# Blinky Eyes
# Animated Display

## Ramsey Electronics Model No.    BE66

*A super eye-catching display that is sure to attract attention. Microcontroller selects from different animations for startling or scary displays. Perfect for costumes, window displays or even your Halloween pumpkin!*

- **66 bright LEDs form two cat eyes.**

- **Lights make the eyes blink and wink.**

- **4 different modes for different blinking patterns.**

- **Runs on 9V DC.**

- **Light sensor adjusts the LED brightness for daytime or nighttime operation.**

- **Easy to build, great kit for beginners.**
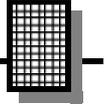
## *PARTIAL LIST OF AVAILABLE KITS:*

**RAMSEY TRANSMITTER KITS**
- **FM10A, FM25B FM Stereo Transmitters**
- **FM100B Professional FM Stereo Transmitter**
- **AM1, AM25 Transmitters**

**RAMSEY RECEIVER KITS**
- **FR1 FM Broadcast Receiver**
- **AR1 Aircraft Band Receiver**
- **SR2 Shortwave Receiver**
- **AA7 Active Antenna**
- **SC1 Shortwave Converter**

**RAMSEY HOBBY KITS**
- **SG7 Personal Speed Radar**
- **SS70A Speech Scrambler/Descrambler**
- **TT1 Telephone Recorder**
- **LEDS1 LED Strobe**
- **MD3 Microwave Motion Detector**
- **WEB1 Walking Electronic Bug**
- **TFM3 Tri-Field Meter**

**RAMSEY AMATEUR RADIO KITS**
- **HR Series HF All Mode Receivers**
- **DDF1 Doppler Direction Finder Kit**
- **QRP Series HF CW Transmitters**
- **CW7 CW Keyer**
- **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.**
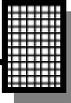
BE66 Blinky Eyes Animated Display
Ramsey Electronics publication No. BE66 Rev. 1.2
November 2003

## KIT ASSEMBLY
# AND INSTRUCTION MANUAL FOR

# Blinky Eyes Animated Display

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## INTRODUCTION

This may be the ultimate blinky kit! The BE66 makes a really great eye-popping display for a window or can be used as a conversation piece. It's made up of 66 LEDs. The irises are made up of 22 yellow LEDs and the rest are composed of 44 orange LEDs. Depending on which of these babies are lit, the eyes can look like they are blinking or winking. They can also display all kinds of other funky patterns like twirling pinwheels and flashing dots. The patterns constantly change and there are four modes to select which types are displayed. In addition, there is an output to drive an optional motor so as the eyes are winking and blinking, a motor will buzz intermittently and freak people out. The BE66 runs on a 9VDC adaptor.

## BE66 CIRCUIT DESCRIPTION

The BE66 is pretty simple electrically thanks to its microprocessor based design. For those of you who are not embedded programmers, don't be alarmed. You will not be required to do any programming for this kit. The basic design consists of the microprocessor, the display chip, and a whole bunch of LEDs. The microprocessor is the Motorola 68HRC908, a low cost but powerful little computer-on-a-chip. It generates all the instructions that tell the display chip how to create the neat patterns that you see. The display chip is the MAX7219CNG. That number probably doesn't ring a bell with any of you so I will explain what the chip does. It is a specialty part designed to drive 7-segment displays like those in a digital alarm clock, but It will also drive individual LEDs in any old way the circuit designer wants, which is how it is used in this kit. Aside from the LEDs and 2 ICs, the rest of the parts on the board compose the power supply and support components for the microprocessor and display chip.

## RAMSEY Learn-As-You-Build KIT ASSEMBLY

While there aren't that many solder connections on the BE66 printed circuit board, you should still practice good soldering techniques.

- Use a 25-watt soldering pencil with a clean, sharp tip.
- Use only rosin-core solder intended for electronics use.
- Use bright lighting; a magnifying lamp or bench-style magnifier may be helpful.
- Do your work in stages, taking breaks to check your work. Carefully brush away wire cuttings so they don't lodge between solder connections.

We have a two-fold "strategy" for the order of the following kit assembly steps. First, we install parts in physical relationship to each other, so there's minimal chance of inserting wires into wrong holes. Second, whenever possible, we install in an order that fits our "Learn-As-You Build" Kit building philosophy. This entails describing the circuit that you are building instead of just blindly installing components. We hope that this will not only make assembly of our kits easier, but help you to understand the circuit you're constructing.

For each part, our word "Install" always means these steps:

      1. Pick the correct part value to start with.

      2. Insert it into the correct PC board location.

      3. Orient it correctly, follow the PC board drawing and the written directions for all parts - especially when there's a right way and a wrong way to solder it in. (Diode bands, electrolytic capacitor polarity, transistor shapes, dotted or notched ends of IC's, and so forth.)

      4. Solder all connections unless directed otherwise. Use enough heat and solder flow for clean, shiny, completed connections.

## **BE66 PARTS  LIST**

Sort and "check off" the components in the boxes provided. We do our best to pack all our kits correctly but it is *possible* that a mistake has occurred and we missed a part. Please note that physical descriptions of parts are for those currently being shipped. Sometimes the parts in your kit may have a different appearance but still have the same values.


## RESISTORS

- ☐  1  100 ohm resistor (R2)
- ☐  2  220 ohm resistors [red-red-brown] (R4,R5)
- ☐  2  1K ohm resistor [brown-black-red] (R3,R9)
- ☐  1  4.7K ohm resistor [yellow-violet-red] (R1)
- ☐  3  10K ohm resistors (R7,R8,R10)


## CAPACITORS

- ☐  2  10 uF electrolytic capacitors (C2,C8)
- ☐  4  .01 uF ceramic disk capacitors[marked 103] (C3,C5,C6,C7)
- ☐  1  10pF ceramic disk capacitor [marked 10] (C4)
- ☐  1  1000uF electrolytic capacitor  (C1)

## SEMICONDUCTORS

- ☐  1  MC68HRC908JK3CP microprocessor [20 pin IC with paper label] (U2)
- ☐  2  1N4002 diode (D17,D68)
- ☐  1  7805 voltage regulator (VR1)
- ☐  1  MAX7219CNG 8 digit display driver (U1)
- ☐  1  BS170 power MOSFET (Q1)
- ☐  1  CDS photocell (CDS1)
- ☐  22 yellow super bright LEDs
- ☐  44 orange super bright LEDs

## MISCELLANEOUS

- ☐  1  20 pin IC socket for U2
- ☐  1  power jack (J1)
- ☐  2  3 pin jumper block headers (J2)
- ☐  2  2 pin jumper block headers (J3)
- ☐  5  jumper blocks
- ☐  1  #4-40 1/4" machine screw with tooth washer
- ☐  1  #4-40 nut

## BE66 PC BOARD ASSEMBLY STEPS

☐ 1. Take a look at the layout diagram. Let's start with the boring part first, and save the cool part for last. Go down to the lower left hand corner of the board. The "bottom" is the edge with the Ramsey Electronics label. Install J1, power jack, where the fun begins.

☐ 2. Next, install D17, 1N4002 diode. Be sure to observe polarity. The band on the diode must line up with the band on the board drawing.

☐ 3. Install C1, 1000uF electrolytic capacitor. Watch polarity with this part also. Make sure the "-" band is in the correct place, that is, not in the "+" spot. This is the biggest cap in the kit.

☐ 4. Install C2, 10uF electrolytic capacitor, next to C1.

☐ 5. Install VR1, voltage regulator. Put the part's pins through the board and bend it back so that the part lies flat and square on the metal area of the circuit board. This is so heat can flow out of the part and into the circuit board, instead of up into the air or into your finger: "Tsss, AHHHH!!". Now go ahead and attach the part to the board using the supplied screw and nut.
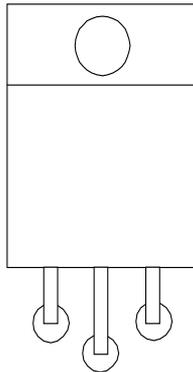


☐ 6. Install J3, the 2 pin header next to VR1.

☐ 7. Install D68, 1N4002 diode, above J3. Observe polarity again.

☐ 8. Install Q1, BS170 transistor [marked BS170]. Make sure it goes in the right  way. The flat spot should face towards the right of the board.

☐ 9. Install C6, .01uF ceramic disk capacitor [marked 103], to the right of Q1.

☐ 10. Install CDS1, cadmium sulfide photocell, on the BACK of the board, under C6. This is the light sensor that causes the LEDs to be brighter or dimmer depending on the amount of light in the room. If the room is bright, the LEDs get brighter, if it's dark, they get dimmer. The sensor goes on the back because if it was on the front the LEDs would shine light into and cause the microprocessor to think that the room was bright. It would then set the LEDs to maximum brightness. The cds cell doesn't have polarity; it is like a resistor.

☐ 11. Install J2, 2 3 pin header blocks, to the right of CDS1. You'll have to install these and then use a couple of jumper blocks to get them in the right position. I recommend using a jumper block on each end to get the spacing exactly right. When you're sure they line up, solder them in place.

☐ 12. Install R7, R8, and R10. 10K ohm resistors [brown-black-orange] vertical style, under J2.

☐ 13. Install C3, .01 uF capacitor [marked 103], next to J2.

☐ 14. Install 20 pin socket for U2. Be sure that all the pins are through the board before soldering. Then install U2, MC68HRC908JK3CP microprocessor. Make sure it goes in the right way. The notch on the board drawing lines up with the notch on the top of the IC. Be sure that all pins slip into the socket and none are bent under or poking over the edge.

☐ 15. Install R3, 1K ohm resistor [brown-black-red], next to U2.

☐ 16. Install C7, .01uF ceramic disk capacitor [marked 103], next to R3.

☐ 17. Install C4, 10pF ceramic capacitor [marked 10], above U2.

☐ 18. Install R1, 4.7K ohm resistor [yellow-violet-red], above C4.

☐ 19. Install R4, 220 ohm resistor [red-red-brown], above U2.

☐ 20. Install R5, 220 ohm resistor [red-red-brown], above R4.

☐ 21. Install U1, MAX7219CNG 8 digit display driver IC [marked, oh who cares, it's the only IC left], above R5. Make sure that it is aligned correctly, with the notch and all.

☐ 22. Now you come to J4. Just leave this out. This is something that may be used in a future version of this kit; it doesn't do anything at this point in time.

☐ 23. Install C8, 10uF electrolytic capacitor, above J4. Make sure to watch the polarity again.

☐ 24. Install R9, 1K ohm resistor [brown-black-red], next to C8.

# BE66 BOARD PARTS LAYOUT DIAGRAM
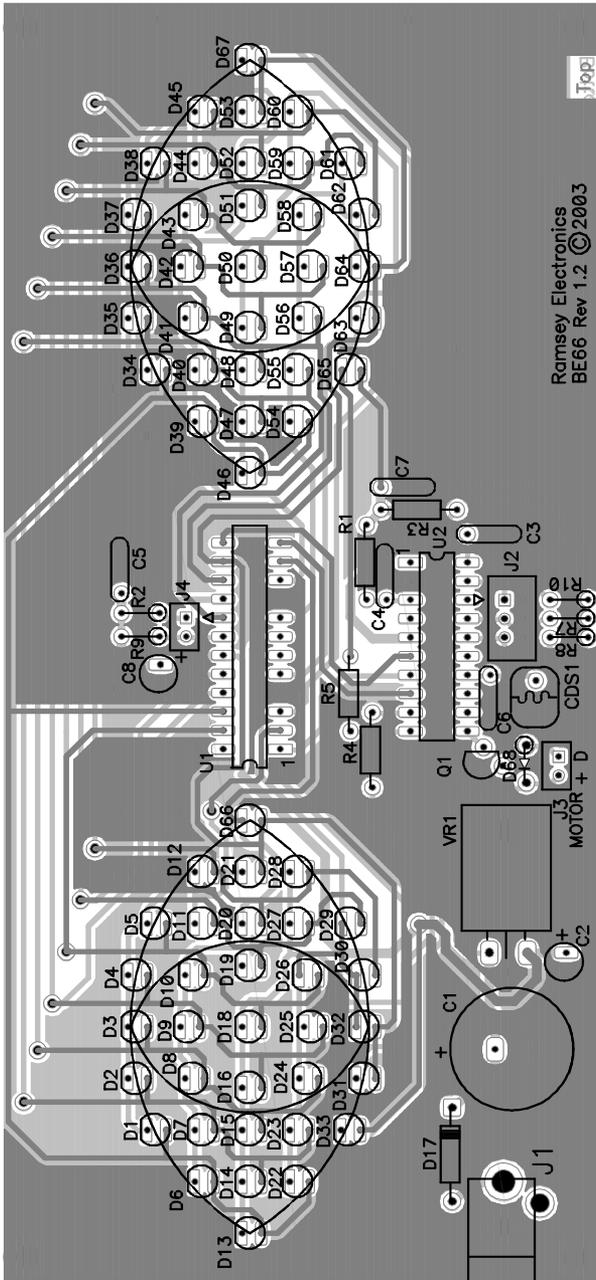
# BE66 MAIN BOARD SCHEMATIC

☐ 25. Install R2, 100 ohm resistor [brown-black-brown], next to R9.

☐ 26. Install C5, .01uF ceramic disk capacitor, next to R2.

Okay, enough of this boring stuff, now lets get on with the fun stuff: LEDs!!

☐ 27. Well, there are 66 LEDs, 22 yellows and 44 oranges. You need to solder the yellows in the irises of the eyes and the oranges in the rest of the eye. For reference the irises are: D3,D8,D9,D10,D16,D18,D19,D24,D25, D26,D32 in the left eye and D36,D41,D42,D43,D49,D50,D51,D56,D57, D58,D64 in the right eye. Its easiest to just go by the board drawing. It doesn't really matter which LEDs you solder in first. Make sure the polarity is right. The flat sides, or cathode sides, should all point to the top of the board. The flat side also corresponds to the shorter lead so orient those toward the top as well. Whichever way of looking at the parts makes more sense to you and gets you to place them correctly is the one to use!

Alright, we're finished. Let's turn it on!

## SETUP AND TESTING

Plug a 9VDC adapter into the power jack and stand in awe of the wonderful LED display! Once your awe has partially subsided, it is time to test the different modes. The different modes are selected by means of jumper block J2. To select a mode, push a little black jumper block across a pair of pins. There are four blinking modes and a CDS cell mode select. The CDS cell mode changes the way the kit responds to room light. With a block in place on the rightmost spot, the BE66 is in on/off mode. It will come on when it is dark, and turn off when it's light. Without the jumper block in the BE66 is in dimmer mode. In this mode the LEDs brighten and dim depending on the room light. They get brighter when the room is brighter and dimmer when the room is darker. The blink modes are selected in the same way. A jumper block in the left spot selects the "mostly off' mode. In this mode, the LED eyes are off most of the time and every once in a while turn on and display a pattern. This mode might be good for a sudden surprise if the kit is hidden somewhere that no one will see it until the lights suddenly come on. With a jumper block in the middle spot, the "random" mode is selected. This mode generates continuously changing random patterns. It is probably the most eye catching mode. When the "mostly off" and "random" blocks are both in, the "mostly on" mode is enabled. In this mode, the LEDs are all lit most of the time and every once in a while a pattern will be displayed. It's pretty much the opposite of the "mostly off" mode. The last mode is the "fire" mode. Those of you who have built Ramsey kits before, must not laugh at this; it doesn't mean that your kit blows up. It means that the LEDs all twinkle rapidly creating a kind of firelight effect. This is especially true if you let the light from the kit shine on a wall or in a pumpkin. To get this mode leave out the "mostly off" and "random" blocks. Play around and see which mode you like best.

Another option you have with your kit is to connect a small motor to J3. The motor will turn on randomly at varying times and could be used to add a scary feature to your kit. The motor could be used to twirl something or hit against a can to make noise. Your motor should take 9V and 300mA or so. If Q1 gets hot when you run your motor, that means it's drawing too much power. You may need to add a series resistor to limit the current. Your adapter should supply at least 500mA of current.

One last note: in order to reset your kit, unplug and plug the power adapter back in after you change the jumper settings.

## Jumper Block

**Mostly Off**     **Random**     **CDS Light Mode**
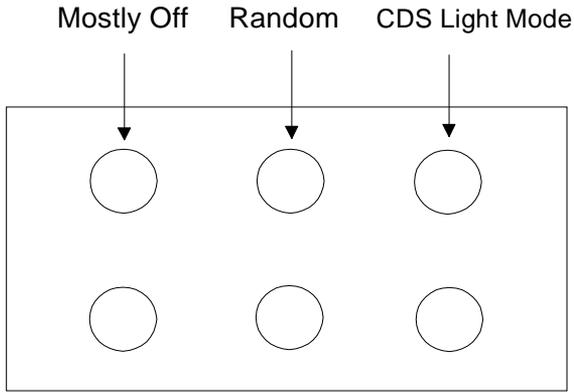
## TROUBLESHOOTING GUIDE

Well, there aren't too many different kinds of parts, so there aren't too many ways to mess up. If an LED doesn't ever light, it's probably in backwards. It is mondo importanto that the ICs are in the right way. Finally, check D17 and the electrolytic capacitors to make sure they ended up being installed correctly.

## CONCLUSION

We sincerely hope that you will enjoy the use of this Ramsey product. As always, we have tried to compose our manual in the easiest, most "user friendly" format that is possible. As our customers, we value your opinions, comments, and additions that you would like to see in future publications. Please submit comments or ideas to:

Ramsey Electronics Inc.
Attn. Hobby Kit  Department
590 Fishers Station Drive
Victor, NY 14564

or email us at:  techsupport@ramseymail.com

And once again, thanks from the folks at Ramsey!

# *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! However, customer satisfaction is our goal, so in the event that you do have a problem, take note of the following.

**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 its 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 (1/2 hour labor) of $25.00, 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.

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## REQUIRED TOOLS

- Soldering Iron (WLC100)
- Thin Rosin Core Solder (RTS12)
- Needle Nose Pliers (MPP4 or RTS05)
- Small Diagonal Cutters (RTS04)

## ADDITIONAL SUGGESTED ITEMS

- Helping Hands Holder for PC Board/Parts (HH3)
- Technician's Tool Kit (TK405)
- Desoldering Braid (RTS08)

## TOTAL SOLDER POINTS
### 240
## ESTIMATED ASSEMBLY TIME

**Beginner ............... 3 hrs**
**Intermediate ......... 2 hrs**
**Advanced ............. .1.5 min**

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