

*EXHIBIT E*  
SYSTEM MANUAL

microcast  
FX5 FM Broadcasting System - User Manual

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## FX5 FM BROADCASTING SYSTEM

### USER MANUAL

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#### 1.0 FCC Notice

FCC ID: XXXSDQSF5
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Model Number: FX5

Manufacturer: Microcast, Inc.

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.

## 1.1 Unpacking

Carefully unpack the shipping container. Use caution if using a razor knife to cut the packing tape, to prevent injury to yourself as well as the valuable contents of the shipping carton.

Your Microcast FX5 should include the following items:

FX5 FM Broadcasting System,  
AC Adapter for 120VAC 50/60hz  
Packing Slip  
Instruction Manual, and  
Additional options and accessories that you ordered that should be described on the packing slip.

If any of these items are missing, please contact your dealer as soon as possible. If you are unable to reach your dealer in a timely manner, please contact us directly at Microcast Customer Service at 1-702-641-9334.

## 2.0 Set Up

### 2.1 Connecting to Power

#### 2.1.1 Operation from 120VAC.

- 1.) For operation from AC power (ordinary house current) locate the AC Adapter enclosed in the small cardboard box (Approximately 3" x 3").
- 2.) Locate the small plug from the wired end of the AC adapter and insert it into the jack marked "DC INPUT" which is located on the rear panel of the FX5.
- 3.) Check to make sure that the "POWER" switch is in the OFF position. The power switch is also located on the back panel, adjacent to the "DC INPUT" jack.
- 4.) Plug the AC Adapter into a standard 120VAC wall receptacle.
- 5.) Flip the "POWER" switch to the "ON" position.

#### 2.1.2 Operation from 12VDC Automotive Power

- 1.) For operation in automotive applications, locate the Lighter Adapter. *This is an optional accessory. If you ordered it, you will find it in a clear plastic bag.*
- 2.) Locate the small plug from the wired end of the Lighter Adapter

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and insert it into the jack marked "DC INPUT" which is located on the rear panel of the FX5.

3.) Check to make sure that the "POWER" switch is in the OFF position. The power switch is located on the back panel, adjacent to the "DC INPUT" jack.

4.) Plug the Lighter Adapter into the vehicle's lighter receptacle.

5.) Flip the "POWER" switch to the "ON" position.

### **2.1.3 Operation from other sources of DC power.**

For operation using an adapter or other power source, (solar power, truck or train power, etc.) not supplied by Microcast, note the following precautions:

1.) The power plug is a 5.5mm X 2.1mm type.

2.) The "tip" or center pin of the power plug is "+", and must be connected to the positive lead of the power source.

3.) Accordingly, the "sleeve" or outer sheath is "-" and connects to the power source's negative lead.

**It is vitally important that no mistake is made here. Reverse polarized connections will most definitely cause the internal fuse to blow when the unit is powered on, and could result in damage to the FX5 under certain conditions.**

4.) **Maximum input to the FX5 unit is 16.5 volts DC.** Operation from sustained higher voltages or operation from un-rectified alternating current may cause the internal fuse to blow within a short time. Use a regulated or step down type DC converter to prevent overloading the power input to the FX5 if there is a chance that the DC input voltage could otherwise exceed 16.5 volts DC at any time. When possible, keep the DC input voltage in the range of 11.8 to 14.3V for most efficient and cool operation.

5.) Check to make sure that the "POWER" switch is in the OFF position when inserting the power plug into the FX5. The power switch is located on the back panel, adjacent to the "DC INPUT" jack.

6.) Flip the "POWER" switch to the "ON" position.

## 2.2 Connection of the FX5 to External Devices

### 2.2.1 "EXT MIC" External Microphone

The FX5 has a built in high quality microphone for live operation or for making recordings into the FX5's built in audio message repeater. However, higher quality sound may be achieved by the use of an external microphone. If higher quality is desired you may plug an external microphone into the rear panel jack marked "EXT MIC". This jack accepts a 2.5mm 3 conductor mini-plug.

A wide range of microphones may be used including dynamic and electret condenser types. Impedances in the range of 50 to 10,000 ohms (balanced) are best. Unbalanced microphones may also be used. The input supplies phantom power when operated using a balanced input.

### 2.2.1 "EXT MIC" External Microphone (Continued)

Microphones purchased at electronic retailers may be plugged directly into the "EXT MIC". If you plan to wire your own microphone plug, connect as described in the following table:

Table of Microphone Cable Connections	
1.)	The "tip" is the "+" input if balanced or "hot" if unbalanced type is used.
2.)	The "ring" is the "-" input if balanced or "ground" if unbalanced type is used. If single conductor/shielded type mic cable is used, there is no connection.
3.)	The "sleeve" is the common ground that connects to the braided shield of the microphone cable in both balanced and unbalanced type connection

The built in microphone is disabled when an external microphone is plugged into "EXT MIC".

### 2.2.2 "AUX IN", External Line Level Input

If you desire to broadcast a line level input from an external source such as;

- CD player;
- Minidisc player;
- Cassette tape deck;
- Reel to Reel tape deck
- DAT deck;
- Audio Mixer.

These and other line level audio playback devices may be connected via the "AUX IN" jack located on the rear panel of the FX5. "AUX IN" accepts a 3mm 3 conductor mini plug.

A stereo input is combined into mono without excessive loading of the external player in order to prevent distortion or loss of a stereo channel. This means that both the left and right channels will be heard on the air equally. Likewise, a monophonic input via 3mm 2 conductor plug may also be inserted into "AUX IN" and will provide the same audio quality as a stereo input.

**Special Considerations when using a Stereo Audio Cassette Deck**

Due to mechanical imperfections in many audio cassette decks a phenomenon known as phase cancellation may occur when playing a stereo program when the stereo channels are combined into mono. This phenomenon is heard as a "swishing" or loudness variation which affects primarily high audio frequencies when they are present in the played program material. It is caused by time differences between the left and right channels. A workable solution is to record the desired program material in mono and on only one channel of the cassette deck.

When an input is plugged into the "AUX IN" jack, both the internal and any connected external microphone is disabled.

### **2.2.3 "HEADPHONE/AUX OUT"**

Located on the back panel of the FX5, the "Headphone/Aux Output" is a low impedance, "stereo" compatible, line level output designed for driving all types of headphones and external line level devices. This output accepts either a 3 conductor "stereo" or 2 conductor "mono" 3mm mini plug. The output impedance is approximately 30 ohms / channel, and is sufficient to drive even 8 ohm dynamic headsets to respectable loudness. Other uses include driving of public address systems, "music on hold" inputs of commercial multi-line telephone systems and other audio inputs such as tape decks and computer sound boards.

The volume output is controlled by the "AUX OUT / SPEAKER VOLUME" control located on the rear panel just above the power input jack and switch.

The Headphone/Aux Output produces about 60 milliwatts per channel working into an 8 ohm load.

### **2.2.4 "AUXILIARY TRANSMITTER" Output Jack**

This is designed for connecting an external "NOMAD" transmitter. Use of an external NOMAD transmitter is desirable where both the advantages of increased coverage area of an outdoor mounted transmitter and the convenience of an indoor FX5 is required. Standard RJ45 cable terminated into RJ45 modular plugs is used to connect power and audio from the FX5 to the external NOMAD. Typically, the 'slave' NOMAD is set to the same operating frequency as the "master" FX5. This configuration gives the effect of increasing the coverage area to as much twice the area of a single transmitter. The maximum length of the RJ45 cable should be no more than 400 feet (125m) for best results.

Wiring of connectors should be non-inverting, that is connectors at both ends should have wire colors in like order when the connectors are held in the same orientation (both with locking tabs up).

## 3.0 Front Panel Set Up

### 3.1 Locating an Operating Frequency

Selection of the best possible operating frequency is the most important step in the operation of your micro power FM radio station. There are three primary factors to consider.

- 1.) Distance in channels from a strong FM station.
- 2.) Overall signal strength of licensed stations in the intended location of operation.
- 3.) The quality of the receiver used to receive your signal.

First of all, use a good quality receiver to monitor the FM band. The factory car radio installed in modern automobiles is the best in terms of selectivity and sensitivity. Scan the band at the intended operating location. Try to locate a frequency that has no interference on it. You'll know it by the constant hiss of "white noise". Avoid frequencies that are adjacent to strong stations, and when possible give the strong stations even a wider berth. For example; if you locate a strong station at say 106.7mhz, you would automatically disqualify operation at 106.7, and as well on adjacent channels 106.5 and 106.9. The reason for this is simple. Most receivers just don't have the selectivity to make the adjacent channels "clear". Modulation side bands will be heard on both the adjacent frequencies on virtually all consumer quality receivers. So in the above case, 106.3 and 107.1 would be the closest candidates to consider, given the strong station at 106.7. These are called "second-adjacent" channels.

The more distant your operating location is from the local "antenna farm", the central location from which the licensed broadcasters operate, the better your coverage radius will be. If you are within 2 miles of the antenna farm, expect 75 to 125 feet on a good frequency. At a distance of 10 miles, you can expect 200 to 300 feet, and in a rural or remote location, impressive distances of 1000 feet or more are possible. These kinds of coverage radii are based on reception on a car radio.

Reduced range should be expected on inexpensive headset radios, "boom boxes" or small portables. Carefully evaluate the operating environment in terms of the types of receivers likely to be used by your listeners. You may discover that one or more auxiliary transmitters is required in situations where inexpensive receivers are used or fixed obstacles (walls, hills, etc.) exist.

### 3.2 Setting the Operating Frequency

Once you have selected your frequency of operation use the "TUNING" buttons to set the transmitter to that frequency, as described below:

- 1.) Activate the transmitter by flipping the power switch (on back panel) to the ON position.
- 2.) Locate the "ON THE AIR" button and LED indicator on the front panel. Make sure the LED is off, if on press the "ON THE AIR" button to turn off the LED and the transmitted carrier. Frequency may not be adjusted with transmitter "ON THE AIR".
- 3.) Locate the "TUNING" buttons, marked "<" and ">". Select the desired operating frequency as you would on any digital receiver. Holding down either of these buttons will cause the frequency to decrease ("<") or increase (">") more rapidly the longer they are held down. Once the desired frequency is displayed on the LCD display, press the "ON THE AIR" button to engage the transmitter. The transmitter will change to the selected operating frequency within 10 seconds.

**NOTE: The ON THE AIR and TUNING controls affect only the transmitter installed in the FX5 unit. If an AUXILLIARY TRANSMITTER is used, it operates continuously unless deactivated by the POWER switch on the back panel of the FX5.**

### 3.3 Audio Controls, RECORD, PLAY, STOP, LISTEN and LIVE

#### 3.3.1 Audio Message Repeater

Your FX5 contains a 3 minute audio message repeater designed for recording and repetitive playback of messages. Messages are non-volatile, that is, they remain in memory regardless of whether or not the FX5 is plugged into a source of power, for a period approaching 100 years. Unless of course you change the message. To record a message:

- 1.) Press the RECORD and PLAY buttons. Both the red and green LEDs above the button will illuminate. Also notice the "FREQUENCY, MHZ /TR" LCD display is now showing the amount of recording Time Remaining.
- 2.) Press the LIVE button. The LED above the LIVE button will illuminate.
- 3.) Speak into the built in microphone located on the right side of the unit, off the front panel about midway up, or use the "EXT MIC" or "AUX IN" inputs on the back panel if you prefer. Recording levels and equalization are automatically optimized as you record or operate live, so there are never any controls to adjust. Observe your recording levels on the "PEAK MODULATION" display. As you can see, pretty much any speaking level will produce a good recording level, but for best quality try to stay within 12" of the microphone.
- 4.) When recording is completed, press STOP.



5.) To review your message press PLAY. A built in speaker may be activated by pressing the LISTEN button to hear your recorded message. However, **for the LISTEN mode to operate, the LIVE mode must be off.** This was done to prevent feedback from the built in speaker.

You may re-record your message as often as you like. There are no mechanical parts to wear out so re-recording and repetitive playback can occur for literally decades without any degradation of the audio quality of the message repeater.

The message repeater is primarily intended for voice recording and playback. It is not CD quality, but is broadcast quality. If higher audio quality or a message length longer than 3 minutes is required, an external CD player may be connected via AUX IN. A custom CD may be recorded using a CD-R installed in a PC. You can then select the "repeat" mode on the CD player. Audio quality as good or better than licensed commercial stations may be achieved.

**Remember that LIVE must be activated anytime a recording is made into the message repeater or when you are using an external input such as a microphone, CD or audio mixer to modulate the transmitter**

### 3.4 Storing of Front Panel Settings

In most instances it is desirable to store the front panel set up of your FX5. This means that if power is interrupted to the FX5 for any reason, that once restored, the transmitter will return to the same frequency, be on the air, and once again return to play or live mode, as selected before power went off. This can eliminate costly service calls or telephone support to end users. To store panel settings:

- 1.) Make sure the unit is fully in the intended modes of operation.
- 2.) While holding down the RECORD button press the ON THE AIR button. To verify storage of the front panel set up, turn the POWER switch to OFF. Wait several seconds, then turn the POWER switch back to ON position. Note that the front panel settings return to the stored values.

### 4.0 Customer Support

Your dealer may assist you in resolving more common technical issues that may come up. They are your first line of support. Your dealer will contact us when they are unable to resolve any problem and we in turn will either resolve the matter with dealer or contact you directly.

## 5.0 Warranty

To insure activation of your One Year Conditional Warranty, please mail the following warranty card on the next page (or a copy) to address below. You may also fax it to (702) 457-6376.

**MICROCAST INC.**  
2689 Prairie Dunes Drive  
Las Vegas, NV 89122-2728

Your Microcast FX5 unit is guaranteed free from workmanship and manufacturing defects for a period of ONE YEAR from date of purchase. Upon notice from the customer, Microcast will repair or replace this device at it's sole discretion in a timely fashion but is subject to the following exclusions; 1.) Physical damage resulting from accidental or intentional acts or negligence 2.) Damage resulting from the operation of this device using any power supply other than the type supplied with the unit, 3.) Attempted repair and/or modification of the electronics or antenna in any way. Microcast, Inc. shall in no case have any obligation to any remedy or damage liability beyond the repair or the replacement of said device at it's sole discretion.

## 5.1 Warranty Form

Please fill out and return. We will send you confirmation or receipt by return mail

**MICROCAST INC.**  
2689 Prairie Dunes Drive  
Las Vegas, NV 89122-2728

Or fax to: (702) 457-6376.

Name
Address
Phone
Fax (optional)
Email (optional)
Date of Purchase
Dealer Name / City / State

FX5 04/06/98 rev. Beta