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1 About this guide



This user guide describes how to operate the NGT VR transceiver. It assumes that you have limited knowledge of HF communication and of using an HF radio. It contains 7 chapters:

Chapter 1 explains the terms and abbreviations used in this guide.

Chapter 2 provides an overview of HF communication.

Chapter 3 explains the transceiver's components, standard features and options.

Chapter 4 explains how to set up the transceiver.

Chapter 5 explains how to operate the transceiver.

Chapter 6 explains how to make calls from the Address List.

Chapter 7 explains how to use several of the transceiver's advanced features.

There is an index at the end of this guide.

Standards and icons

The following standards and icons are used in this guide:

This typeface	Means
<i>Italic</i>	A cross-reference or text requiring emphasis

This icon	Means
	A step within a task
	Note: the text provided next to this icon may be of interest to you

Definitions

Acronyms and abbreviations

ALE	automatic link establishment
AM	amplitude modulation
ESN	electronic serial number
HF	high frequency
LSB	lower sideband
PTT	press-to-talk
Rx	receive
SWR	standing wave ratio
Tx	transmit
USB	upper sideband
UTC	universal time coordinated

Glossary

This term	Means
address	The HF radio equivalent of a telephone number. The address of your station is used when you make calls (to identify you as the caller) and when stations call you (to alert your station to the call). The address is sometimes referred to as an ID, a station ID or a self ID.
channel	A 3 kHz range of frequencies used to transmit and receive audio signals.
fixed base station	A station that is permanently installed and cannot be moved without some preparation.
frequency	The number of times per second that a radio wave oscillates.
handset	A hand-held device that enables a user to communicate with an RF unit. A handset has a microphone, PTT button, display and keypad.
junction box	The unit in a transceiver to which a handset, RF unit, speaker and related devices are connected. The junction box receives the instructions that users enter through the handset and sends them to the relevant devices.
mobile station	A station that can function while it is mobile or stationary.
network	Two or more stations that communicate on the same frequencies.
PTT button	'Press to talk' button, located on the left side of the handset.
RF unit	The unit in a transceiver that converts 'baseband' or audio signals to radio frequencies that can be transmitted on air, and that converts the radio frequencies it receives into audio signals. An RF unit cannot be used without a junction box and a handset or computer.

This term	Means
standing wave ratio	A measure of your antenna's performance. An SWR of 2.0 or less is acceptable.
station	A power supply, a transceiver, an antenna and appropriate connecting cables.
transceiver	An RF unit, junction box and handset, and appropriate connecting cables.

Units

Measurement	Unit	Abbreviation
Frequency	hertz	Hz
Power	watt	W
Voltage	volt	V
Power ratio	decibel	dB
Distance	metre	m

Unit multipliers

Unit	Name	Multiplier
M	mega	10^6
k	kilo	10^3
d	deci	10^{-1}
m	milli	10^{-3}
μ	micro	10^{-6}

About this issue

This is the first issue of the NGT *VR* Transceiver User Guide.

Associated documents

This user guide is one of a series of publications related to the NGT *VR* Transceiver. Associated documents are:

- NGT *VR* Transceiver Quick Reference Card
(Codan part number 06-02018)
- NGT *AR*, *SR* and *VR* Transceiver Reference Manual
(Codan part number 15-04099)
- NGT Transceiver System Technical Service Manual
(Codan part number 15-02063)

2 HF radio transmission



This chapter provides an overview of:

- HF radio transmission (2-2)
- etiquette for the use of HF radio (2-5)

HF radio transmission

The High Frequency (HF) band is the range of frequencies between 3 and 30 MHz. HF radios usually include a frequency range of 2 to 30 MHz.

Codan HF radios transmit on single sidebands. This reduces the power required to send HF signals and increases the number of channels available within the HF spectrum.

HF radios are primarily used for long-range communication where distances of 3000 km and more are possible. Obstructions such as buildings and mountains have little effect on long-range communication. HF radio can cover such large distances because of the way the transmitted radio signal propagates.

HF radio waves are propagated in three ways simultaneously:

- ground wave
- direct wave
- sky wave

Ground wave

The ground wave travels near the ground for short distances, typically up to 100 km over land and 300 km over sea. The distance covered depends upon the operating frequency, transmission power and type of terrain.

Direct wave

The direct wave travels in a direct line-of-sight from the transmitter to the receiver.

Sky wave

The sky wave is the most important form of HF propagation. The radio wave is transmitted toward the sky and is reflected by the ionosphere to a distant receiver on earth.

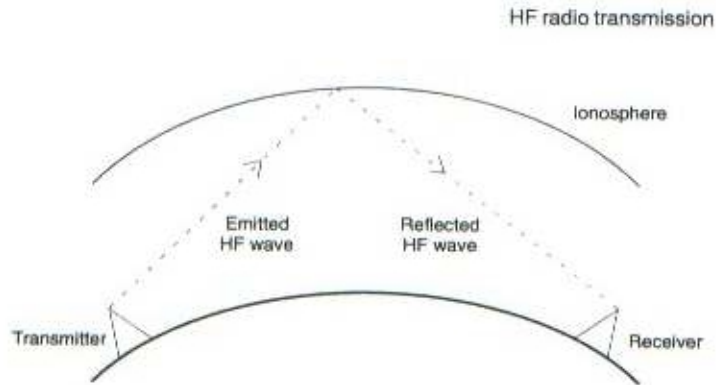


Figure 2-1: The reflective properties of the ionosphere

The reflective properties of the ionosphere change throughout the day, from season to season and yearly.

Frequency, distance and time of day

The extent to which a radio wave is reflected depends on the frequency that is used. If the frequency is too low the signal is absorbed by the ionosphere. If the frequency is too high the signal passes straight through the ionosphere. Within the HF band, low frequencies are generally considered to be in the range of 2 to 10 MHz. High frequencies are above 10 MHz.

A frequency chosen for daytime transmission may not necessarily be suitable for night-time use. During the day the ionosphere has many layers. The layers absorb lower frequencies and reflect higher frequencies. At night, the ionosphere becomes very thin. The low frequencies that were absorbed during the day are reflected and the high frequencies that were reflected during the day pass straight through.

Summer HF communications usually operate on higher frequencies than those used in winter over the same distance.

Solar activity varies over an eleven year cycle. Higher frequencies need to be used during periods of peak activity.

It is important to remember that you may need to change the frequency you are using to achieve the best communication. The general rules of thumb for HF communication are:

- the higher the sun, the higher the frequency
- the further the distance, the higher the frequency

Channels

A channel is a name that is given to a frequency or a pair of frequencies, e.g. 'Channel 1', '4500' and 'Headquarters'. The frequencies may be any frequencies within the HF range.

Each channel has one or more modes associated with it, e.g. LSB and USB. Table 2–1 shows examples of channels and the information associated with them.

Table 2–1: Examples of channels

Channel	Receive frequency (kHz)	Transmit frequency (kHz)	Modes
Channel 1	10,600	10,600	LSB, USB
4500	4,500	—	USB
Headquarters	22,758	23,000	LSB

Networks and scanning

A network is two or more stations that have agreed to use particular frequencies to communicate. The frequencies are allocated by a government authority and enable the network to maintain HF communication throughout the day and night.

The transceiver can be set to scan the frequencies in your network to detect incoming calls. It is recommended that when you are not using the transceiver to communicate you switch scanning on. This ensures that you are able to receive calls from other stations in your network.

Etiquette for the use of HF radio

There is a standard procedure for communicating over HF radio. Before transmitting, listen to the channel that you are going to use and ensure that there is no voice or data communication taking place. You may need to wait until the channel is clear or select another channel.

When you first establish communication with another station it is customary to state their call sign and then your own using the phonetic alphabet (see Table 2-2). For example:

'Alpha Bravo One, this is Alpha Bravo Two. Do you receive me? Over.'

In this example your call sign is AB2 and you are calling a station with call sign AB1. A call sign is a group of letters and numbers issued by a government authority to identify a station. The phonetic alphabet is used to ensure that your call sign is properly understood.

The word 'over' is used to signify the end of your transmission. The transceiver also transmits a short beep when you release the PTT button on the handset. When your conversation with the other party is finished, the party that speaks last should say 'out'.

Swearing or foul language should not be used—heavy penalties can apply.

Keep communication as short as possible.

Table 2-2: The phonetic alphabet

Letter	Word	Letter	Word
A	Alpha	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliet	W	Whiskey
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

3 The NGT *VR* Transceiver



This chapter provides an overview of:

- the components of the NGT *VR* Transceiver (3-2)
- the standard and optional features of the transceiver (3-7)

The NGT *VR* Transceiver

The NGT *VR* Transceiver consists of a:

- 2020 Handset
- 2030 Junction Box
- 2010 RF Unit

The handset is a hand-held device that has a microphone, PTT button, display and keypad. The microphone and PTT button are used for voice communication. The keypad enables you to control and configure the transceiver system. The handset is connected to the junction box.

The junction box is a unit to which the handset, RF unit, speaker and related units are connected. It interprets the instructions you enter through the handset then sends them to the appropriate units.

The RF unit converts audio signals to radio frequencies that can be transmitted on air, and converts the radio frequencies it receives into audio signals.

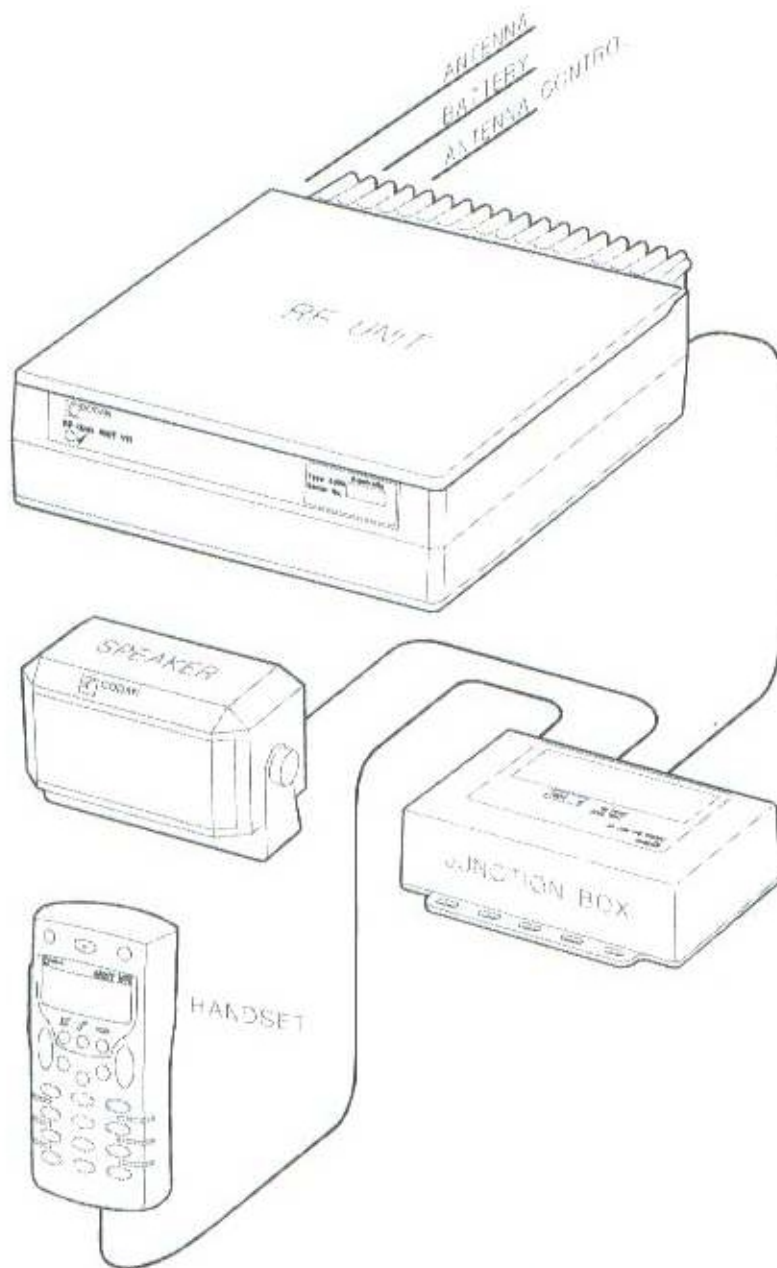


Figure 3-1: The NGT VR Transceiver

The 2020 Handset

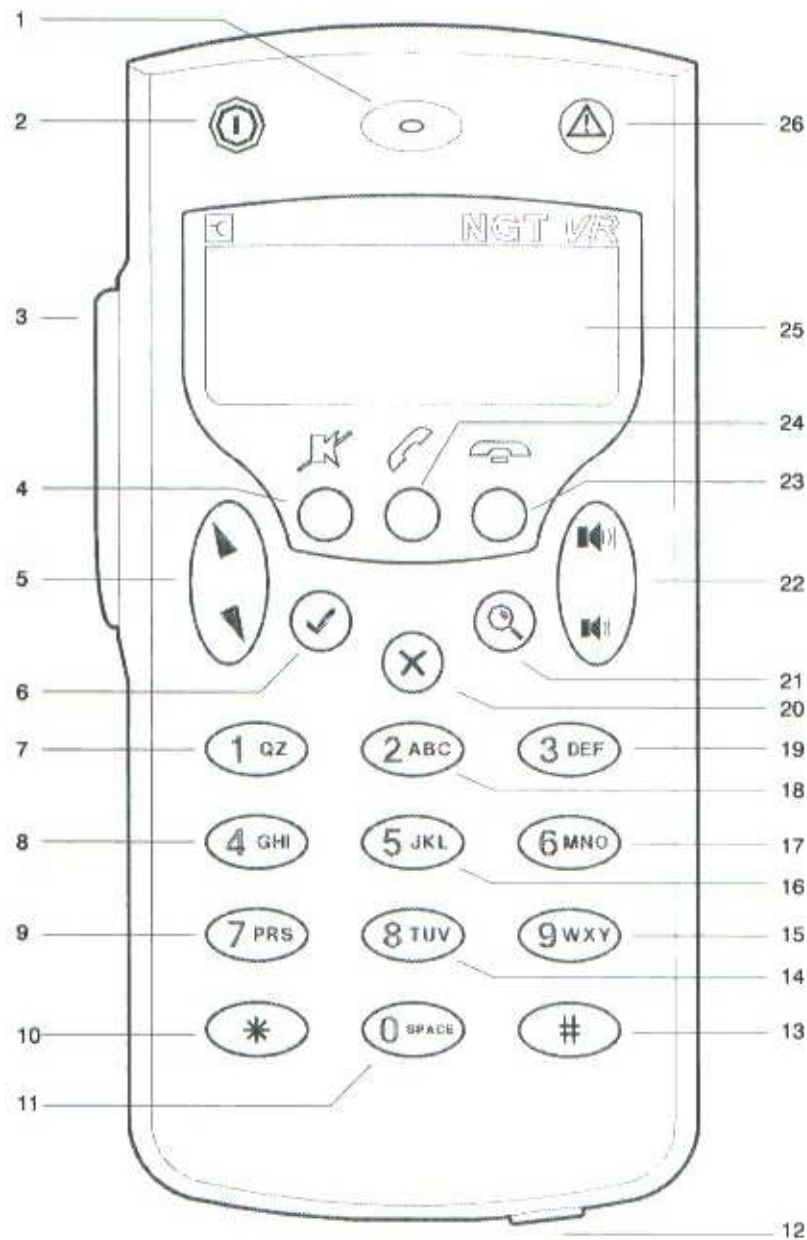


Figure 3-2: The 2020 Handset

Table 3-1 explains the features of the handset and the tasks they enable you to perform.

Table 3-1: Features of the handset

No.	Feature	Name	Enables you to...
1		Microphone	speak to other stations
2		Power On/Off key	switch power to the transceiver on or off
3		Press To Talk (PTT)	communicate during calls and to cancel various operations
4		Mute key	switch mute on or off
5		Scroll keys	scroll through items in a list and scroll over text on a line
6		Tick key	select items in lists, begin calls, save changes to values and answer 'yes' to prompts
7	1 QZ	1QZ key	enter 1, Q and Z
8	4GHI	4GHI key	enter 4, G, H and I
9	7PRS	7PRS key	enter 7, P, R and S
10	*	Asterisk key	enter the punctuation marks , space ! ? @ # & * () - +
11	0 SPACE	Zero space key	enter 0 and a space
12		Programming jack	use a programming cable and the NGT System Programmer software to upload and download information to/from the transceiver

No.	Feature	Name	Enables you to...
13	#	Hash key	enter #
14	8TUV	8TUV key	enter 8, T, U and V
15	9WXYZ	9WXYZ key	enter 9, W, X and Y
16	5JKL	5JKL key	enter 5, J, K and L
17	6MNO	6MNO key	enter 6, M, N and O
18	2ABC	2ABC key	enter 2, A, B and C
19	3DEF	3DEF key	enter 3, D, E and F
20	✕	Cross key	exit settings, entries and lists, backspace over text, cancel changes to values, display the home screen and answer 'no' to prompts
21	🔍	Find key	display the Find prompt and open the List Manager
22	🔊 🔊	Volume up and down key	increase or decrease the volume of the speaker
23	📞	End call key	end a call if a call is in progress, or toggle scanning
24	📞	Call key	begin a call
25	📶	Handset screen	view the status of the transceiver
26	⚠️	Emergency key	begin an emergency call

Standard features and options

The standard features of the NGT *VR* transceiver are:

- Channel Test calls
- Easitalk speech processing
- Emergency calls

The optional features of the NGT *VR* transceiver are:

- Option AM, for AM capability
- Option D, for Get Status calls
- Option S, for Selective calls
- Option T, for Phone calls (Option S is also required)
- Option TXD, to disable programming of transmit frequencies from the handset