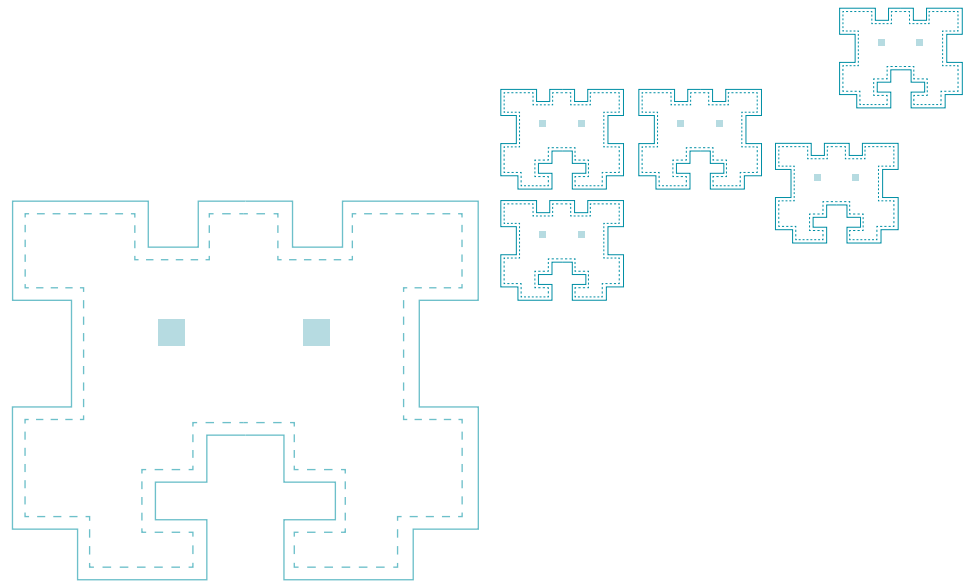




SPACE INVADERS TOTE



Accessorized with a handmade Space Invaders Tote for an evening shindig, you will never miss a call again. Whether you're out in crowded loud bar or trying to be discrete at a friend's poetry reading, the Space Invaders Tote provides an ambient light signal letting you know that someone is trying to reach you.

HOW IT WORKS »

The Space Invaders are sensitive to the electromagnetic waves of mobile phones. When in close proximity to a mobile phone, the Space Invader is energized by an incoming call and its LED eyes begin to twinkle.



COMPLEXITY: INTERMEDIATE

WHAT YOU WILL LEARN

- » How to solder and desolder
- » How to sew a soft circuit
- » How to work with LEDs

RELATED TUTORIALS

- » Working with LEDs (19-23)
- » Sewing Soft Circuits (57-67)
- » Art of Soldering (45-49)
- » Desoldering (49)



MATERIALS

- » **Metallic snaps (4)**
- » **1yd sturdy fabric** for exterior of bag
- » **1yd lining fabric**
- » **½yd metallic nylon ripstop fabric** for Space Invader
- » **½yd ironing board material** for top layer of Space Invader
- » **1½yd nylon webbing** for shoulder strap
- » **Interfacing**
- » **Metal strap carriers (2)**
- » **Metallic thread**
- » **Nonmetallic thread**
- » **Fabric fusing material**
- » **Conductive thread**
- » **Electrical tape**
- » **Ruler**



TOOLS

- » **Sewing machine**
- » **Soldering iron**
- » **Third hand** (recommended)
- » **Tracing pen**
- » **Sewing pins**
- » **Needle**
- » **Scissors**
- » **Needlenose pliers**
- » **Utility knife**
- » **Iron and ironing board**
- » **Wire strippers**
- » **Rosin-core solder**
- » **Desoldering braid**



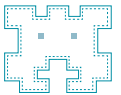
ELECTRONICS

- » **Cellphone flasher** part #PF1 001
mutr.co.uk
- » **26 AWG stranded wire, 12"**
- » **LEDs (2)** Piranha high-flux LEDs are recommended.



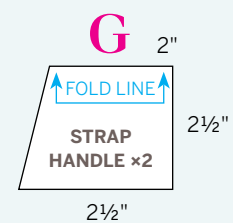
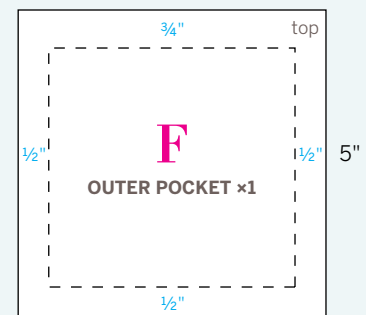
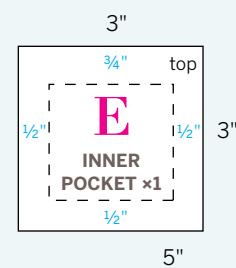
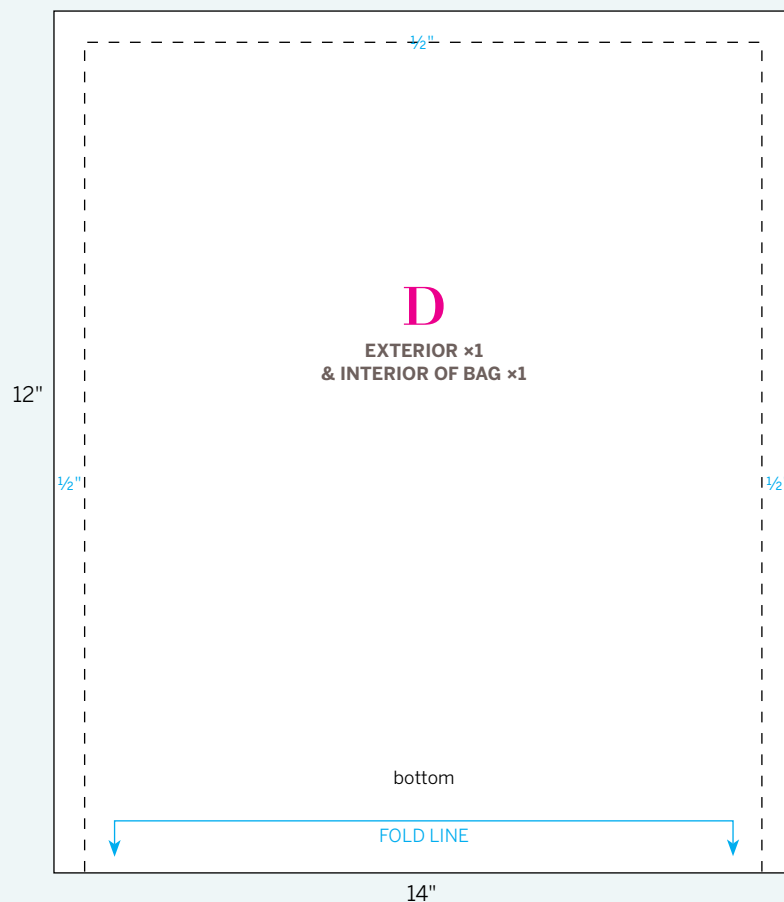
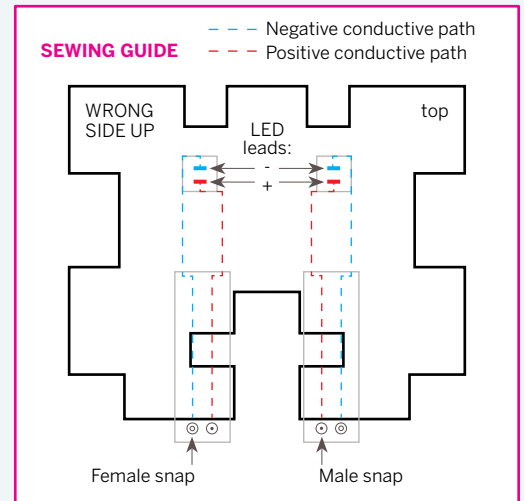
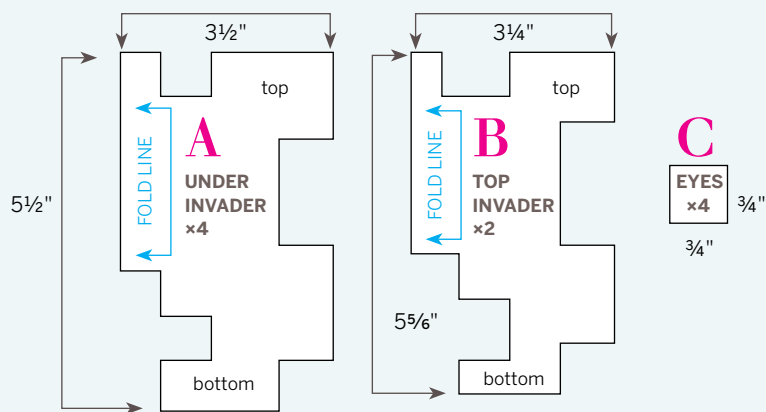
TEMPLATES

- » **Template A**
Space Invader bottom (2) and interfacing (2)
- » **Template B**
Space Invader top (2)
- » **Template C**
Eyes (4)
- » **Template D**
Bag exterior (1) and bag lining (1)
- » **Template E**
Inner pocket (1)
- » **Template F**
Outer pocket (1)
- » **Template G**
Strap handle (2)



TEMPLATES

Templates available online at fashioningtechnology.com/spaceinvaders.

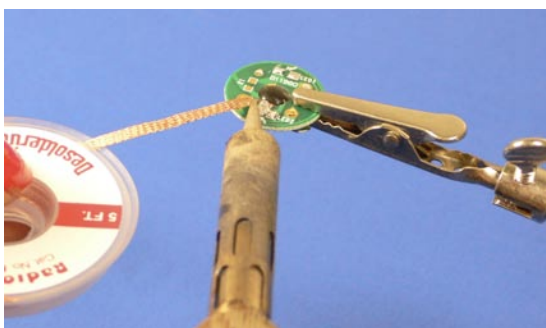
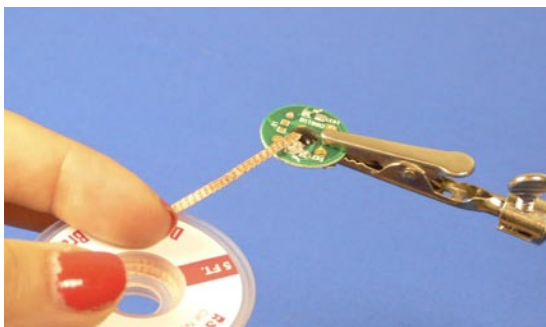


START »

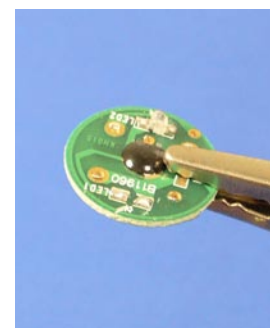
1. WIRE THE PHONE FLASHER UNIT

The phone flasher comes with 2 LEDs presoldered on the circuit board. You will be removing the LEDs and replacing them with wires soldered with a pair of snaps at each end. A third hand tool is recommended.

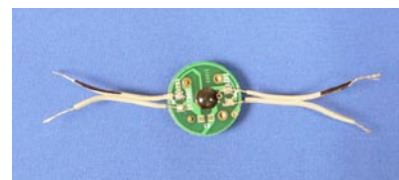
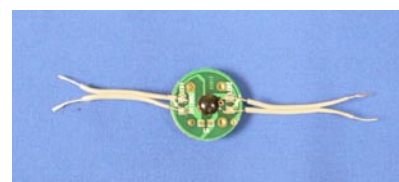
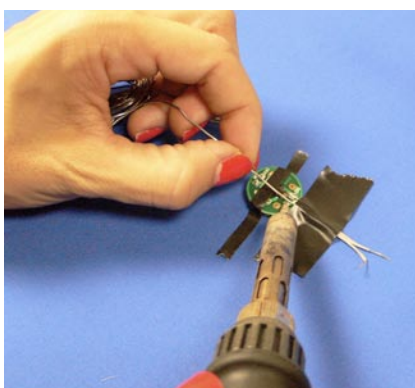
- a. Remove the batteries from the phone flasher board.
- b. Using a desoldering braid, place the braid over a solder joint of an LED. Using the iron tip, press the tip over the braid and joint. Once the solder is molten, remove the braid. (For a detailed tutorial on how to desolder, refer to page 49.) Repeat for the second joint, completely removing the LED from the circuit board. Repeat for the second LED. Both LEDs should now be removed.
- c. Cut and strip the ends of four 1½" pieces of stranded wire. Twist the ends tightly so that they don't fray. Next, tape the phone flasher board onto a hard surface (or use your third hand tool), making sure to leave the solder points open.



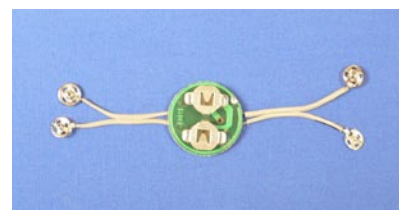
NOTE: Before removing LEDs from phone flasher unit, test the unit first (by checking your voicemail, for example) to ensure that it works with your particular cellphone and/or that the batteries are not discharged. If the LEDs do not blink, try replacing the batteries.

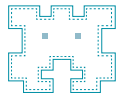


- d. Solder one end of the stranded wire onto one of the solder points. Repeat for the other 3. The wires soldered near the markings "LED1" and "LED2" on the board will be the negative wires, and the other 2 will be the positive. Using a black marker, mark the negative wires.



- e. Grab the female ends of the snaps. Loop and twist one of the positive wires through a female snap. Add a touch of solder to secure the connection. Repeat for the other positive wire and remaining female snap. Grab the male ends of the snaps. Repeat the process, soldering the negative wires to the male snaps.

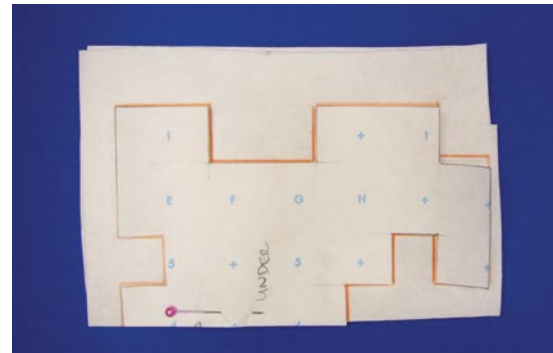




2. CUT THE SPACE INVADER PATTERN

Use the *Space Invader* pattern or create one of your own. You will be making 2 *Space Invaders* to sew onto the upper portion of your tote, one with a pair of LEDs for its eyes.

a. Cut the metallic nylon ripstop fabric into four 6"×8" pieces. Fold the 6"×8" fabric in half, lengthwise, wrong side out, aligning edges. Pin the side of Template A marked "fold line" to the folded edge of the fabric. Template A will be the bottom layer of the *Space Invader* — the backing.

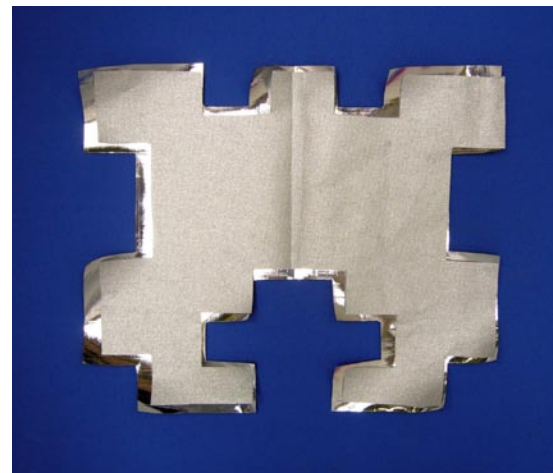


b. Using a tracing pen, trace the pattern onto the fabric. Cut the fabric along your traced lines. Repeat 3 more times, cutting a total of 4 pieces.

c. Repeat Steps 2a and 2b for Template B using the ironing board fabric, cutting a total of 2 pieces. Template B will be the top layer of the *Space Invader*.

d. Pin Template C onto the metallic nylon ripstop fabric and trace the template. Cut a total of 4 pieces. Template C will be the eyes.

e. Using Template A, trace and cut 2 pieces of interfacing slightly smaller than the template. The interfacing will be sandwiched between the top and bottom fabric pieces to give the *Space Invader* structure.



3. SEW THE SPACE INVADERS

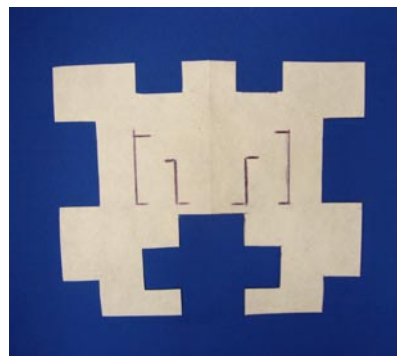
a. Topstitch the upper fabric layer of the *Space Invader* to the bottom layer. Repeat for the second *Space Invader*.

b. Topstitch the eyes on top in any desired location, preferably at least 1½" apart. This will be the front of the *Space Invader*. Repeat for the second *Space Invader*.



c. Take one of the interfacing pieces. Sandwich the interface layer between the top and bottom layers of the Space Invader. You can use a layer of fusing material to adhere the pieces together before sewing. Topstitch the 3 pieces together.

d. Mark the location of the eyes on the remaining interfacing piece. Using conductive thread, hand-stitch a line from the top outer section of an eye down to the bottom of the interfacing. This will be the negative line. Then hand-stitch a line from the bottom inner section of the eye down to the bottom of the interfacing. This will be the positive line. Repeat for the second eye. See sewing guide on page 97.



e. Cut two 1"×2" pieces of fabric. Starting ¼" from the left side, using conductive thread, machine-sew a line from the top of the fabric, stopping ¼" from the bottom. Leave 5" of loose thread from the top and bottom. Then sew a parallel line ¼" from the right side. Repeat for the second piece.

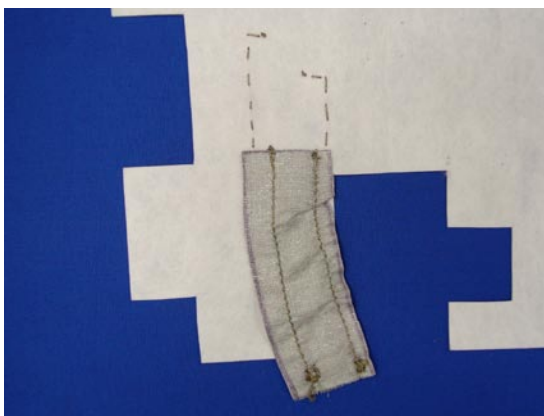
f. Thread a sewing needle with the loose thread from the bottom left of the fabric. Hand-sew a female snap, securing it to the fabric. Knot and cut off any extra thread. The female snap will be the negative snap. Repeat, sewing a male snap to the bottom right of the fabric. The male snap will be the positive snap. Repeat for the second fabric piece, this time swapping the placement of the snaps.

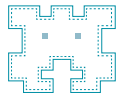


NOTE: For the second fabric piece, swap the placement of the male and female snaps so that the female snap is at the bottom left and the male snap is at the bottom right.

g. Grab the interfacing layer. Place a fabric piece face down, aligning the stitch lines from the positive (male) and negative (female) snaps to the positive (from bottom of eye) and negative lines (from top of eye) sewn on the interfacing. Refer to the sewing guide on page 97. Thread a sewing needle with the positive loose thread from the fabric piece. Securely sew the fabric piece onto the interfacing, overlapping the conducting lines from both pieces, creating a conductive path from the interfacing to the snap.

h. Thread a needle with the negative loose thread from the fabric piece. Securely sew the fabric piece onto the interfacing, making sure both negative conductive lines overlap. Repeat for the second fabric piece, aligning the stitch lines from the positive and negative lines accordingly. Place the combined top fabric layer face down. Place the interfacing layer directly on top of the fabric layer with the snaps facing down. Pin.

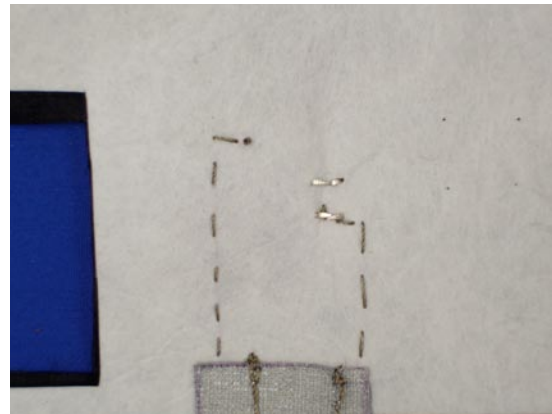




4. ADD THE LEDS

a. Turn the combined top fabric layer and interfacing layer right side up. Position an LED in the center of the eye square with the negative leads facing up. (If you are not sure which is the negative or positive lead of the LED, refer to page 74 to learn how to distinguish between the 2 leads.)

Pierce the leads of an LED through both pieces, having the leads exit through the top of the interfacing. Using a pair of needlenose pliers, gently bend the leads flush to the fabric.



b. Using conductive thread, hand-sew the bottom positive leads of the LED to the positive stitched line on the interfacing. Be careful not to sew through the top layer. Repeat for the top negative leads, sewing them to the negative stitched line on the interfacing.



c. Repeat Steps 4a and 4b for the second LED. The positive leads of the LEDs should now be connected to the positive stitched line of the interface concluding at the positive male snap, and vice versa for the negative leads. All the positive conductive paths should now be connected together and all the negative paths to each other.

d. Align the bottom fabric layer on top of the Space Invader. Pin. Using scissors, cut 2" off the bottom fabric, creating an opening for the snap fabric strips. Topstitch the pieces together.



5. CUT THE BAG EXTERIOR AND LINING TEMPLATES

a. Fold the exterior bag fabric in half, lengthwise, wrong side out, aligning edges. Pin the side of Template D marked "fold line" to the folded edge of the fabric. Using a tracing pen, trace the template onto the fabric. Cut the fabric along traced lines, cutting notches.

b. Mark a $\frac{1}{2}$ " seam line along all sides except the fold line. Fold the fabric in half along the fold line, wrong side out, aligning edges and notch marks. Machine-stitch along both side seam line markings.

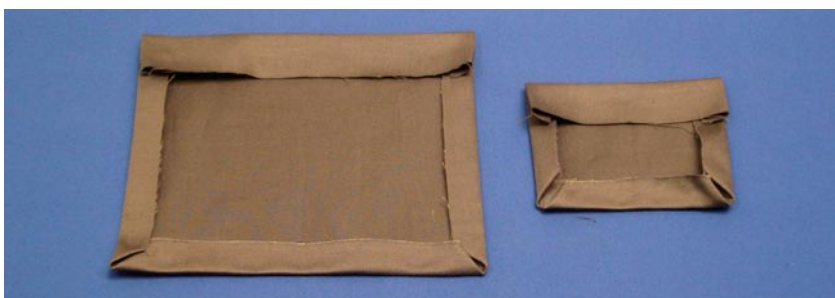
c. Repeat Steps 5a and 5b for the lining fabric, but do not machine-stitch yet.



6. ATTACH THE POCKET TO THE LINING

a. Pin Template E and F onto the fabric. Trace, including the seam lines. Cut the pocket pieces.

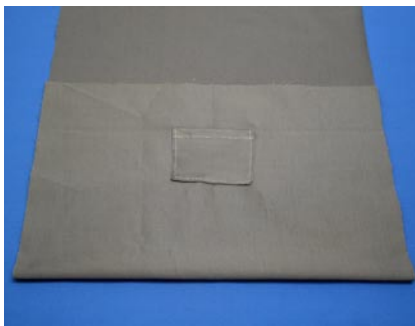
b. Place one of pocket pieces wrong side up on an ironing board. Fold the seam lines inward and press. Repeat for second pocket piece.

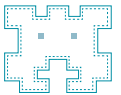


c. Machine-stitch along the $\frac{3}{4}$ " seam for both pockets. The $\frac{3}{4}$ " seam will be the top of the pockets.

d. Place the lining piece right side up. Center the small pocket piece, also right side up, 2" below the upper seam line. Topstitch the pocket piece into place. Repeat for the large pocket piece, aligning it $1\frac{3}{4}$ " from the upper seam line. The large pocket piece will cover the small, inner pocket piece.

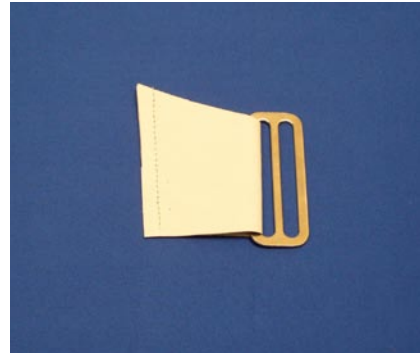
e. Fold the lining fabric in half along the fold line, wrong side out, aligning edges. Machine-stitch along both side seam line markings.





7. MAKE AND ATTACH THE STRAP HANDLES

- a. Fold the strap handle fabric (should be similar to the exterior fabric) in half, wrong side out. Pin the side of Template G marked “fold line” to the folded edge of the fabric. Trace and cut the template along the marking lines. Repeat cutting for a total of 2 pieces.
- b. Slip the strap handle piece through a metal strap carrier. Machine-stitch $\frac{1}{4}$ " from ends. Repeat for the second strap handle.



- c. On the exterior bag fabric, position the strap carriers at opposite ends and opposite sides of the bag. Align the bottom of the strap carrier piece to the top of the bag, with the angled side facing in, and pin to the outside of the bag. Machine-stitch the strap carriers, securing them in place.



8. INSERT BAG LINING

- a. Insert lining piece, right side out, into the exterior bag piece. Match the side seams. Then fold the $\frac{1}{2}$ " seam allowances of both the inner and outer pieces toward each other and pin. Press and topstitch around the bag about $\frac{1}{4}$ " from the edge (the top seam, not the sides).
- b. Make two $1\frac{1}{2}$ " horizontal buttonholes 2" apart from each other, locating them 1" from the top of the large inner pocket. These buttonholes will be used to slip the snap fabric pieces through to the interior of the bag.



9. SEW THE SPACE INVADERS

a. Center the Space Invader *without the LEDs* on the bag, with 3" of it hanging off the top of the bag. The first Space Invader should be placed on the side of the bag *without the pockets*. Pin, then topstitch the Space Invader into place.



b. Center the second Space Invader *with the LEDs* on the opposite side of the bag, aligning it with the first Invader. Pin. Slip the snap fabric pieces through the buttonholes into the interior of the bag. Then topstitch the Space Invader, avoiding the interior pockets.



c. Snap the phone flasher into place and slip it into the small interior pocket.

10. SEW ON THE SHOULDER STRAP

Cut the nylon webbing to your desired length. Slip the webbing through the strap handle, looping it over onto itself, and machine-stitch. Repeat, attaching the opposite end of the webbing to the second strap handle.



FINISH

