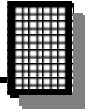


# 88-108MHZ 1 WATT POWER BOOSTER

**Ramsey Electronics Model No. FM100BEX**

*Give your FM100B the power to crush the competition! This 1 Watt booster configuration especially designed for the FM100B brings the standard output of 25 mW up to more than 1 Watt! That's enough power to drive a professional power amplifier or to cover the neighborhood with a solid Hi-Fidelity signal.*

- **Over 1 Watt of high power RF output; significantly increases transmission distances of the FM100B**
- **More than 30 dB of RF gain**
- **All components mount directly on original circuit board!**
- **Runs from internal power supply of the FM100B**
- **Clean, low-noise RF output**
- **Works great with the Ramsey FM100 Tru-Match or FMA200 Colinear antennas!**
- **Easy to assemble and no adjustments necessary!**



### RAMSEY TRANSMITTER KITS

- FM100B Professional FM Stereo Transmitter
- FM25B Synthesized Stereo FM Transmitter
- MR6 Model Rocket Tracking Transmitter
- TV6 Television Transmitter

### RAMSEY RECEIVER KITS

- FR1 FM Broadcast Receiver
- AR1 Aircraft Band Receiver
- SR2 Shortwave Receiver
- SC1 Shortwave Converter

### RAMSEY HOBBY KITS

- SG7 Personal Speed Radar
- SS70A Speech Scrambler
- BS1 "Bullshooter" Digital Voice Storage Unit
- AVS10 Automatic Sequential Video Switcher
- WCT20 Cable Wizard Cable Tracer
- LABC1 Lead Acid Battery Charger
- IG7 Ion Generator
- CT255 Compu Temp Digital Binary Thermometer
- LC1 Inductance-Capacitance Meter



### RAMSEY AMATEUR RADIO KITS

- DDF1 Doppler Direction Finder
- HR Series HF All Mode Receivers
- QRP Series HF CW Transmitters
- CW700 Micro Memory CW Keyer
- CPO3 Code Practice Oscillator
- QRP Power Amplifiers

### RAMSEY MINI-KITS

Many other kits are available for hobby, school, Scouts and just plain FUN. New kits are always under development. Write or call for our free Ramsey catalog.

FM100BEX POWER BOOSTER INSTRUCTION MANUAL  
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## KIT ASSEMBLY AND INSTRUCTION MANUAL FOR

# FM100BEX 1 WATT 88-108 MHz AMPLIFIER

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**WARNING!** This product is for export use outside of the USA only! FCC rules and regulations inside of the USA don't allow for transmissions of the power that this product can provide without appropriate licenses. To order your copy of FCC rules part 15, call the US Government, Superintendent of Documents, at 202-512-3238, or fax at 202-512-2250. To order the correct document, ask for "CFR Title 17: Parts 1 to 19." The cost is about \$30.00, Master Card and Visa accepted.



## **INTRODUCTION TO THE FM100BEX**

At Ramsey Electronics we are constantly bombarded with the age old question “How do I get MORE POWER out of my FM100B”? For those loyal customers who want to obtain a greater coverage area, the FM100BEX modification does it all. This high quality booster takes the normally low-level RF signal (about 25 mW) from the FM100B and boosts it up to over one watt! Of course since the FCC (in the US) does not tolerate this sort of RF level being transmitted without the appropriate licenses, this kit is only legally used as an export item.

## **CIRCUIT DESCRIPTION**

Even though there are only a few parts. The FM100BEX modification will give you about a 30 dB increase in the output level of your FM100B!

The adjustable low level RF signal from U6 is fed through C65 to couple off the DC bias voltage of the GAL5. Swamping R64 and L1 ensure proper biasing for class C operation of Q6. This NPN silicon power transistor is rated for 1.5 watts and has long been touted as an industry workhorse.

Inductor L2 provides a low impedance DC path for power, while preventing the RF from re-entering the power source. R50 lowers the Q of L2, preventing the components tied to the collector from resonating at some other frequency than what we want. This allows the amplifier to have a greater bandwidth capability.

The final filtering stage needed to suppress any harmonic output from the amplifier stage is already built as part of the standard FM100B. Could it get any easier?!

Let's build up this section and get on the air!

## **FM100BEX PARTS LIST**

### **Semiconductors**

- 1 MRF557 NPN UHF Transistor (4-pin flat pack) (Q6)

### **Resistors**

- 1 220 ohm resistor (red-red-brown) (R50)
- 1 270 ohm resistor (red-violet-brown) (R64)

### **Inductors**

- 1 LK200 ferrite core (L2)
- 1 1.5 uH inductor (L6)  
(looks like a resistor, brown-green-gold with green body)

### **Miscellaneous**

- 1 6" piece of #28 AWG Buss wire to wind L2
- 1 Copper bar heat sink. (HS1)

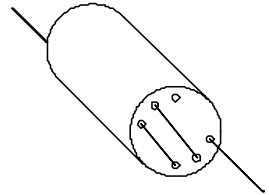
### **Other Equipment (Not included)**

- 1 Pencil type soldering iron (30-40 Watts) Don't use a solder gun!
- 1 Mini-torch (used only to pre-heat HS1 heat sink)
- 1 Roll of fine 60/40 solder (less than .045" diameter)

## FM100BEX ASSEMBLY

If you purchased the high power version of the FM100B as an export model for overseas operation, a predrilled hole has been provided for Q6 to mount on the circuit board. If you are upgrading your FM100B that you already built, you'll need to drill out the center hole labeled Q6 with a #2 drill bit (0.221"). The rest of the parts provided with this modification kit have pre-designated positions on the main board of the FM100B already.

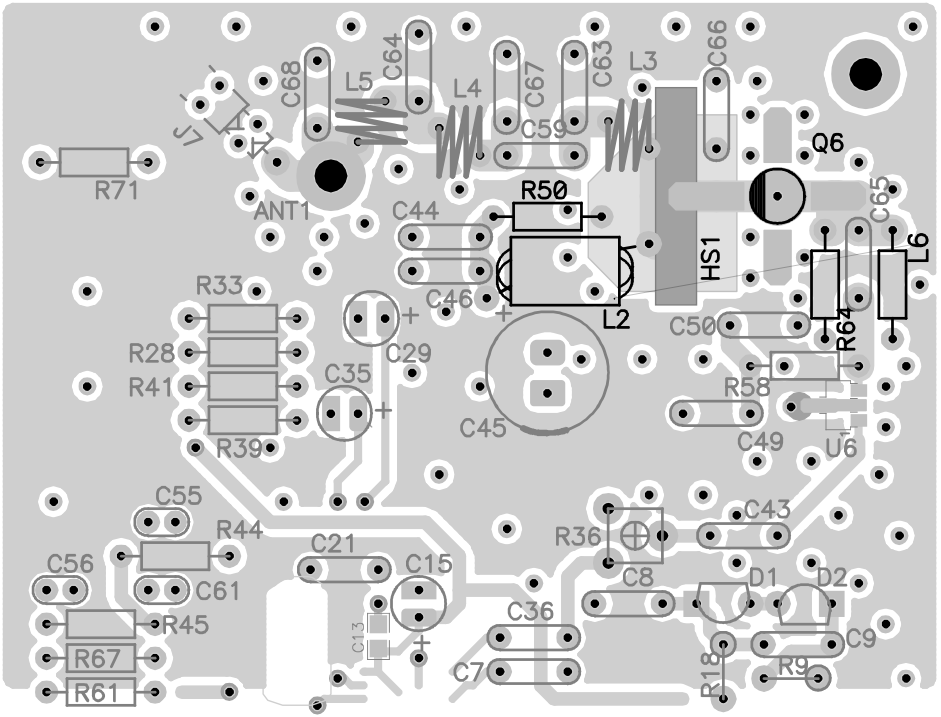
- 1EX. Install L6, a 1.5 uH inductor. It looks a lot like a resistor only it is green. (brown-green-gold-silver).
- 2EX. Install R64, a 270 ohm resistor (red-violet-brown).
- 3EX. Install R50, a 220 ohm resistor (red-red-brown).
- 4EX. Using the ferrite bead and the #28 AWG Buss wire, wind the wire through five of the holes. The ends of the wire should be on opposite ends of the core.
- 5EX. Trim the ends to an appropriate length and tin each end before attempting to solder it in the board.
- 6EX. Install L2, the custom wound coil you just made. Note the holes that the leads of this inductor should be solder in to. The leads should be on opposite ends of the core. Look at the silkscreen on the board for verification.
- 7EX. Make sure the hole for Q6 has been fully drilled out. Make certain that there are no residual rings from the original traces left on either side of the circuit board. This provides room for Q6 to be mounted flush to the board.
- 8EX. Install Q6, an MRF557 transistor. It should be mounted text side up, with the wide collector lead pointing in the direction of L2. Triple-check the orientation before soldering it into place.



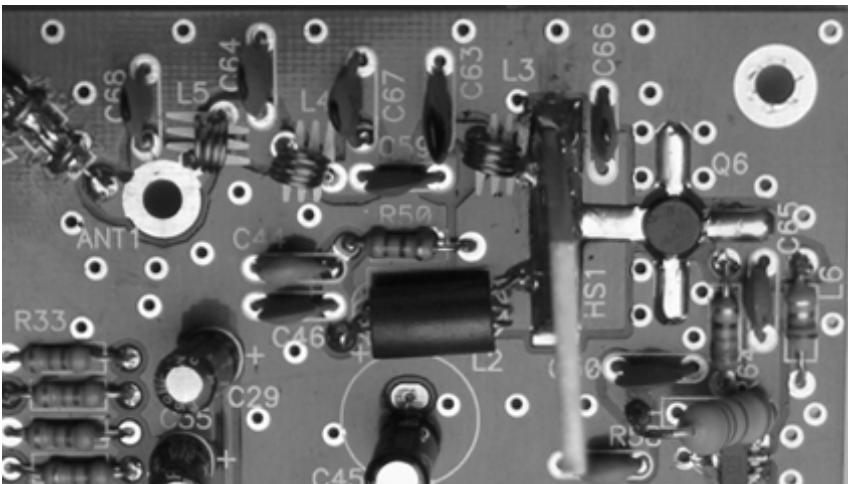
Crank your soldering iron up to its highest level, you will need plenty of heat for this next operation. We are going to apply solder to one end of the provided copper bar (HS1) in order to tin the junction area. (Pre-heating the copper bar with a small mini-torch can speed things up. Do not try to solder the bar in place with a torch however! You will destroy the circuit board and void your warranty.)

- 9EX. Hold the soldering iron to one end of the copper bar and apply solder until it begins to melt to the copper. Once hot enough, use a pair of needle-nose pliers to pick up the copper bar and solder the tinned end to the pad labeled HS1 on the silkscreen (just off the collector of Q6). Hold it in place with the pliers until the solder cools.
- 10EX. Inspect the joint and add solder with using your iron if needed.

## PARTS LAYOUT DIAGRAM



## HIGH POWER PARTS CLOSE-UP PICTURE







## **FINAL TESTING AND CALIBRATION AMENDMENTS**

Testing your FM100BEX is almost exactly the same as shown in the standard FM100B manual. The only major differences are with your initial power settings and the antenna connection. (NOTE: Never use the standard whip antenna included with the FM100B series transmitters with your FM100BEX. It is not rated for the higher power capability of the export unit.)

- [1] Before following the standard instructions to calibrate the system, make sure you turn the RF power setting pot (R36) fully CCW for minimum power output.
- [2] Connect a suitable antenna to the RF output ('F' style connector) capable of handling a few watts in the 88 to 108 MHz band.

Follow the standard alignment instructions. R36 should be set at about the 3/4 turn position for 1 Watt of RF output.

## **TROUBLESHOOTING**

PROBLEM: Nothing happens at all when I turn it on.

SOLUTION: Check your fuse. If it is blown you will want to check for any possible direct shorts to ground near the amplifier stage you just installed.

PROBLEM: Everything works, but I only a few feet of transmitting distance.

SOLUTION: Again check for any possible shorts near the RF amplifier. If HS1 is shifted too far to one side or the other it may be shorting your RF output to ground.

## **FM100BEX SPECIFICATIONS**

AC power input:	85 - 264 VAC (47 - 63 Hz) @ 1 Amp
Frequency coverage:	88.0 -108.0 MHz
Frequency steps:	100 kHz
Bandwidth:	+/- 75 kHz with built-in limiter
Broadcast modes:	Stereo / Mono
Pre-emphasis:	50 usec (Europe) / 75 usec (U.S.) selectable
Audio input:	1 V p-p (line level), 2 channels, RCA connectors
Microphone input:	mono 3.5 mm mic
Monitor output:	1 V p-p (line level)
RF output:	adjustable .5 uW to over 1 W F style RF output connector
Dimensions:	9.5" L x 6.0" W x 4.0" H
Weight:	3.7 lbs.

## **The Ramsey Kit Warranty**

**Please read carefully BEFORE calling or writing in about your kit. Most problems can be solved without contacting the factory.**

Notice that this is not a "fine print" warranty. We want you to understand your rights and ours too! All Ramsey kits will work if assembled properly. The very fact that your kit includes this new manual is your assurance that a team of knowledgeable people have field-tested several "copies" of this kit straight from the Ramsey Inventory. If you need help, please read through your manual carefully. All information required to properly build and test your kit is contained within the pages!

**1. DEFECTIVE PARTS:** It's always easy to blame a part for a problem in your kit, Before you conclude that a part may be bad, thoroughly check your work. Today's semiconductors and passive components have reached incredibly high reliability levels, and it's sad to say that our human construction skills have not! But on rare occasions a sour component can slip through. All our kit parts carry the Ramsey Electronics Warranty that they are free from defects for a full ninety (90) days from the date of purchase. Defective parts will be replaced promptly at our expense. If you suspect any part to be defective, please mail it to our factory for testing and replacement. Please send only the defective part(s), not the entire kit. The part(s) MUST be returned to us in suitable condition for testing. Please be aware that testing can usually determine if the part was truly defective or damaged by assembly or usage. Don't be afraid of telling us that you 'blew-it', we're all human and in most cases, replacement parts are very reasonably priced.

**2. MISSING PARTS:** Before assuming a part value is incorrect, check the parts listing carefully to see if it is a critical value such as a specific coil or IC, or whether a RANGE of values is suitable (such as "100 to 500 uF"). Often times, common sense will solve a mysterious missing part problem. If you're missing five 10K ohm resistors and received five extra 1K resistors, you can pretty much be assured that the '1K ohm' resistors are actually the 'missing' 10 K parts ("Hum-m-m, I guess the 'red' band really does look orange!") Ramsey Electronics project kits are packed with pride in the USA. If you believe we packed an incorrect part or omitted a part clearly indicated in your assembly manual as supplied with the basic kit by Ramsey, please write or call us with information on the part you need and proof of kit purchase.

### **3. FACTORY REPAIR OF ASSEMBLED KITS:**

To qualify for Ramsey Electronics factory repair, kits MUST:

1. NOT be assembled with acid core solder or flux.
2. NOT be modified in any manner.
3. BE returned in fully-assembled form, not partially assembled.
4. BE accompanied by the proper repair fee. No repair will be undertaken until we have received the MINIMUM repair fee (1 hour labor) of \$50.00, or authorization to charge it to your credit card account.
5. INCLUDE a description of the problem and legible return address. DO NOT send a separate letter; include all correspondence with the unit. Please do not include your own hardware such as non-Ramsey cabinets, knobs, cables, external battery packs and the like. Ramsey Electronics, Inc., reserves the right to refuse repair on ANY item in which we find excessive problems or damage due to construction methods. To assist customers in such situations, Ramsey Electronics, Inc., reserves the right to solve their needs on a case-by-case basis.

The repair is \$50.00 per hour, regardless of the cost of the kit. Please understand that our technicians are not volunteers and that set-up, testing, diagnosis, repair and repacking and paperwork can take nearly an hour of paid employee time on even a simple kit. Of course, if we find that a part was defective in manufacture, there will be no charge to repair your kit (But please realize that our technicians know the difference between a defective part and parts burned out or damaged through improper use or assembly).

**4. REFUNDS:** You are given ten (10) days to examine our products. If you are not satisfied, you may return your unassembled kit with all the parts and instructions and proof of purchase to the factory for a full refund. The return package should be packed securely. Insurance is recommended. Please do not cause needless delays, read all information carefully.

**FM100BEX 1 WATT 88-108 MHz AMPLIFIER**  
**Quick Reference Guide**

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**REQUIRED TOOLS**

- Soldering Iron                      Ramsey WLC100,
- Thin Rosin Core Solder        Ramsey RTS12
- Needle Nose Pliers              Ramsey RTS05
- Small Diagonal Cutters        Ramsey RTS04  
<OR> Complete Soldering Tool Set RS64-2801

**ADDITIONAL SUGGESTED ITEMS**

- Optivisor Magnifier Headband        Ramsey OPMAG
- Helping Hands Holder for PC Board/Parts Ramsey HH3
- Desoldering Braid                      Ramsey RTS08

Price: \$10.00

Ramsey Publication No. MFM100BEX

Assembly and Instruction manual for:

**RAMSEY MODEL NO. FM100BEX**



<b><u>TOTAL SOLDER POINTS</u></b>
13
<b><u>ESTIMATED ASSEMBLY TIME</u></b>
Beginner .....20 min
Intermediate .....15 min
Advanced .....10 min