten the Antenna by turning it clockwise on to the Antenna Connector on the top panel of radio.

Caution: There are 3 types of Antenna depending on the frequency bandwidth programmed on the SR21 radio.

#1:AT20A-01 for 150-158MHz #2:AT20A-02 for 158-166MHz #3:AT20A-03 for 166-174MHz

Be sure to use the right Antenna for optimizing the performance. Use of wrong Antenna will make insufficient coverage of communication area, and may cause malfunction of radio due to excessive load put on the transmitter.

2. Mate the key guide of audio connector of Headgear or Ear Mic with the AF Connector (6 pin) on the top panel of radio and press in. Turn the Lock Screw clockwise until it is firmly tightened.
3. If required, unscrew (turn counterclockwise) and take off the water-sealed cap on the Program Connector (7 pin) on the top panel of radio, and mate the key guide of the audio connector of Remote PTT Switch and press in. Turn the Lock Screw clockwise until it is firmly tightened.

Caution: Be sure to securely tighten the Antenna and all other audio connectors on right position. Insufficient tightening of Antenna and connectors may cause improper performance of the waterproofing.

4. Put the Headgear or Ear Mic in the on position.

Caution: Make a good contact of the Microphone and Speakers of the Headgear to your head. Loose contact may cause insufficient audio performance as like deterioration of microphone sensitivity or low audio volume from the speakers.

When Ear Mic is used, remember to select the ear tip either Medium or Large for your comfortable fit to your ear, and insert the earpiece as deep as possible into your ear canal. Loose contact of Ear Mic to your ear may cause insufficient audio performance as like deterioration of microphone sensitivity or lack of intelligibility in transmit audio.

Caution: Ear Mic is NOT waterproof. DO NOT use in the water or under heavy rain or splash of water.

OPERATION

1. Select the communication mode as appropriate for your operation.

Operation Mode	Function
PTT	Either PTT Button on the radio or Remote PTT Switch connected to the radio is being in function.
VOX	Built-in VOX is being in function. The transmission is automatically keyed on by your speech. Your message is sent with slight delay at 0.5 sec for avoiding clipping of the first part of speech. PTT operation via PTT Button on the radio or Remote PTT Switch remains in function.
NOISE CANCEL PTT	Either PTT Button on the radio or Remote PTT Switch connected to the radio is being in function. Digital noise suppression is added on the transmit signals. This DSP controlled noise cancellation is to selectively suppress the audio elements that are not being recognized as human voiced sounds. Due to this digital processing, a slight deterioration of audio quality is observed.
NOISE CANCEL VOX	Built-in VOX is being in function. The transmission is automatically keyed on by your speech. Your message is sent with slight delay at 0.5 sec for avoiding clipping of the first part of speech. Digital noise suppression is added on the transmit signals. This DSP controlled noise cancellation is to selectively suppress the audio elements that are not being recognized as human voiced sounds. Due to this digital processing, a slight deterioration of audio quality is observed. PTT operation via PTT Button on the radio or Remote PTT Switch remains in function.

2. Select the RF output power between Hi (1W) and Lo (100mW) by RF Output Power Selector according to the Group's range of activity.
3. Select the Group number by Group Selector Switch where your communication is to be established.
4. Power the radio ON by turning the Power/Volume Switch clockwise, and set the volume level at 12 o'clock position. You can adjust the volume level as appropriate for your operation.
5. In PTT operation, press and hold on the PTT Button on the radio, or press and hold on the Remote PTT Switch, to engage Transmit status for sending your message. Release the PTT Button, or Remote PTT Switch, to return in Receive/Stand-by status.
6. In VOX operation, start to speak in normal voice to automatically engage the Transmit status. If the VOX circuitry detects no voiced sound for 0.7 sec, it shuts off the transmission and makes the radio return to Receive/Stand-by status.

Caution: When the radio is engaged in Transmit status, you can hear a short “Pip!” via a speaker of Headgear or Ear Mic. Remember that your transmission is not completed if no “Pip!” tone is heard.

In this case, release the PTT Button (in PTT operation) or mute your speech more than 0.7 sec (in VOX operation) to make the radio return in Receive/Stand-by status, and retry to press the PTT Button or start speaking for establishing the transmission.

Especially in VOX operation, you should always aware of “Pip!” tone for starting speech and “Pip! Pip!” tone for ending the transmission.