



# ACE 5400™

Four Carrier Signal Generator



**Operation Manual**

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## 1. Features

The ACE 5400™ portable RF signal generator has four agile carriers that can be activated individually or in any combination. The frequency and amplitude of each carrier is adjustable.

The ACE 5400™ generates CW signals that are stable and spectrally clean. It is ideal for testing and aligning CATV return paths and commercial and institutional networks. The ACE 5400's™ basic and straightforward performance makes it ideal for applications that require a precise, stable RF stimulus.

### FEATURES

- Agile frequency settings (5 to 100 MHz in 10kHz steps)
- Agile amplitude settings (+30 to +50 dBmV in 1 dB increments)
- Field portable, compact, rugged design
- Strong, fast charge, internal battery
- Easy to use keypad
- Carriers are activated individually
- Carriers are very stable and precise
- Output is spectrally clean
- Store and label multiple frequency plans

### STANDARD ACCESSORIES

- Padded carrying case and shoulder strap
- Transformer for charging battery, 120V or 230V
- Spare F connector
- Operation manual

## 1.1. Specifications

Each of the Four RF Carriers:

Type .....	Continuous Wave (CW)
Frequency	
Range.....	Tunable from 5 to 100 MHz in 10 kHz steps
Accuracy.....	Within 0.025% or 2.0 kHz (the greater value)
Amplitude	
Range.....	+30 to +50 dBmV (90 to 110 dB $\mu$ V)
Selectable Increments.....	1 dB steps
Accuracy.....	$\pm$ 1.0 dB
Spectral Purity.....	at least -55 dBc (When carrier is set to maximum output level)
Output Impedance.....	75
Operating Temperature Range..	0°F to 120°F (-18°C to +50°C)
Internal Rechargeable Battery...	1800 mAh
Operation Time per charge....	7 hours, continuous use
Time to Recharge Battery .....	3.5 hours fast charge

Enclosure

Type.....	High impact, molded plastic,
Size.....	8.5"W x 6.5"H x 3.25"D, 4.5 lbs
Weight .....	(21.5cm x 16.5cm x 8.25cm, 3.63kg)

*Specifications subject to change without notice*

## 1.2. Connections

- 1) RF output
- 2) Battery charger input
- 3) Calibration Port

### 1.3. Controls and Connections



### 1.4. Keypad

The keys are labeled with their primary function, but may provide extra functions indicated under the key. The P1, P2, P3 and P4 buttons' primary function is to indicate the desired pilot carrier. In the setup screens, these are used as "soft-keys" to select various options.

Key	Primary Function	Secondary Function
ON / OFF	Power on	Power off
FREQ ← (left arrow)	Frequency entry	backspace
AMPL → (right arrow)	Amplitude entry	
↑ (Up arrow)	Incrementing values	scrolling up
↓ (Down arrow)	Decrementing values	scrolling down
SETUP / RUN	Enter Setup Mode	Enter Run Mode
P1,P2,P3,P4	Pilot carrier selection	Option selection
ENTER	Complete a field entry	Turn backlight on/off
Numeric keys	Numeric entry	Alphabetic entry
.	Decimal point	

When you are entering a file name, alphabetic characters are entered by pressing the indicated key once for the first letter, twice for the second, three times for the third and four times for the digit on the key. The key presses must be done fairly quickly. After a short delay without a key press, the cursor advances to the next position. If you make a mistake, you can back up with the left arrow key.

## 2. Operating Modes

There are two operating modes of the instrument: Run Mode and Setup Mode. In Run Mode, you can turn pilots on and off and set frequency and amplitude. In Setup Mode you can save, restore and delete setup files and change other operating parameters of the instrument.

The Setup Mode displays a scrolling list of features on the left and the options that can be selected for those features on the right. You select different features by moving the cursor with the up/down arrows. If there are more features than fit on one screen, the lines will scroll when you arrow up off the top or down off the bottom. The selected feature will be indicated by <> brackets around the present setting.

## 3. Run Mode

The Run Mode is used for normal operation of the instrument.

### 3.1. Basic Operation

	P1	P2	P3	P4	
Freq	10.00	20.00	30.00	40.00	MHz
Ampl	30	40	50	50	dBmV
	ON	off	ON	ON	

The main screen has one column for each pilot showing the frequency, amplitude and on/off state. The following operations are available:

1. You may turn any pilot on or off by pressing the P1, P2, P3 or P4 buttons immediately under the pilot column.
2. You may change any pilot amplitude using either the numeric keypad or the up and down arrows as described below.
3. You may change any pilot frequency using either the numeric keypad or the up and down arrows (also as described below).

Note: the frequencies may be locked in the setup mode. If locked, you will not be able to change the frequencies without unlocking them first.

### 3.2. Using the Numeric Keypad

To change the amplitude or frequency using the numeric keypad use these steps:

1. Press AMPL to change the amplitude or FREQ to change the frequency. A cursor should appear in appropriate field of the previously selected pilot.
2. Press P1, P2, P3 or P4 to select the pilot you want to change. You may skip this step if the desired pilot was previously selected.
3. Enter the value for the amplitude or frequency you want to set.
4. Press ENTER to save and set the value.

If you enter a value outside the supported range, the closest available value will be used.

**Examples:**

Set amplitude to a specific value

Press:            AMPL <pilot> <digit> <digit> ENTER  
Example:         AMPL P1 4 5 ENTER

Set Frequency:

Press:            FREQ <pilot> <digit> <digit> .... ENTER  
Example:         FREQ P2 8 7 . 1 5 ENTER

### 3.3. Using the Arrow Keys

To change the amplitude or frequency using the arrow keys:

1. Press AMPL to change the amplitude or FREQ to change the frequency. A cursor should appear in appropriate field of the previously selected pilot.
2. Press P1, P2, P3 or P4 to select the pilot you want to change. You may skip this step if the desired pilot was previously selected.
3. Press the up arrow to increase the value, or press the down arrow to decrease the value. The values will increase or decrease by the step size defined in the setup screen.

**Examples:**

Increment amplitude:

Press:            AMPL <pilot> <up/down arrows>  
Example:         AMPL P1 Up Up

Increment amplitude:

Press             FREQ <pilot> <up/down arrows>  
Example:         FREQ P2 up up up

## 4. Setup Files

You may save a combination of frequencies and amplitudes in a setup file for easy recall at a later time. For example, you may want to save a setup that is customized for a particular cable system. Every time you work on that cable system, you can simply recall the setup, avoiding the need to reset the frequencies.

When a setup file is in use, the setup file name appears on the top line in place of the generic P1 to P4 column labels:

( changed )	NEWTOWN_CABLE				
Freq	5.00	13.00	31.00	57.00	MHz
Ampl	30	30	30	30	dBmV
	ON	off	ON	ON	

If the setup has been changed since it was last saved, "(changed)" will be indicated in the top left of the screen.

### 4.1. Saving a New Setup File

Starting from a new setup (with the P1 to P4 column labels), or from a previous setup, reset the frequencies and levels to the desired values using the standard run screen as described above, then use the following steps:

	SETUP	P1=Save
Contrast: 400		P2=Save As
Setup File:<NEWTOWN_CABLE>		P3=File List
Freq lock: LOCKED		P4=New

- 1) Press SETUP
- 2) Press DOWN to position cursor on setup file line
- 3) Press P2 (Save As)
- 4) Enter a file name (alpha characters obtained by pressing the key multiple times)
- 5) Press ENTER

Enter new file name	
Setup File: _____	
	ENTER=store
	P4=cancel



## 4.2. Recalling Stored Setups

To recall a setup that was previously stored:

- 1) Press SETUP
- 2) Press DOWN to position the cursor on the Setup File line
- 3) Press P3 to display the list of available files:

Select File	P1=Open
<NEWTOWN_CABLE>	P2=Delete
CENTRAL	P3=New
EASTERN	P4=cancel

- 4) Use the up and down arrows to select the desired file
- 5) Press P1 to open the file and recall the saved settings

Note: if you had made changes that were not saved, you will be asked if you want the changes discarded.

## 4.3. Modifying An Existing Setup File

Starting from an existing setup, reset the frequencies and levels to the desired values using the standard run screen as described above, then use the following steps:

SETUP	P1=Save
Contrast: 400	P2=Save As
Setup File: <NEWTOWN_CABLE>	P3=File List
Freq lock: LOCKED	P4=New

- 1) Press SETUP
- 2) Press DOWN to position cursor on setup file line
- 3) Press P1 (Save)
- 4) When asked to confirm overwriting the existing file, press P1 for yes.

## 4.4. Starting a New File

You can start a new setup and change the column labels back to "P1...P4" as follows:

- 1) Press SETUP
- 2) Press DOWN to position the cursor on the Setup File line
- 3) Press P4 (New)

If you had unsaved changes to the previously selected file, you can discard them or you are given a chance to save the changes first.

#### 4.5. Deleting Files

You may delete stored files with the following procedure. A confirmation window will pop up as a safety precaution.

- 1) Press SETUP
- 2) Press DOWN to position the cursor on the Setup File line
- 3) Press P3 to display the list of available files:

Select File	P1=Open
<NEWTOWN_CABLE>	P2=Delete
CENTRAL	P3=New
EASTERN	P4=cancel

- 4) Use the up and down arrows to select the desired file
- 5) Press P2 to delete the selected file
- 6) Press P1 when asked to confirm the deletion (or P2 to cancel)

## 5. Setup Parameters

Setup files store frequency and amplitude settings but there are several other parameters that can also be changed in the Setup Mode.

### 5.1. Contrast

The LCD contrast can be adjusted with the first setup parameter. If the contrast adjustment is way off, the screen may be all blank or all dark. If this happens, perform the following key press procedure carefully to adjust the screen until you can see it clearly.

- 1) Press SETUP

```

                                SETUP
    Contrast:<400>                P1=Change
    Setup File: NEWTOWN_CABLE    P2=Default
    Freq lock: Locked
  
```

- 2) Press P1 (Change)

```

                                SETUP
    Contrast:<400>                ↑ = more
    Setup File: NEWTOWN_CABLE    ↓ = less
    Freq lock: Locked           ENTER=done
  
```

- 3) If the screen is too light (or blank) press the UP arrow until the characters are dark and the background is even.
- 4) If the screen is too dark, the area around each character will be dark and the character obscured. Press the DOWN arrow until the screen lightens and is easy to read.
- 5) Press ENTER to store the new setting

### 5.2. Frequency Lock

You may lock the frequency settings to prevent accidentally changing them in the Run mode. Use the up/down arrows to select the "Freq Lock" line and press P1 to unlock or P2 to lock.

```

                                Setup
    Setup File: NEWTOWN_CABLE    P1=Unlock
    Freq lock:<Locked>          P2=Lock
    Ampl Units: dBmV
  
```

### 5.3. Amplitude Units

You may change the units that the amplitude is displayed in. Use the up/down arrows to select the "Ampl units" line and press the key corresponding to the units you prefer.

```

                                Setup
Setup File: NEWTOWN_CABLE      P1=dBmV
  Freq lock: LOCKED           P2=dBuV
Ampl Units:<dBmV>              P3=dBm
                                P4=dB(atn)

```

With the "dB" option selected, the instrument will display an attenuation value between 0 and 31.5 dB rather than an absolute power level. This setting will let you change the level in 1/2dB steps but is not calibrated.

### 5.4. Safety Timeout

The "safety timeout" terminates the edit mode when no buttons are pressed as a safety feature to help prevent accidental changes. This timeout can be changed. Select the line and press P1 to enter a numeric value. Or press P2 to restore the default (5 seconds).

```

                                Setup
  Freq lock: LOCKED           P1=change
Ampl Units: dBmV              P2=default
Safety t/o:< 5> secs

```

### 5.5. Step Size

The frequency and amplitude step sizes define the change when adjusting frequency or amplitude using the arrow keys.

```

                                Setup
Safety t/o: 5 secs           P1=change
  Freq step:< 1.00> MHz      P2=default
Ampl step: 5 dB

```

### 5.6. Shutdown Timer

The instrument also has an inactivity shutdown timer that is enabled when the timeout value is set to something other than zero. The default is zero.

```

                                Setup
  Freq step: 1.00 MHz       P1=change
Ampl step: 5 dB            P2=default
Shutdown:< 0>Mins

```

## 6. Battery Charging

The standard Nickel Metal Hydride (NiMH) battery pack will last for 500 to 1000 charge-discharge cycles, if properly cared for.

The ACE 5400 has a fast battery charge circuit that charges the battery in approximately 4 hours. An overnight charge (6 to 8 hours) will continue charging until the battery is completely full.

***LEAVING THE CHARGER ON AFTER THE BATTERY IS COMPLETELY CHARGED WILL NOT HARM THE UNIT, BUT REMOVING THE CHARGER AFTER 12 TO 16 HOURS IS RECOMMENDED.***

### 6.1. Battery Status Indicator

In the lower right corner of the display, a battery charge indicator is shown. This indicator will either appear full (all dark), half full, or empty. The word (low) will flash to draw attention to the low battery condition.



When the “Empty” symbol is shown, the unit should be recharged. If the battery becomes too low to safely operate, the screen will be erased and a “Low Battery” message displayed. The instrument will then shut off after 5 seconds.

### 6.2. Battery Charge LED

The battery charge LED shows the status of the battery charging circuit:

- OFF charger is not connected
- YELLOW charging
- GREEN battery nearly full and in a trickle-charge mode

### 6.3. Charger Cube

The charger cube is rated at 120-250 VAC, 50-60Hz input and 24 VDC at 1.5 Ampere output with 2.1 mm plug. Using any device other than the provided charger cube may result in damage to the device and the ACE 5400.

***ANY ATTEMPTS TO CHARGE THE BATTERY WITH AN EXTERNAL POWER SOURCE OTHER THAN THE PROVIDED AC CHARGER CUBE MAY RESULT IN POOR OPERATION OR DAMAGE AND WILL NOT BE COVERED UNDER THE WARRANTY.***