

DATE	SYM	REVISION RECORD	AUTH	DR	CHK
04.00	A	Added references to drawing	MJ	PM	

General Sample Bottle Lanyard Installation Instructions

Parent Part Number: SBE32, 50234, 50249, 50265

SBE Drawings:

76009 Lanyard assembly for Niskin Bottles

Sea-Bird Electronics Procedure

PROCEDURE NUMBER: **76009**

TITLE: **SBE32 Sampler Bottle Lanyard Procedure**

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SBE32 Bottle Lanyard Sub-Assembly

I. Background

This procedure discusses the general steps required to install lanyards on Ocean Test Equipment (OTE) Model 110 Niskin style water sample bottles. These steps may have to be altered for other manufacturer's bottles or different style OTE bottles. However, the basic guidelines will still apply in most cases.

II. Scope

No. of Bottles	QTY of Nicopress	QTY of brass hooks	Qty of Plastic Lanyard Balls
12	5	1	1
16	5	1	1
24	6	1	2

This procedure covers different assembly techniques for different sized carousels. As such, some ambiguity and redundancy may occur. Please refer to the chart on the last page for a quick guide to cutting your lanyards.

III. Precautions

The upper and lower bottle stoppers are held in place by a length of rubber tubing. When the bottles are in the "cocked" position, the stoppers, when released, will snap closed with a force sufficient to cause injury to personnel and/or damage to the seating surface of the bottles. Use a wooden spacer, cut to the correct dimensions to hold the stoppers in the open position.

If a step is unclear, DO NOT PROCEED. Ask supervisor for assistance.

Please make notes on this copy for review and to keep it up to date.

IV. Equipment needed

- A. Lanyard material – 0.080 inch (0.20 cm) monofilament trimmer line (P/N 30665)
- B. Nicopress oval sleeve, 18-1-C, 5 per lanyard set (P/N 30664)
- C. Brass snap hook for lower stopper, 1 per lanyard set (P/N 30772)
- D. Plastic lanyard ball, 1 per lanyard set (P/N 30773)
- E. Nicopress crimping tool (proper size for 18-1-C oval sleeves)
- F. Side cutters or wire cutters
- G. Measuring tape
- H. 2" (5.08 cm) X 8" (20.32 cm) wooden spacers to hold stoppers in open position (2 required)
- I. Black marker

V. Procedure

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General Lanyard Notes

Refer to SBE assembly drawing 76009 for Details.

1. To determine exact measurements, you will need to use existing bottle lanyards as a model.
2. Sea-Bird defined lanyard lengths exist in a table at the end of the document. To add your own dimensions, simply measure your needs, and add them to the list.
3. Top and bottom lanyards are the same throughout bottle sizes, varying only as the bottle diameter changes.
4. Length of bottle lanyards vary for all bottle sizes, and are actually a little easier to do if done on the fly, rather than precutting precise lengths.
5. Procedure as follows details the complete lanyard assembly. For any training or reference needed, please follow these steps as outlined.

Lower Stopper Lanyard

Refer to SBE assembly drawing 76009 for Details.

1. This piece is considered universal, and listed measurements may be presumed to be correct for all bottle and carousel sizes.
2. Cutting the lanyard length.
 - a. Cut a piece of lanyard material approximately 8 inches (20.32 cm) long.
 - b. Measure over one inch (2.54 cm) from either end, and make a mark on the lanyard.
 - c. From the mark that was just made, measure over 6 ¼" (15.88 cm) and make a second mark.
3. Install lanyard onto bottle
 - a. Feed the lanyard through the hole in the handle of the lower stopper.
 - b. Thread a brass snap hook through the lanyard before closing the loop.
4. Secure the lanyard with one Nicopress
 - a. Feed one end of the lanyard through the Nicopress sleeve.
 - b. Feed the other end of the lanyard through the Nicopress sleeve from the opposite direction.
 - c. Work the lanyard ends through the sleeve until the two black marks line up on one side of the sleeve. *This fixes the size of the loop at the correct size.*
 - d. Using the crimp tool, crimp the sleeve in two places.
5. Cut the excess lanyard material off next to the sleeve at a 45 degree angle.
 - *This is to make the termination as smooth as possible.*
 - *By angling the cuts such that points are closest to the lanyards, you can reduce the tendency for the lanyard to snag on nearby items.*
6. Move the loop around on the stopper handle until the sleeve is next to the stopper. Pull straight down on the brass hook to help the lanyard take the desired "set". The completed lower lanyard should look like the drawing.

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Upper Stopper Lanyard Lanyard

Refer to SBE assembly drawing 76009 for Details.

A. General Notes

1. The exact length of this lanyard will vary according to size of carousel frame, and bottle diameter.
2. For 24-position carousels, we use a second white ball, as described below.

B. Setting up the first loop

1. Preparing the upper lanyard
 - a. Cut a piece of lanyard material to about an inch longer than the length you have determined to be correct.
 - b. Measure over one inch (2.54 cm) from one end and make a mark on the lanyard at this point.
 - c. From this mark, measure an additional 10 5/8" (26.99 cm) and make a second mark.
2. Feed both ends of the lanyard through one end of a Nicopress sleeve
 - a. The two bitter ends of the lanyard should come out the same side of the sleeve, leaving a loop or a bight above one end of the sleeve, per drawing.
 - b. This loop will mate with the hook on the pylon once the assembly is complete. **DO NOT crimp the sleeve at this time.**
 - c. Adjust the lanyard ends so that one end hangs below the other by 2" (5.08 cm).
 - d. Adjust the sleeve position so that the loop measures 1 1/4" (3.18 cm) from the top of the sleeve to the end of the loop.
3. Install Lanyard Ball
 - a. The plastic lanyard ball has a hole drilled through it.
 - b. The opening on one side is slightly larger than the other.
 - c. Feed the two bitter ends through the larger hole and work the ball up on the lanyard until it rests against the Nicopress sleeve.
 - d. At this point the assembly of the upper lanyard should look like the drawing.

C. Completion of upper lanyard: 12-PLACE AND 12/16-PLACE ONLY

1. Feed the longer end of lanyard through the hole in the upper stopper, and then through a Nicopress sleeve.
2. Feed other end of lanyard through the same Nicopress from the opposite direction.
3. Work the lanyard ends through the sleeve until the two black marks line up on one side of the sleeve.
4. Slide the sleeve carefully over the marks, and use the crimp tool to crimp the sleeve in two places.
5. Cut the excess lanyard material off next to the sleeve at a 45 degree angle to make the termination as smooth as possible.
6. Adjust the ball and the other sleeve so that the tension is taken up evenly by both legs of the lanyard.
7. Re-align the ball and Nicopress such that the loop they retain is kept at its 1-1/4" length.
8. Crimp the sleeve in two places. The upper lanyard should look like the drawing.
9. Test the assembly by placing the loop above the ball over the appropriate hook in the pylon. The bottle stopper should be held in the correct "cocked" position. If it is incorrectly positioned, remake the lanyard, adjusting the measurements as required.

Caution: Do not "dry fire" the bottle without placing foam padding in the bottle mouth. Damage to the bottle and/or injury to personnel could occur.

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D. Completion of upper lanyard: 24-PLACE ONLY

1. Feed the longer end of lanyard through the hole in the upper stopper, and then through a Nicopress sleeve.
2. Feed other end of lanyard through the same Nicopress from the opposite direction.
3. Work the lanyard ends through the sleeve until the two black marks line up on one side of the sleeve.
4. Slide the sleeve carefully over the marks, and use the crimp tool to crimp the sleeve in two places.
5. **Slide a second ball over leads, and press it tight against the crimped Nicopress.
6. **Cut the excess lanyard material off *just past the ball* at a 45 degree angle to make the termination as smooth as possible.
7. Adjust the *first* ball and the other sleeve so that the tension is taken up evenly by both legs of the lanyard.
8. Re-align the ball and Nicopress such that the loop they retain is kept at its 1-1/4" length.
9. Crimp the sleeve in two places. The upper lanyard should look like the drawing.
10. Test the assembly by placing the loop above the ball over the appropriate hook in the pylon. The bottle stopper should be held in the correct "cocked" position. If it is incorrectly positioned, remake the lanyard, adjusting the measurements as required.

Caution: Do not "dry fire" the bottle without placing foam padding in the bottle mouth. Damage to the bottle and/or injury to personnel could occur.

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Middle Lanyard Assembly
Refer to SBE assembly drawing 76009 for Details.

A. General Notes

1. The middle lanyard connects the upper and lower lanyards. Both the length of the middle lanyard as well as the design will depend on the carousel type, and length of the sample bottles being rigged. The loops at each end of the middle lanyard will be the same size regardless of the bottle length. Some trial and error will be needed to determine the correct length for the middle lanyard.
2. 24-position carousels require the upper loop to feed around the ball, not through the upper stopper lanyard, as is done for 12 and 16 position carousels.

B. Preparing the middle lanyard

1. **12/16-POSITION:** Cut a piece of lanyard material approximately 12” (30.98 cm) longer than the bottle being rigged.
2. **24-POSITION:** Cut a piece of lanyard material approximately 24” (61.96 cm) longer than the bottle being rigged.
3. Create the lower loop first.
 - a. Measure over 1” (2.54 cm) from one end and place a black mark on the lanyard.
 - b. Beginning at the first mark, measure over 5 ¼” (13.39 cm) and place a second black mark on the lanyard.
 - c. Feed the end with the marks through a Nicopress sleeve. Double the end back through the sleeve so a loop is created.
 - d. Work the end and the sleeve so the two black marks align.
 - e. Holding the lanyard securely to maintain the alignment, slide the sleeve until the black marks are at the edge of the sleeve opposite the loop as shown in figure 6.
 - f. Crimp the sleeve in two places.
 - g. Cut the excess lanyard material off next to the sleeve at a 45 degree angle to make the termination as smooth as possible.
4. Set up bottle for installing the lanyard
 - a. Place the upper lanyard loop on its appropriate hook on the pylon so that it is in its “cocked” position. Place a 2” (5.08 cm) wide wooden spacer in the bottle mouth for safety.
 - b. Place the other wooden spacer in the lower bottle mouth. The stopper handle should angle out away from the carousel, not in towards the middle of the carousel.
5. Install and secure lanyard
 - a. Engage the lower loop of the middle lanyard into the snap hook of the lower lanyard.
 - b. Feed the bitter end of the middle lanyard through the handle in the bottle going from left to right as shown in drawing. This will prevent the loss of either stopper in the event that the rubber tubing between the two stoppers breaks.
 - c. Make sure that the bottle stoppers are cocked at the correct angle before creating the upper loop.

C. Install middle lanyard onto upper stopper lanyard

1. Thread the free end of the middle lanyard through a Nicopress sleeve.
2. Feed middle lanyard onto upper stopper lanyard
 - a. **12-POSITION:** Feed the bitter end of the middle lanyard through the hook loop on the upper lanyard. This loop should be on the pylon hook at this time.

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- b. **24-POSITION:** Feed the bitter end of the middle lanyard around the closer ball, just past the first crimp on the upper stopper lanyard. This loop should be on the pylon hook at this time.
3. Bring the end of the middle lanyard back through the sleeve so that the resulting loop “captures” the upper lanyard.
4. Adjust the lanyard length so that the middle lanyard takes up the tension on the lower stopper.
5. Final Adjustments for upper loop
 - a. **12-POSITION:** Adjust the position of the sleeve so that the upper loop, measured from the top of the sleeve to the top of the loop is about one inch (2.54 cm) long.
 - b. **24-POSITION:** Adjust the position of the sleeve so that the upper loop, measured from the top of the sleeve to the top of the loop is about one inch (2.54 cm) long. *You may need to keep this loop smaller, in order to insure that it cannot pass over the ball.*
6. Crimp the sleeve in two places.
7. Cut the excess lanyard material off next to the sleeve at a 45 degree angle to make the termination as smooth as possible.
8. The upper lanyard assembly with the middle lanyard crimped on should look like the picture in drawing.
9. Remove the wooden spacers. Both the upper and lower stoppers should be held in the proper “cocked” position.

Reversing thermometer lanyards

Refer to SBE assembly drawing 76009 for Details.

A. General notes

1. *Like the assembly of the middle lanyard, the configuration of lanyards for reversing thermometers will depend on the specific type of thermometer and the length of the bottle being rigged.*
2. *In general, the lanyard will run from the top of the reversing thermometer (when the thermometer is held in the “cocked” position) to the same position on the upper lanyard as the long lanyard.*

B. RT Lanyard Assembly

1. Prepare the bottles for installing lanyard.
 - a. Place the loop in the upper lanyard over the appropriate pylon hook to place the upper stopper in the “cocked” position.
 - b. Insert the wooden spacer in the bottle mouth for safety.
2. Cut the lanyard length
 - a. Measure from the hole in the thermometer mount to the final position on the upper lanyard.
 - b. Add about 6 inches (15.24 cm) to this length and cut a piece of lanyard material.
3. Install bottom (Reversing Thermometer) end of lanyard.
 - a. Holding the reversing thermometer in the “cocked” position, thread one end of the lanyard through a Nicopress sleeve and lead the end through the top hole in the reversing thermometer.
 - b. Double the end of the lanyard back through the sleeve, forming a loop around the thermometer housing.
 - c. Adjust the sleeve until the loop fits snugly around the housing.
 - d. Crimp the sleeve in two places.
 - e. Cut the excess lanyard material off next to the sleeve at a 45 degree angle to make the termination as smooth as possible.

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4. Install upper (onto lanyard) end of lanyard.
 - a. Insert the unterminated end of the lanyard through a Nicopress sleeve.
 - b. Lead the bitter end of the lanyard around the hook loop (do NOT go through the hook loop) and run the double the end back through the sleeve.
 - c. Adjust the lanyard and sleeve until all the slack is taken out of the lanyard and loop takes up tension on the lanyard ball. The loop around the upper lanyard should be about 1 ½” (3.81 cm) measures from the top of the sleeve to the top of the loop.
 - d. Crimp the sleeve and trim the excess lanyard material in the same manner as all others.
5. With the wooden spacer in place for safety, release the pylon hook holding the upper lanyard. The reversing thermometer lanyard should fall away from the upper lanyard assembly and the thermometer should spin to its “reading” position.
6. Note that once this bottle has been fired, this lanyard is free and could potentially interfere with the proper deployment of another bottle position. Depending on thermometer and bottle type, some thought should be given to “capturing” the lanyard after the bottle fires using a rubber band or some additional lanyard material.
 - a. One option is to make a lanyard loop around the bottle horizontally, such the RT lanyard will be trapped beneath it.
 - b. Another way is to feed the lanyard around the bottle such that it does not get in anything's way.
 - c. *IMPERATIVE: Test your configuration in the lab before using it in the field.*
 - d. *IMPERATIVE: Do not strap lanyards too tightly, or you may risk having the bottles fail to fire.*

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Quick Guide to Lanyard Lengths

Carousel Type	Top Lanyard		Middle Lanyard
	Length	Loop length	Length (Mark off 1" from each end)
<u>Sub-Compact Models</u>			
12-Place 2.5-Liter	12-5/8"	10-5/8"	34.5"
12/16-P 1.7-L	12-5/8"	10-5/8"	26.5
<u>Standard and Compact Models</u>			
12-P 1.7-L	12-5/8"	10-5/8"	26.5"
12-5	12-5/8"	10-5/8"	29.5"
12-8	12-5/8"	10-5/8"	37"
12-10	12-5/8"	10-5/8"	42"
12/16-1.7	12-5/8"	10-5/8"	32"
<u>Larger Models</u>			
24-P 45" frame, 2.5L	18-3/4"	16"	36.5"
24-2.5	30-1/4"	28-1/4"	42.25"
24-8	33-1/2"	8-1/2" / 3" *	46"

* First number denotes loop to bottle, second number denotes loop to carousel pylon triggers.

All bottom lanyards are made identically.

- Cut an 8" length of lanyard.
- Mark points at 1" from either end, leaving a 6" loop space.
- Feed loop through brass clip and lower bottle stopper.
- Secure with 2 crimps on one Nicopress, and cut off excess lanyard from ends.

All middle lanyards get an identically sized loop at either end.

- Cut off the proper lanyard length first. It is recommended to start with one lanyard only, to test the accuracy of the chart.
- Mark off 2.75" from one end, and call this the "top loop". This loop will connect to the upper stopper lanyard.
- Mark off 4.25" from one end, and call this the "bottom loop". This loop will be clipped into the brass clip on the lower stopper lanyard.

The above chart may be used as a reference for those carousels listed. All values should not be assumed to be correct for all situations. You should do one lanyard first to test the values, and add any new values to this chart.

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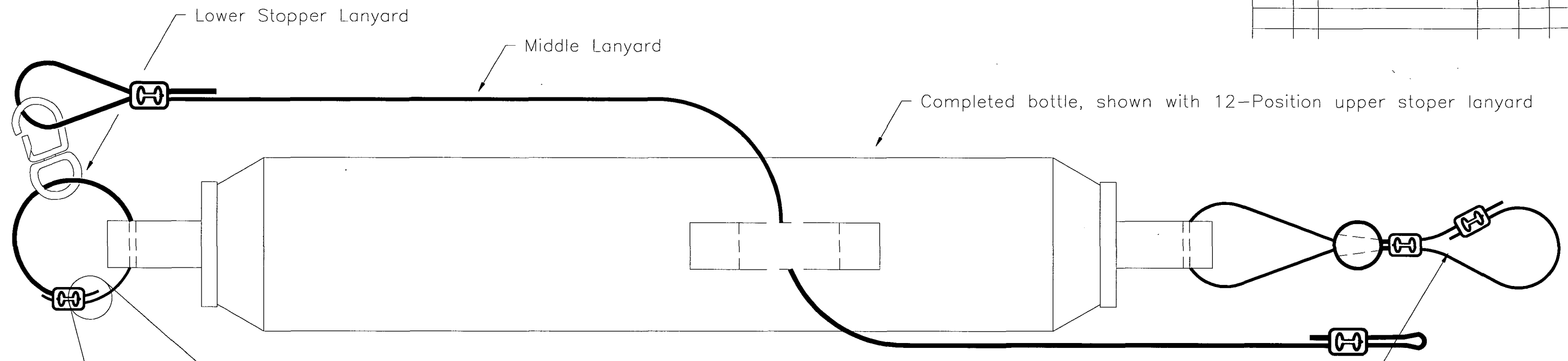
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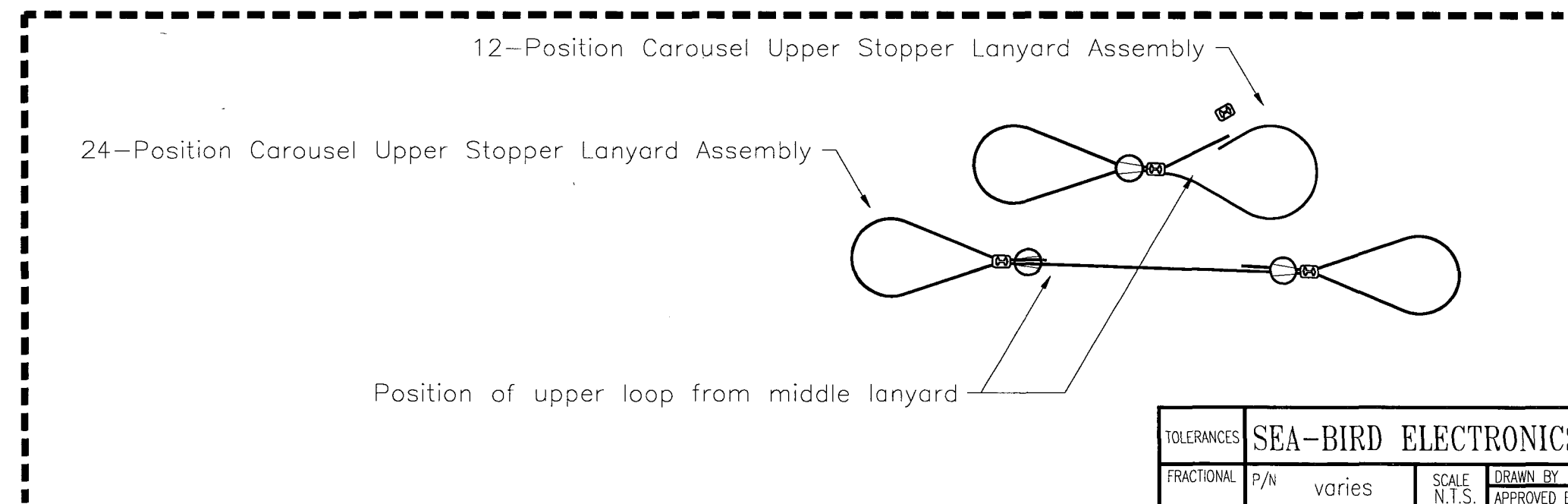
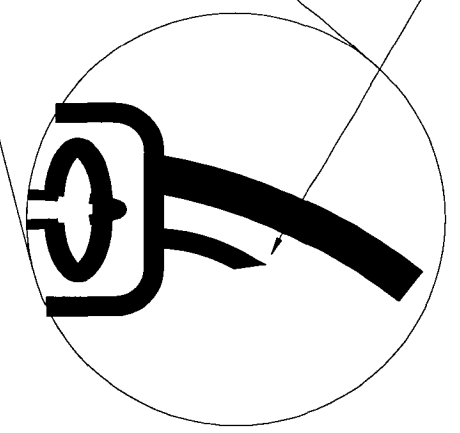
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Trim off all excess lanyard about 1/4" the nicopress, at a 45 degree angle, such that sharp end lies against lanyard.



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DECIMAL	TITLE SBE32 Carousel Bottle Lanyard Assembly				
ANGULAR	DATE 04.25.00	DRAWING NUMBER 76009	REV		