

# OWNERS MANUAL



## Bearcat<sup>®</sup> 220FB

**20 Channel  
Crystalless Scanner  
Aircraft • Marine • Public Service**

MONITORS VHF and UHF FM RADIO SERVICES

Ham  
Police  
Government  
Forestry  
Conservation  
Mobile Telephones  
Press  
Fire  
Aircraft

Utility Services  
Industry  
Business  
Hospitals  
Ambulances  
Automobile Emergency  
Marine  
Manufacturers

Special Emergency  
Disaster Relief  
School Buses  
Transportation  
Taxis  
Railroads  
Paging  
Trucks

MADE IN CUMBERLAND, IND. U.S.A. UNDER ONE OR MORE OF THE FOLLOWING PATENTS:  
3,961,261 3,982,844 4,027,251 4,230,584 4,106,497 4,123,715  
and patents pending.

**Electra**

**ELECTRA  
COMPANY**

DIVISION OF MASCO CORPORATION OF INDIANA  
CUMBERLAND, INDIANA 46229

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UNDERWRITERS  
LABORATORIES  
LISTED

Certified in accordance with  
FCC Rules and Regulations  
Part 15.63 as of date of  
manufacture.

## CAUTION

TO PREVENT FIRE OR SHOCK  
HAZARD, DO NOT EXPOSE THIS  
APPLIANCE TO RAIN  
OR MOISTURE.

For future reference, write the model number and serial number below. You will find them printed on the back of your radio.

Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_

Purchased from: \_\_\_\_\_ Date \_\_\_\_\_

## TECHNICAL SPECIFICATIONS\*

<b>Size:</b>	10 5/8" W x 3 1/2" H x 8" D
<b>Weight:</b>	5 lbs.
<b>Cabinet:</b>	Vinyl-clad Steel or Painted Textured Steel
<b>Power:</b>	240 Vac, 50-60Hz, 20W, 13.8 Vdc, 9W
<b>Antenna:</b>	Telescoping antenna (supplied) Connector provided for external antenna (50-70 ohms)
<b>RF Sensitivity:</b>	0.4uV 66-88MHz 0.4uV 144-174MHz 0.8uV 420-512MHz (±5KHz deviation 12db SINAD) 1.0uV for 10db S/N Aircraft 60% mod.
<b>IF Selectivity:</b>	-55db @ +25kHz
<b>Frequency Coverage:</b>	Low Band 66-88MHz Aircraft 118-136MHz Amateur 144-148MHz High Band 148-174MHz UHF Band 420.450-470MHz UHF-T Band 470.0125-512.45MHz
<b>Scan/Search Speed:</b>	Selectable 4 or 11 channels per second
<b>Audio Output:</b>	2 Watts RMS, 8 ohms, 10% THD (max.)
<b>Front Panel:</b>	Volume (ON/OFF) Squelch (Auto. Squelch) Display Keyboard Speaker
<b>Rear Apron Connectors:</b>	12Vdc External Antenna External Speaker Jack 240Vac Receptacle

\*Specifications are typical and subject to change without notice

## SAFETY PRECAUTIONS

Although your Bearcat 220FB is listed with Underwriters Laboratories for complying with standards of safety, a review of common precautions is recommended.

- Do not operate this unit if it is wet.
- Never touch an electrical appliance while standing in water or on wet ground.
- Do not tamper with the internal circuitry.
- Do not connect or disconnect the rear-apron power connector when the line cord is plugged in to an ac receptacle.

## GENERAL DESCRIPTION

The Bearcat 220FB uses a microprocessor to make scanning easy. Its versatile keyboard is divided into a Program Section that will allow you to command any frequencies (VHF/UHF) on its 20 channels; and an Operation Section that controls scan, lockout of unwanted channels, direct channel access, service search selectable speed control for both scan and search, priority and programmed search.

The solid state circuits include 3 custom designed integrated circuits that give it unique features. It operates on either 240Vac or 12Vdc.

## OPERATING INSTRUCTIONS

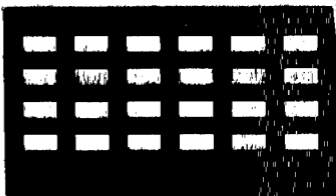
Read the following instructions carefully and enjoy listening to your scanner in minutes.

1. Unpack the unit from the carton (save the carton for possible future use). Check your scanner for shipping damage; if damage has occurred, contact your dealer immediately.
2. Install two AA batteries. See picture on bottom of radio or battery details page 9.
3. Attach the power cord to the radio and then into a 240Vac outlet.
4. Insert the threaded end of the antenna into the hole on the top of the scanner. Screw it finger-tight and extend it fully.
5. Turn your scanner ON by turning the volume control clockwise 1/3 of its rotation.
6. Rotate the squelch control clockwise until you hear background noise; then turn it back counterclockwise until the noise disappears.
7. You are ready to program frequencies in your scanner. It is scanning at fast speed as indicated by the rolling display.

## FRONT PANEL CONTROLS

1. **ON/OFF-VOLUME:** Turns the receiver ON and OFF and adjusts the sound level.
2. **SQUELCH:** Allows the radio to scan or search for signals, and keeps radio quiet unless a signal is being received.
3. **AUTO SQUELCH:** A convenient, fixed squelch setting.
4. **KEYBOARD:** Simply punch in the desired frequencies you wish to monitor. It also controls automatic scan or manual channel select, bank select, service search, search limits, starts or holds the radio searching, programs the delay and lockout features into any desired channel.

## KEYBOARD



## PROGRAM KEYS:

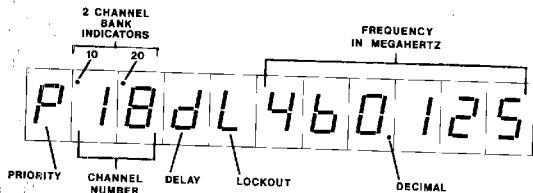
Numeric keys **0** thru **9** and dec point **.** are used to program the frequencies your scanner. **E** enters frequencies into scan nels from keyboard or from search display.

## OPERATION KEYS:

- Scan** Starts scan of all displayed channels.
- Manual** Stops scan; single steps your scanner through channels.
- Lockout** Locks out displayed channel during scan only.
- Delay** Delays 1 second to receive a reply transmission wh the same channel.
- Search** Starts searching for signals between two selecte quencies. Restarts after "hold".
- Limit/Hold** Enters two selected frequencies as upper and limits; also stops search.
- Speed** Selects scan or search rates of 4 or 11 channel second.
- Priority** Samples channel 1 every two seconds and automat switches to any signal on channel 1 regardless o other signals.
- Aircraft** Provides a single key-press Search of the entire Ai Band (118-136MHz). "Image" interference from aircraft signals may be received in this mode. See p for explanation and suggestions.
- Marine** Searches the marine band (156.05-157 160.625-162.025 MHz).
- 10** **20** Two banks (10 channels each) are each includ excluded.

## DISPLAY FEATURES

The display consists of 11 spaces or "windows" in which lighted characters indicate the programming commands of the keyboard and scanning status.



PRIORITY is selected in first space.

CHANNEL 18 is selected in second and third space.

BOTH CHANNEL BANKS, 10 and 20, are selected as indicated by dots at upper left of second and third spaces.

DELAY selected in fourth space.

LOCKOUT selected in fifth space.

AIRCRAFT selected in fifth space.

MARINE selected in fifth space.

FREQUENCY 460.125MHz is selected (6th thru 11th spaces) and programmed in channel 18.

## PROGRAMMING FREQUENCIES INTO THE RECEIVER

You can program your radio to scan twenty different frequencies, one in each of the twenty channels. (De-select priority.)

### EXAMPLES

To program 162.55MHz in desired channel (for example channel 14):

PRESS:  Manual step to desired channel (14)

PRESS:  1  6  2  .  5  5  E

READ: 14 162.550

PRESS:  Manual steps for next channel (15)

To program 471.1375MHz in next channel (for example channel 15):

PRESS: [4] [7] [1] [.] [1] [3] [7] [5] [E]  
READ: 1 5 471.137 (rounded off to 6 places)

If you attempt to program a frequency that is outside the tuning range of the receiver, "Error" appears on the display. If this happens, simply enter a new frequency.

If you make a mistake programming a frequency on a channel, just:

PRESS: [E] then program correct frequency

## DIRECT (MANUAL) CHANNEL ACCESS

To display any channel manually (for example channel 14) when scanning is stopped, just:

PRESS: [1] [4] [Manual]  
READ: 1 4 in second and third spaces followed by the frequency

If you want to advance from channel 14 to 15, just press [Manual] then read 15 followed by the frequency.

## SCANNING

To put your receiver in the "Scanning Mode", adjust the squelch properly (see Page 3). Then:

PRESS: [Scan]  
READ: Rolling Zeros in the 10 right-most spaces of the display.  
The Bank Indicator Dot for the bank being scanned at that instant.  
Lockout symbols (L) (instead of zeros) representing the channels being skipped.

## PRIORITY

This selectable feature will permit you to hear channel 1 any time it is active, regardless of any other signals being received at that time. Put your favorite frequency in channel 1. Then:

PRESS:  "P" is displayed

To de-select Priority

PRESS:  again. "P" disappears

## LOCKOUT

You may wish to lock out certain frequencies and skip over them when scanning. To program Lockout on a channel (for example channel 5) first select that channel manually.

PRESS:

PRESS:

READ: 5 L appears in the third and fifth spaces of the display

To remove Lockout

PRESS:  again and the "L" will disappear

## SPEED

To scan slowly or rapidly (4 or 11 channels per second)

PRESS:  To resume fast scan PRESS:

## SCAN DELAY

Your scanner may be programmed to pause for about one second after a transmission on any selected channel. This is useful when both sides of a conversation are transmitted on the same frequency.

To program Delay on a selected channel.

PRESS:  step to that channel

PRESS:  The symbol "d" appears on this channel in the fourth space

To remove Delay

PRESS:  The symbol "d" will disappear from this channel.



## SEARCH

To Search for unknown signals between two frequencies in the same band, manually step to the channel you desire to use, (for example Channel 8), then, for example, to Search from 146.500 to 146.950MHz:

PRESS:  step to Channel 8 (or use Direct Access)  
PRESS:      Limit/Hold (for limit)  
READ: 8 146.500 (One limit is entered)  
PRESS:       Limit/Hold (for limit)  
READ: 146.950 (Other limit is entered)  
PRESS:

When an active channel is found, the Search stops and the frequency is displayed.

If you desire to stay on that frequency

PRESS:  (for hold)

To resume searching without changing Search limits

PRESS:  If "Error" appears search limits were not in the same band, or an out of band frequency was attempted.

To enter a frequency found by Searching in that channel

PRESS:

To continue searching between the same limits, manually select another channel and press .

Search the Aircraft band (118-136MHz): as above, or

PRESS:  The letter "A" will appear in the fifth space.

If searching is stopped by a continuous signal or "image" interference, such as ham repeaters or cab dispatch, press  repeatedly to continue. If interference persists, Search using limits that exclude the interference.

To search the Marine band (156.05-157.48MHz, 160.625-162.025MHz):

PRESS:  The symbol "-" will appear in the fifth space.

## EXTERNAL ANTENNA

The telescoping antenna provided with your Bearcat 220FB is recommended for most monitoring. For weak-signal reception, or for electrically-noisy locations, the Bearcat A-70 external antenna is readily available. Always use coaxial cable for lead-in. RG-58U is recommended for lengths of up to 100 feet.

Your Bearcat 220FB is equipped with an automotive type external antenna jack, and a mating plug (supplied) must be used.

An outside antenna need only be high enough to clear surrounding obstructions. Above all, **STAY AWAY FROM POWER LINES!** You may be killed upon contact of the antenna with a power line.

## EXTERNAL SPEAKER

Although the internal speaker of the scanner will provide ample room volume, in some applications an external speaker such as the Bearcat B-45 may be desired. The external speaker should be plugged into the rear-apron jack which will cut off the internal scanner speaker.

## BATTERY

Your scanner is not supplied with a battery. See label on the bottom of your scanner for battery type and installation instructions. It is recommended that you install the proper battery before you start programming and while the set is unplugged. The battery provides power for the channel memory in the event of a power failure or when the power cord is unplugged. While unplugged, the batteries provide power to the channel memory for about one year.

While the receiver is plugged into 240Vac, the battery is not losing its charge and the memory is activated by the power supply.

**NOTE:** Anytime the BC-220FB is turned off or disconnected from its power source, the status of priority banks and the programmed search limits will be lost; however, delay and lockouts are retained. The radio always turns on scanning in the fast condition showing bank 10.

## BATTERY INSTALLATION

The battery compartment is held with two screws. Remove the screws and carefully swing the compartment out of the receiver. Clean the terminals with a pencil eraser, if necessary. Insert the proper batteries into the holder. Reassemble the holder and secure it with the screws. (See picture on the bottom of the receiver).

## MOBILE INSTALLATION

In some areas, unauthorized mobile police receivers are unlawful; be sure to check with local authorities before installing your unit.

Your Bearcat 220FB may be installed in any vehicle or boat which has a 12-volt, negative-ground electrical system.

A mounting bracket has been provided for your convenience.

1. Using the mobile mounting bracket, select a location under the dash to hold the scanner in the desired position.
2. Mark and drill two mounting holes using a 7/64 drill bit; secure the bracket with two #6 self-tapping screws (provided).
3. Insert the two plastic T-washers (provided) into the bracket holes, flanges inward, and secure the scanner in place with the two mounting bolts and washers (provided).
4. Connect the dc power cable to the insulated terminal on the rear apron of the receiver; attach the other end of the cable to the 12V battery. Be sure the radio cabinet is well-grounded to the car metal through the mounting frame; otherwise, connect a piece of wire from the ground screw on the rear apron of the radio to the metal body of the vehicle.
5. Connect a mobile monitor antenna such as the Bearcat A-60 to the scanner. If necessary, the automotive antenna, extended about 18 inches, can be used with fair results.

## USER HINTS

Your scanner is a versatile instrument. The following operating hints will help you use all its features:

1. Always remember when programming, the **[E]** key must be depressed in order to enter the frequency desired.
2. Never turn the radio OFF by pulling the AC cord from the wall socket. Always turn the ON/OFF volume control OFF first, then disconnect the line cord when you must move the radio.
3. When memory is lost, it is corrected simply by reprogramming the desired frequencies.
4. When searching, a strong signal may cause the scanner to "lock-on" just prior to the actual frequency. (e.g. weather may be received on 162.545 rather than the correct frequency 162.550). This is easily corrected by pressing the Search button again.
5. This receiver has high noise immunity because of the quieting squelch system. However, in cases of strong interfering noise or signals, it may be desirable to reduce the length of the antenna to reduce noise pick-up below a critical level. This may be very effective in medium and strong signal areas.
6. When programming, be sure to press each key firmly in the center — this assures registering each desired number and avoid errors.
7. When moving or shipping the radio, remove the telescoping antenna to avoid damage to it or to the internal circuit assemblies.

## SERVICE

If your scanner does not seem to be functioning properly:

1. Refer to operating instructions to confirm that the proper procedure for operation has been followed.
2. Be sure the radio is plugged into a working ac outlet.
3. Is it turned ON?
4. Check that the telescoping antenna is properly installed.
5. If memory is lost after a power failure, check for a dead battery.
6. If "Error" appears on readout, you have entered an invalid frequency.
7. While using the single key-press Aircraft search, "image" interference from ham repeaters, cab dispatch, mobile telephone, etc. may stop search. This may be unavoidable in your area and does not indicate failure of the radio.
8. If it is then determined that the receiver requires servicing, refer to the warranty instructions enclosed with your unit for the proper repair facility.
9. When preparing the receiver for shipment, remove the telescoping antenna, batteries and ac power cord.
10. Pack the unit in its original packing carton and include a brief, concise description of the observed problem you are having along with your name, address, phone number and a copy of your purchase receipt.

## BIRDIES

All scanners using frequency synthesized circuits generate signals called "Birdies". Those signals may interfere with the search frequencies on your scanner. The BC 220FB is relatively free of this problem.

If during Search the receiver encounters a "birdie", the scan will most likely stop. In order to resume searching just press the Search button.

# NUMERICAL LISTING OF VHF MARINE RADIOTELEPHONE CHANNELS

CHANNEL	XMIT FREQUENCY (MHz)		AUTHORIZED TRAFFIC
	SHIP	COAST	
1	156.050	160.650	International Only
2	156.100	160.700	International Only
3	156.150	160.750	International Only
4	156.200	160.800	International Only
5	156.250	160.850	International Only
6	156.300		INTERSHIP SAFETY
7	156.350	160.950	International Only
7A	156.350	156.350	Commercial
8	156.400		Commercial
9	156.450	156.450	Commercial, Non-Commercial
10	156.500	156.500	Commercial
11	156.550	156.550	Commercial
12	156.600	156.600	Port Operations, USCG
13	156.650	156.650	Canals, Locks, Pifots
14	156.700	156.700	Port Operations, USCG
15		156.750	Environmental, Hydrographic
16	156.800	156.800	DISTRESS, SAFETY, & CALLING
17	156.850	156.850	Restricted, State Control
18	156.900	161.500	International Only
18A	156.900	156.900	Commercial
19	156.950	161.550	International Only
19A	156.950	156.950	Commercial
20	157.000	161.600	Port Operations
21	157.050	161.650	International Only
21CG	157.050	157.050	Restricted, USCG
22	157.100	161.700	International Only
22CG	157.100	157.100	Restricted, USCG
23	157.150	161.750	International Only
23CG	157.150	157.150	Restricted, USCG
24	157.200	161.800	Public Correspondence
25	157.250	161.850	Public Correspondence
26	157.300	161.900	Public Correspondence
27	157.350	161.950	Public Correspondence
28	157.400	162.000	Public Correspondence
29	157.450	157.450	International Only
60	156.025	160.625	International Only
61	156.075	160.675	International Only
62	156.125	160.725	International Only
63	156.175	160.775	International Only
64	156.225	160.825	International Only
65	156.275	160.875	International Only
65A	156.275	156.275	Port Operations
66	156.325	160.925	International Only
66A	156.325	156.325	Port Operations
67	156.375		Commercial
68	156.425	156.425	Non Commercial
69	156.475	156.475	Non Commercial
70	156.525		Non Commercial
71	156.575	156.575	Non Commercial
72	156.625		Non Commercial
73	156.675	156.675	Port Operations
74	156.725	156.725	Port Operations
75			GUARD CHANNEL, Unuseable
76			GUARD CHANNEL, Unuseable
77	156.875		Commercial
78	156.925	161.525	International Only
78A	156.925	156.925	Non-Commercial
79	156.975	161.575	International Only
79A	156.975	156.975	Commercial
80	157.025	161.625	International Only
80A	157.025	157.025	Commercial
81	157.075	161.675	International Only
82	157.125	161.725	International Only
83	157.175	161.775	International Only
83CG	157.175	157.175	USCG Auxiliary Only
84	157.225	161.825	Public Correspondence
85	157.275	161.875	Public Correspondence
86	157.325	161.925	Public Correspondence
87	157.375	161.975	Public Correspondence
88	157.425	162.025	International Only
89	157.475	157.475	Commercial

# AIRCRAFT FREQUENCIES

118.00 to 128.8      Air Traffic Control, at the field and up to 30 miles from major airports and includes:  
 Approach Control  
 Departure Control  
 Center  
 Tower  
 (ATIS) Automatic Terminal Information Service  
 Clearance Delivery  
 (majority of communications below 125.00)

### SPECIFIC FREQUENCIES WITHIN THE 118-135.975 RANGE:

121.5      National Aircraft Emergency

121.6 to 121.9      Ground Control of aircraft at major airports

121.975-122.675      General aviation aeronautical advisory stations and Air Traffic Control. Commonly called Flight Service Station (FSS)

122.0      Weather Advisory

123.6      FSS at airport with a tower

122.7 to 123.05      Unicom-Communications at General Aviation airports

122.90, 122.95      Air to Air Communications

123.1      Search and Rescue

123.175-123.575      Flight test.—manufacturers, etc.

123.3-123.5      Flight schools-instruction

126.2      Military Towers

128.825-132.00      Aeronautical Enroute Frequencies  
 Airlines communication with their companies

132.025-135.975      Air Traffic Control beyond 30 miles of major airport. Usually remote stations.

**NOTE:** Authorization and channels used may vary with locality. Check with local authorities for verification.