Appendix E

SINGLE VISOR SPH-5 HELMET ASSEMBLY
Fitting, Operation, and Maintenance Instructions

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CONTENTS

Introduction And General Description E-1
Helmet Sizing E-2
Helmet Fitting And Operation E-2
Inspections E-8
Cleaning E-9
Replacement Procedure 1: Energy-Absorbing Liner And TPL E-9
Replacement Procedure 2: Retention Assembly E-9
Replacement Procedure 3: Earcups And Earphones E-11
Replacement Procedure 4: Microphone Assembly E-12
Replacement Procedure 5: Communications E-12
Replacement Procedure 6: Visor Assembly E-13
Illustrated Parts Breakdown E-16

INTRODUCTION AND GENERAL DESCRIPTION

This booklet provides operation and maintenance instructions, as well as an illustrated parts breakdown (IPB), for the GENTEX SPH-5® Single Visor Helmet Assembly (see Figure 1).

The SPH-5 is a lightweight helmet assembly providing head protection, noise reduction, and communication enhancement for helicopter personnel. It consists of an impact-resistant helmet shell, a Styrofoam energy-absorbing liner, a preformed thermoplastic liner (TPL®) that allows for custom-fitting if needed, a yoke-style retention assembly (including a chinstrap and a nape strap -- both adjustable), sound-attenuating earcups, a single visor assembly, and a communications assembly featuring a boom-mounted microphone and dual earphones. The helmet is available in two sizes: regular and X-large. (Other sizes are available. In addition, various visor assembly styles are available and are listed at the end of this booklet. Contact GENTEX Corporation for more information.)

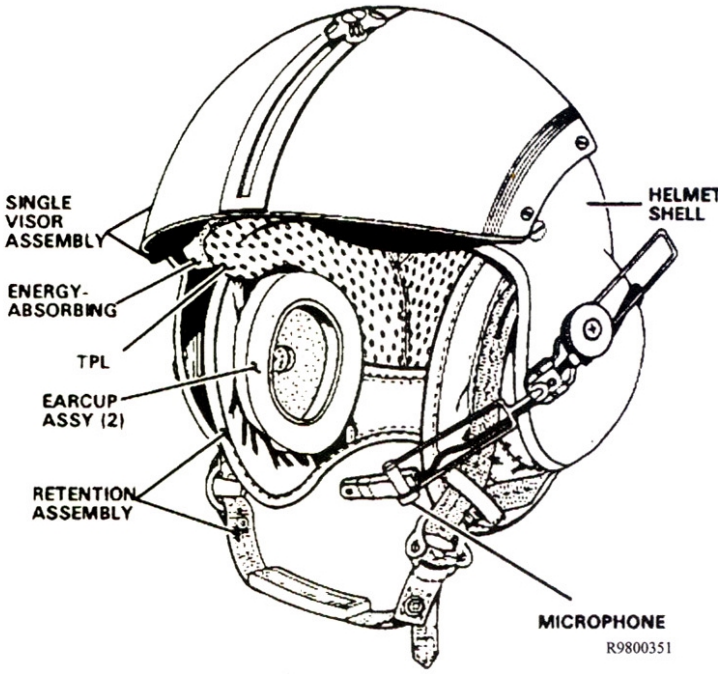


Figure 1. SPH-5 Helmet Assembly

Helmet sizing is based on head circumference. (Figure 2 shows how the crewmember's head is measured for circumference.) Below are sizing parameters.

HELMET SIZE	MAXIMUM HEAD CIRCUMFERENCE (INCHES)*
Regular	21.5 - 22.4
X-Large	greater than 22.4

* These are rule-of-thumb measurements. At times, the next larger or smaller size may be required to achieve a satisfactory fit.

* If your head circumference falls outside the measurements listed above (either larger or smaller), contact GENTEX Corporation for assistance.

HELMET FITTING AND OPERATION

In this procedure, you will ensure that the helmet is properly fitted to the crewmember. You will also familiarize the crewmember with operation procedures, including donning and doffing the helmet (Steps 1 and 7 respectively), adjusting the nape strap (Step 2), fastening and unfastening the chinstrap (Steps 3 and 6 respectively), and operating the visors (Step 4).

1. Have the crewmember don the helmet as follows (see Figure 3):

   CAUTION: Spread the helmet slightly - just enough to allow ease of donning. Excessive spreading may damage the helmet.

a. Grip the retention assembly below the earcups as shown in Figure 3, View A.

b. Spread the sides of the helmet slightly and position the front edge firmly against the forehead as shown in Figure 3, View B.

c. Roll the helmet back and down onto the head. Press the helmet firmly downward with both hands to ensure that the helmet is properly seated on the head and the ears are surrounded by the earcups. (The earcups can be rotated for optimum fit.)

d. Check the distance between the eyebrows and the edge of the helmet shell; it should be approximately (but no more than) 3/4" for optimum field of view.

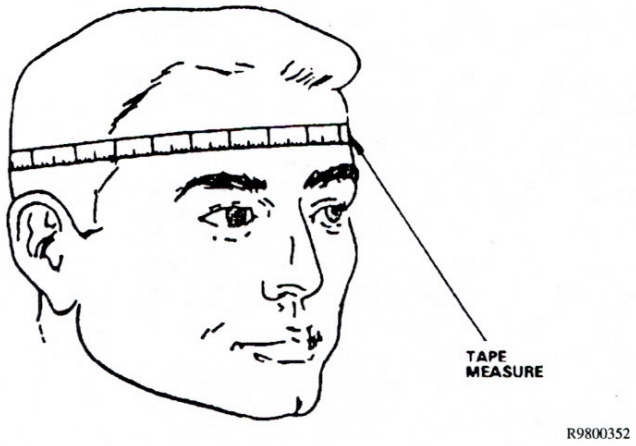


Figure 2. Head Circumference for Helmet Sizing

WARNING: For helmet stability, always tighten the nape strap and the chinstrap as snugly as possible when wearing the helmet. Failure to do so may result in injury.

2. Have the crewmember tighten the rear of the retention assembly by adjusting the hook-and-pile closure and tightening the nape strap through the adjustment buckle. (See Figure 4.)
3. Have the crewmember fasten the chinstrap as follows:

   a. If not already done, insert the snap end of the chinstrap through the D-ring on the right side (as worn) of the retention assembly and fasten the snap as shown in Figure 5, View A.

   b. Feed the other end of the chinstrap through the D-rings on the left side of the helmet.

   c. Split the D-rings, loop the chin strap end back through inner D-ring, and pull the chin strap through both D-rings as shown in Figure 5, View B.

   d. Tighten the chinstrap to the desired tension. Once the desired tension is achieved, the chinstrap can be fastened and unfastened via the snap as shown in Figure 5, View A.

   e. Check the helmet fit.

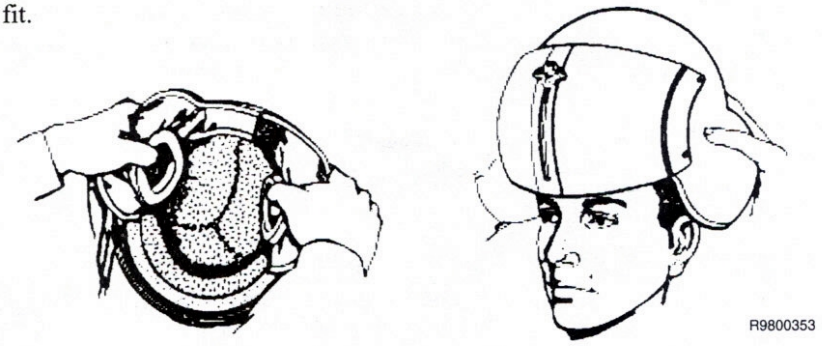


Figure 3. Donning Helmet

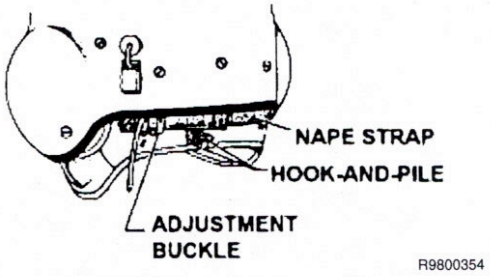


Figure 4. Rear of Retention Assembly

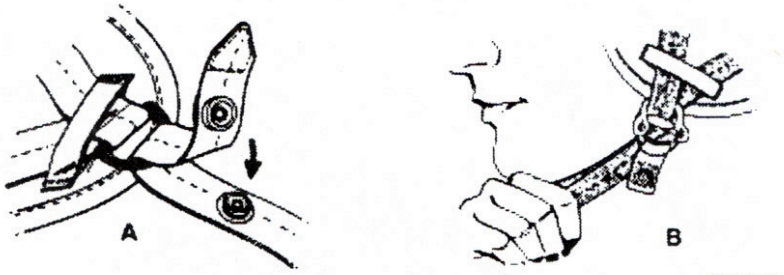


Figure 5. Adjusting Chinstrap

4. Have the crewmember lower and raise the visor as follows (to test operation and clearance):
   a. Unlock the visor by turning the center lock knob counterclockwise as shown in Figure 6.
   b. Rotate the visor by sliding the knob along the housing slot.
   c. Lock the visor by turning the knob clockwise.
5. Evaluate the fit according to the following criteria:
   a. The earcups should surround the ears completely.
   b. The earseals should be compressed to the greatest degree possible without discomfort.
   c. The overall fit should be comfortable; no hot spots or pressure points should exist.

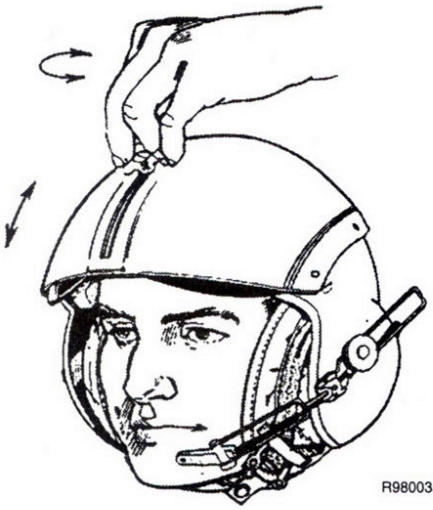
NOTE: After evaluating the fit, you will unfasten the chinstrap and doff the helmet as instructed in Steps 6 and 7. If the helmet fulfills all of the criteria listed in Step 5, mark and store the helmet as required. If the earcups do not surround the ears completely, refer to "Adjustment #1: Earcup Centering." If the earseals are not sufficiently compressed, refer to "Adjustment #2: Earseal Compression." If the overall fit is too tight or too loose, or hot spots or pressure points exist refer to Adjustment #3: TPL Custom-Fitting."

6. Have the crewmember unfasten the chinstrap by unsnapping the strap disengaging the strap through the right- hand (as worn) D-ring.

7. Have the crewmember doff the helmet as follows:

CAUTION: Spread the helmet slightly - just enough to allow ease of doffing. Excessive spreading may damage the helmet.

   a. Hook the thumbs in the earcups and spread the helmet at the earcup area.
   b. Roll the helmet upward and rearward as shown in Figure 7.
   c. Check microphone and earphone operation.
   d. Recheck the helmet fit.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Adjustment # 1: Earcup Centering

1. If the ears are not centered within the earcups, rotate the earcups within the retention assembly. Don the helmet, tighten the chinstrap, and recheck the earcup centering.
2. If the ears are not centered within the earcups after the earcups have been rotated, unfasten the chinstrap, doff the helmet, and remove the TPL as in Replacement Procedure 1, Step 1 (Page E-9). Have the crewmember don the helmet and hold it so that the edge of the helmet is approximately 3/4" above the eyebrows. With the helmet in this position, check the location of the earcups. If the earcups now completely surround the ears this indicates a need for TPL custom-fitting. Have the crewmember doff the helmet. Perform the TPL Custom Fitting Procedure. This should result in a proper fit of the helmet and the earcups.
3. If the ears are not centered in the earcups after the TPL has been removed, or you must raise or lower the helmet to achieve proper centering, you will have to adjust the retention straps upward or downward. To obtain access to these straps, you must remove the energy-absorbing liner and at least one earcup. Follow these steps:

   a. Remove either earcup from the retention assembly as in Replacement Procedure 3, Steps 2 and 3 (Page E-11) .

   b. Remove the energy-absorbing liner as in Replacement Procedure 1 Steps 3 and 4 (Page E-9).

   c. Adjust the retention strap holes upward or downward as necessary. The front and center straps allow for upward or downward adjustment; the rear straps allow for forward or rearward adjustment. (See Figure 8.) Remove the attachment hardware. Apply one or two drops of white Weldwood glue #281 or equivalent to the first two threads of each screw and reinstall the hardware in the selected holes as needed.

   d. Reinstall the energy-absorbing liner as in Replacement Procedure 1, Step 5 (Page E-9).

   e. Reinstall the earcups as in Procedure 3, Steps 10-11 (Page E-11 and 12).

   f. Reinstall the TPL as in Replacement Procedure 1, Step 7 (Page E-9).

   g. Have the crewmember don the helmet and fasten the chinstrap. If the ears are now centered in the earcups, remove and store the helmet as required. If not, readjust the retention straps as necessary until the ears are centered in the earcups.

Adjustment #2: Earseal Compression

1. If the earseals are not sufficiently compressed, doff the helmet and tighten the helmet cross straps. Two cross straps are located behind each earcup; each cross strap has a loop. To tighten each cross strap, insert a finger into the loop and move the loop toward the bottom of the shell. (See Figure 9.) Don the helmet, tighten the chinstrap, and re-check the earseal compression.
2. If the earseals are not sufficiently compressed after the cross straps have been tightened, doff the helmet and add earcup spacer pads behind each earcup as required. The earcup spacer pad set supplied with each helmet consists of four pads (two 1/2" thick and two 1/4" thick) and pressure-sensitive pile fastener. Install the pads as follows:

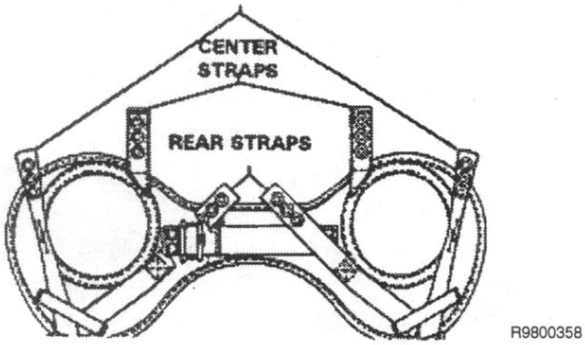

Figure 8. Retention Straps

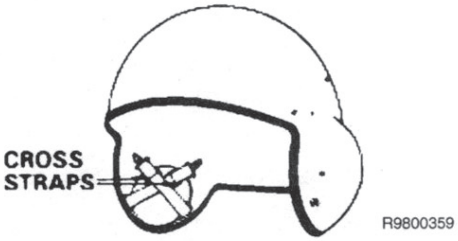

Figure 9. Tightening Cross Straps

a. Peel the backing from one pressure-sensitive pile fastener and apply the adhesive side of the fastener directly to the back of one earcup. Repeat for the other earcup.

NOTE: Spacer pads may be installed whole or cut to any size or shape needed to increase or balance earcup compression. See Figure 10 for examples.

b. Attach spacer pad(s) to an earcup with the hook side of the pad facing the pile fastener on the earcup. Ensure that the fasteners are firmly attached. Repeat for the other earcup.

3. Don the helmet, tighten the chinstrap, and recheck the earseal compression. Add more spacer pads if needed until earseals are sufficiently compressed and a uniform, comfortable earcup fit is attained.

Adjustment #3: TPL Custom-Fitting

If the helmet does not fit properly, i.e. it has hot spots or pressure points or the fit is too tight or too loose, remove the helmet and custom-fit the TPL following the Custom-Fitting Procedure below.

Tools and Equipment Required

1. Oven - Capable of stabilized sustained temperature of 200°F ±5°F (93.3°C ± 2.8°C) with thermometer and internal volume of approximately 1.5 cubic feet or equivalent
2. Ruler
3. Timer or equivalent
4. Masking Tape

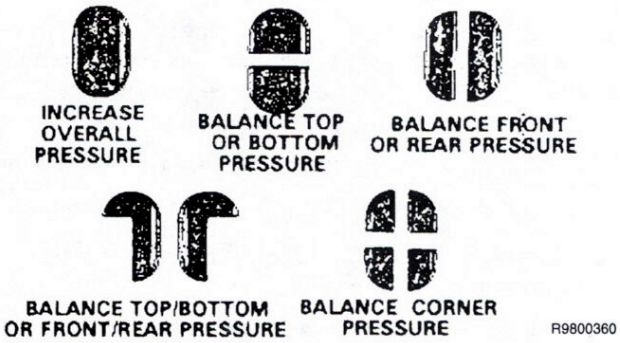

Figure 10. Earcup Spacer Pad Applications

STEP	RESULTS/REMARKS
1. Set oven rack to the lowest position; heat oven to 200°F ±5°F (93.3°C ± 2.8°C).	- Ensure oven stabilizes at approximately 200°F. - Preview Steps 5 through 10 so that they may be completed within 30 seconds.
2. Place TPL fabric side down in center of rack in heated oven.	- Do not remove TPL cover; heat as a unit.

CAUTION: Ensure That No Upper Burner Activates During Heating, or TPL Plastic Layers Will Melt.

3. Allow oven to stabilize at temperature listed in Step 1 before starting timed sequence.	- In helmet, cover hook fasteners on rear of energy-absorbing liner with masking tape to ease TPL positioning
4. Heat TPL for approximately 10 minutes.	- Set timer, stopwatch, or equivalent. - Check TPL every two or three minutes to ensure plastic layers are not melting.
5. Remove TPL from oven.	- Describe procedure to crewmember being fitted. - Steps 5 - 10 should be completed within 30 seconds.

STEP	RESULTS/REMARKS
WARNING: TPL Plastic Will Be Hot To Touch. Avoid Burning Hands. Wear Gloves If Necessary.	
6. Squeezing sides of TPL together to clear earcups, place TPL in helmet with label and holes facing front.	
7. Align TPL to protrude approximately 1/4" past energy-absorbing liner.	- Ensure TPL is centered within the helmet. - Do not be concerned if rear of TPL extends beyond energy-absorbing liner.
CAUTION: Hot TPL Plastic Layers Are Soft. When Performing Step 8, Do Not Press Too Hard In Any One Area; This Will Deform TPL.	
8. Position TPL crown into helmet.	
9. Have crewmember don helmet.	- To ensure TPL does not bunch up in rear during donning, hold rear of TPL against energy-absorbing liner while crewmember dons helmet. (See Figure 11.)
10. With hands on top of helmet press down until ears are centered in earcups. Hold for three to five minutes.	- Ensure entire ear is surrounded by earcup; press helmet down further if necessary. - Chinstrap may be fastened to hold helmet in position. - Ensure helmet shell is centered comfortably on head. - Lower visors to check centering and nose clearance.
11. Check distance between eyebrow and edge of helmet shell.	- Distance should be approximately (but no more than) _" for optimum field of view.
12. Release pressure and remove helmet.	- Remove tape from hook fasteners covered in Step 3. - Reposition TPL in helmet; ensure label and holes face front.
13. Have crewmember don helmet.	- Adjust earcups; tighten nape strap and chinstrap.
14. Check fit.	- Check for hot spots and pressure points. If none exist, remove and store helmet as required. If the helmet does not fit properly, remove TPL and repeat fitting procedure.

NOTE: The TPL cloth cover can be laundered or dry cleaned. Before removing cover in preparation for cleaning, note the direction in which the cover is facing. Note especially the "Y" seams on the cover; the double leg of the "Y" should face the front of the TPL and the single leg should face the rear. Replace the two-sided tape after cleaning, and install cover on layers in the proper direction.

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Figure 11. Donning Helmet with Heated TPL

INSPECTIONS. Inspections consist of preflight and postflight inspections by the user, and periodic inspections by the technician.

Preflight Inspection. Prior to each flight, the user should inspect the helmet assembly to see that it is in good working order. This inspection should ensure that:

1. The helmet, liners and earcup assemblies have been fitted properly.
2. The chinstrap and nape strap are adjusted properly and the retention assembly is attached to the helmet with the screws tightened securely.
3. The visors operate properly and are clean and free of cracks or scratches.
4. All communication components have been installed properly and the earphones and microphone operate properly.
5. The overall condition of the helmet has been checked for serviceability.

Postflight Inspection. After each flight, the user should note any component malfunction or damage to the helmet resulting from operational use. Affected components should be replaced as specified in Table 1.

Periodic Inspection. Crewmembers are responsible for ensuring that their helmet assembly is clean and that all components are working properly. Periodic or scheduled inspections should occur at least every 180 days or as required. Refer to Table 1 for applicable procedures.

Table 1. Periodic Inspection

Component	Inspect For:	Applicable Procedure
Helmet Shell	Cracks, holes, warping.	Remove all components; install components in replacement shell.
	Cleanliness.	Clean per instructions on the next page.
Energy-Absorbing Liner	Worn or loose hook fasteners.	Remove liner as in Replacement Procedure 1, Page E-9. Replace fasteners; reinstall liner.
	Gouges, cracks, indentations.	Replace liner as in Replacement Procedure 1.
TPL	Torn or damaged areas.	Replace TPL as in Replacement Procedure 1, Page E-9.
	Loose bond at edges.	Remove TPL as in Replacement Procedure 1; replace two sided tape attaching cloth cover to plastic layers; reinstall TPL.
	Worn cover.	Remove TPL from helmet as in Replacement Procedure 1; replace TPL cover, reinstall TPL.
Earcup Assembly	Cracked cup, broken or missing tab, torn earseal, worn earphone holder or spacer pad, or failed earphone.	Remove earcup as in Replacement Procedure 3, Page E-11, replace parts as necessary; reinstall earcup.
	Cleanliness.	Clean per instructions on the next page.
Retention Assembly (including nape strap and chin strap)	Frayed or torn fabric, loose stitching, corroded or bent buckles or snap.	Replace as in Replacement Procedure 2, Page E-9.
	Cleanliness.	Clean per instructions on the next page.
Microphone, Boom, Swivel Assembly	Failed microphone; damaged or worn swivel or boom.	Replace assembly as in Replacement Procedure 4, Page E-12.
Microphone Cord	Connector	Cuts, cracks, deteriorated insulation, general damage.
Visor Assembly	Cracks, scratches, loose knobs.	Replace as in Replacement Procedure 6, Page E-13.
	Cleanliness.	Clean per instructions on the next page.