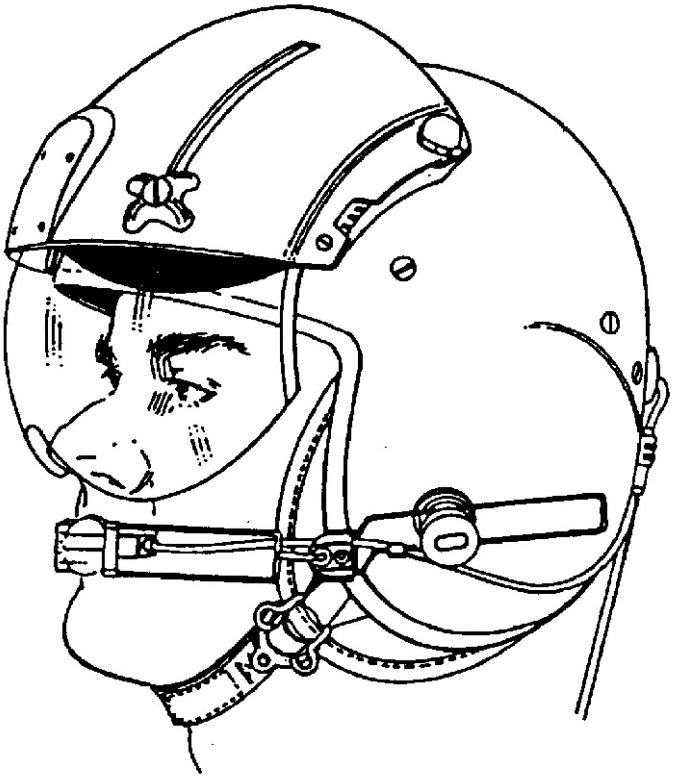
SPH-4B
HELMET ASSEMBLY



HELMET DESCRIPTION

The SPH®-4B (see Figure 1) is a lightweight, head-protective helmet capable of supporting Aviator's Night Vision Imaging System (ANVIS) Night Vision Goggles (NVGs). The helmet is designed for helicopter crew members performing long and demanding day or night missions. Equipped with enhanced lightweight components, the SPH-4B features greater comfort and fit, improved helmet stability and retention, and increased impact protection in comparison with earlier SPH helmets. The components include a helmet shell, an energy-absorbing liner, a preformed thermoplastic liner (TPL®), lightweight contoured earcups, a lightweight dual visor assembly, a yoke retention assembly, and a communications system.

This booklet contains a description of the SPH-4B helmet assembly and its components. Also included are instructions for sizing and fitting the helmet, custom-fitting the TPL, and modifying the ANVIS mount. A parts list at the end of the booklet provides information for ordering the helmet and its components.

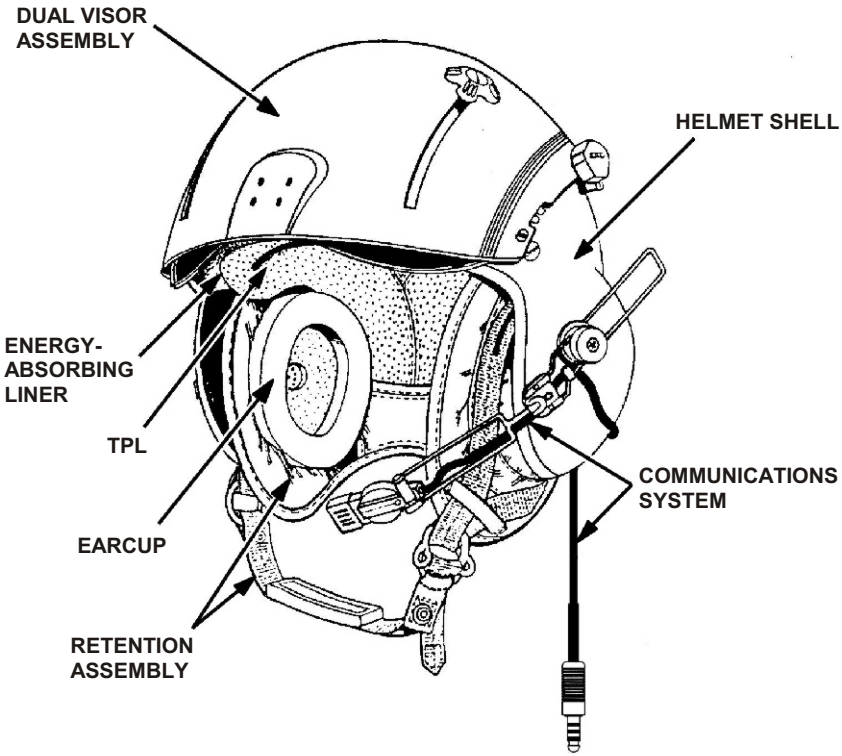


Figure 1. SPH-4B Helmet Assembly

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COMPONENT DESCRIPTION

Helmet Shell (Figure 2)

The lightweight composite helmet shell protects the head from impact. Chafing pads prevent the earcups from chafing against the side of the shell. Cross straps control earseal compression for optimum fit and noise reduction.

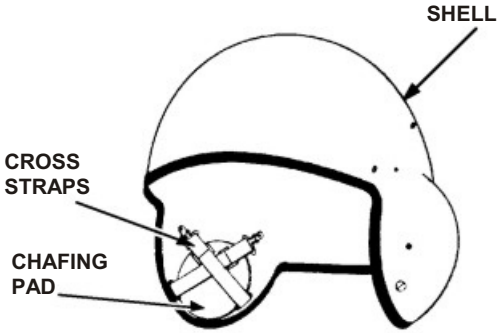

Figure 2. Helmet Shell

Energy-Absorbing Liner and TPL (Figure 3)

The energy-absorbing liner and the preformed TPL replace the sling suspension systems of earlier SPH models.

The energy-absorbing liner is molded from rigid polystyrene and is designed to absorb and reduce impact forces to the head. It is attached to the inside surface of the helmet shell with hook-and-pile fastener.

The TPL consists of molded layers of plastic and a removable, washable cloth cover. The sides of the cloth cover are made of pile fastener that attaches the TPL to the hook fastener on the inside surface of the energy-absorbing liner. Preformed in three sizes (small/regular, regular, and extra-large), the TPL fits most heads. However, if necessary, the TPL can be heat-softened and custom-fitted to an individual head shape.

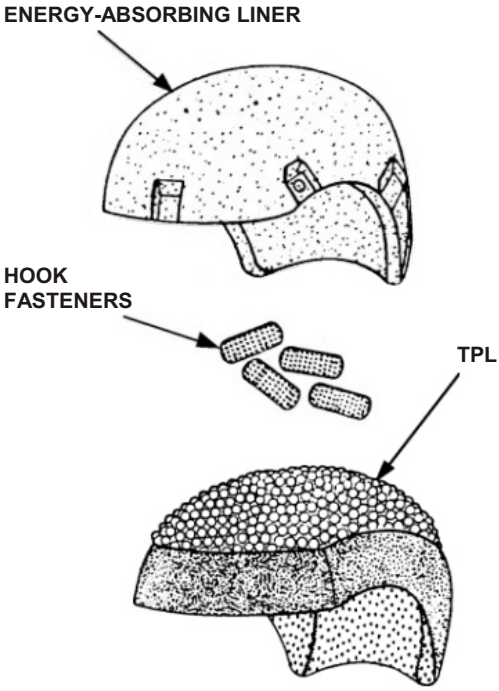

Figure 3. Energy-Absorbing Liner and TPL

Earcups (Figure 4)

Lightweight energy-absorbing earcups provide lateral impact protection and sound attenuation. The earcups are contoured to enhance the fit to the ear, and can be rotated within the retention assembly to further improve the fit. Earcup spacer pads may be placed between the earcup and the inside of the helmet shell to increase earseal compression, if necessary.

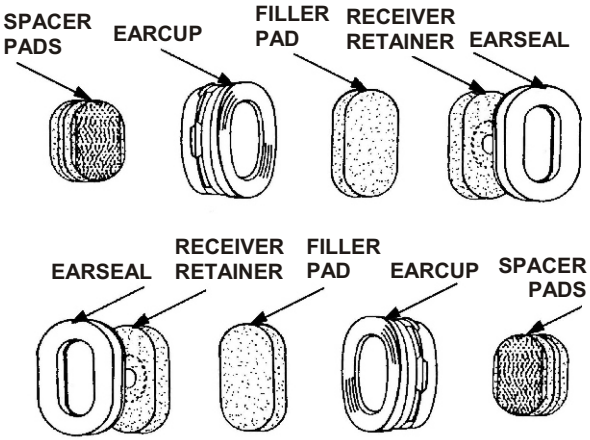

Figure 4. Earcups

Retention Assembly (Figure 5)

The yoke-style retention assembly is designed to minimize forward rotation of the helmet and reduce chinstrap stretch during use, thus providing a higher level of protection. The chinstrap employs a double “D” ring design for ease of tightening and loosening. The retention assembly has an adjustable rear nape strap system incorporating a rear-closure hook-and-pile fastener for individual sizing and an adjustment strap and buckle to ensure a snug fit. A hanger tab at the rear helps hold the retention assembly in place and provides for up-and-down adjustment via two eyelets.

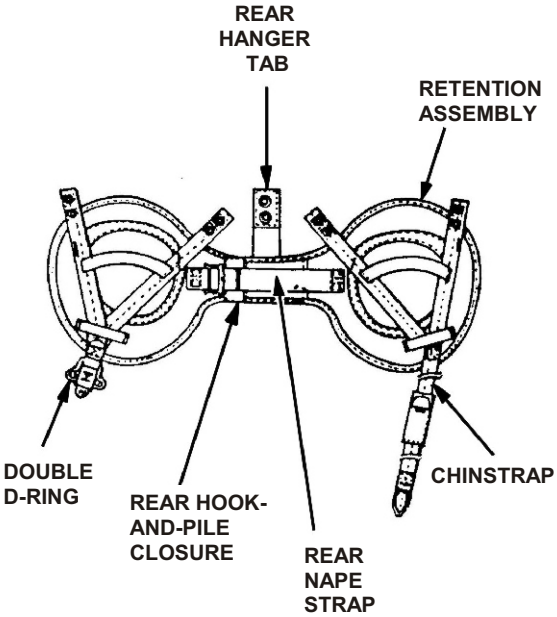

Figure 5. Retention Assembly

Dual Visor Assembly (Figure 6)

The lightweight dual visor assembly consists of a visor housing, a clear visor, a neutral gray (sunshade) visor, actuating knobs, tracks, and attaching hardware. The center of the visor housing features an ANVIS mounting platform for NVG attachment. An ANVIS cable clip can be attached to the right-side visor track to secure the cable. The visor housing attaches to the helmet using four screws and posts. The visors can be configured for left- or right-hand operation. The clear and neutral gray visors are made of scratch-resistant coated polycarbonate. Optional special-purpose visors are also available — for example, laser-protective, high-contrast, gradient, and amber visors.

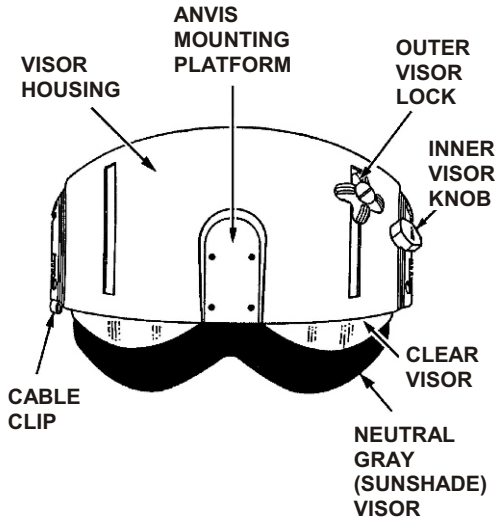

Figure 6. Dual Visor Assembly

Communications System (Figure 7)

The communications system consists of a boom-mounted adjustable microphone, a microphone cord, dual earphones, and a communications cord with a connector plug for radio communications. The microphone is mounted on the left side of the helmet (as worn) and can be readily placed in an operating or stowed position. The microphone cord plugs into the connector on the helmet; in turn, the connector branches into the earphones and the communications cord.

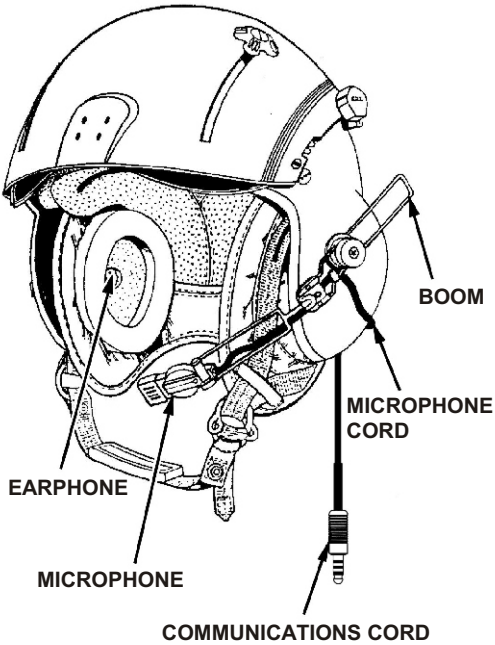

Figure 7. Communications System

HELMET SIZING

Helmet size is based upon head circumference as follows:

HEAD CIRCUMFERENCE (INCHES)*	HELMET SIZE	TPL SIZE
Less than 21.5	Regular	Small/regular
21.5-22.4	Regular	Regular
Greater than 22.4	X-Large	X-Large

*Guidelines only. At times, the next smaller or larger size may be needed for a satisfactory fit.

HELMET FIT CHECK

1. Don the helmet, tighten the nape strap, fasten the chinstrap, and adjust the earcups as required. Distance from the eyebrow to the helmet shell should be approximately 3/4" when the helmet is properly seated on the head. The earcups can be rotated within the retention assembly to improve the fit to the ear, if required. Ensure that the ears are centered in the earcups.

2. The earseals should be compressed to the greatest degree possible without causing discomfort. For maximum earseal compression, the helmet cross straps can be tightened. Two cross straps are located behind each earcup; each cross strap has a loop. To tighten the cross strap, insert a finger into the loop and move the loop toward the bottom of the shell. Don the helmet and check the fit.

3. If the earseals are not sufficiently compressed when the cross straps are tightened, earcup spacer pads may be added as required behind each earcup. Spacer pads may be cut to any size or shape necessary to achieve maximum compression.

4. Lower the visors to check operation and nose clearance. If either visor does not move freely, loosen (do not remove) the four screws attaching the visor housing to the helmet. Move the housing side-to-side as required, and tighten the screws.

5. Check for hot spots or pressure points. If none are present, remove the helmet, mark the helmet with crew member’s identity, and store the helmet as required.

6. 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 TPL Custom-Fitting Instructions on the next page.

TPL CUSTOM-FITTING INSTRUCTIONS

Tools and Equipment Required

1. Convection oven, capable of stabilized sustained temperature 200°F ±5°F (93.3°C ±2.8°C) with a thermometer and an internal volume of approximately 1.5 cubic feet or equivalent
2. Timer or equivalent
3. Masking tape
4. Ruler

Custom-Fitting Procedure

STEP	REMARKS
1. Preheat the oven to 200ºF ±5ºF (93.3ºC ±2.8ºC).	- Ensure that the oven stabilizes at approximately 200ºF. - Do not remove the TPL cover; heat the TPL as a unit.
2. Place the TPL in the preheated oven, fabric side on the rack. **CAUTION** ENSURE THAT NO UPPER BURNER ELEMENT ACTIVATES DURING THE HEATING PROCESS.	- Place the on rack in the center of the oven for even heating.
3. Allow the oven to stabilize at the temperature listed in Step 1 before starting the timed sequence.	- In the helmet, cover the hook fasteners at the rear of the energy-absorbing liner with tape to allow easy positioning of the TPL when placed in the helmet for custom fitting.
4. Heat the TPL for approximately 10 minutes.	- Set the timer or stopwatch. - Describe the procedure to the crewmember being fitted.

(Continued on next page)

Custom Fitting Procedure (continued)

STEP	REMARKS
5. Don the skull cap (optional). Personnel with a full head of hair do not require a fitting cap or a skull cap.	- Personnel intending to wear a skull cap should do so during the fitting process. - Review steps 7 through 10 so they may be accomplished in a minimum of time (30 seconds or less).
6. Remove the TPL from oven. **CAUTION** THE TPL MAY BE HOT TO THE TOUCH.	- Touch only the fabric part of the TPL. - Wear gloves if necessary. - Steps 7 through 10 should be completed in less than 30 seconds.
7. Place the TPL in the helmet.	- Squeeze the sides of TPL to clear the earcups. - Position the label and holes in the TPL toward the front of the helmet.
8. Align the TPL front edge with the energy-absorbing liner.	- Ensure that the TPL is symmetrically located from side to side in the center of the helmet.
9. Position the TPL crown into the helmet.	- Do not be concerned if the rear of the TPL extends beyond the edge of the energy-absorbing liner at the rear of the helmet.
10. Have the crewmember don the helmet. Place the front of the helmet against the brow and rotate the helmet rearward and down onto the head.	- To ensure that the TPL does not bunch up in the rear during donning, hold the rear of the TPL against the energy-absorbing liner while crew-member dons helmet. - The helmet should be in the normally worn position, and the TPL should be evenly pushed up in front and rear. - Do not press too hard in any one area.

(Continued on next page)

Custom Fitting Procedure (continued)

STEP	REMARKS
11. Check the eye offset using a ruler.	- Offset should be 2” ¼”.
12. Pull downward with hands on top of the helmet until the ears are centered in the earcups.	- Hold for five minutes. - Ensure that the entire ear is covered by earcup; pull down farther if required. - The chinstrap may be fastened to hold the helmet in position. - Ensure that the shell is centered comfortably on the head, i.e., shell center line over nose. - The visor can be lowered to check nose clearance.
13. Release pressure on top of the head at end of five minutes.	- Remove the helmet. - Remove the tape from the hook fasteners covered in Step 3. - Reposition the TPL in the helmet in accordance with Step 8.
14. Don the helmet.	- Adjust the earcups, and tighten the napestrap and the chinstrap.
15. Check the fit.	- Check for hot spots and pressure points. - The TPL can be reheated and refitted if necessary. **WARNING** In cases of extreme fitting problems, **up to two (2) layers** may be removed from the TPL. **Layers may only be removed from the inside of the TPL (closest to the head).**

ANVIS ATTACHMENT

Before an ANVIS NVG is installed on the SPH-4B helmet, the ANVIS mount must be modified, and a cable clip must be attached to the helmet. The ANVIS attachment kit contains installation instructions, four screws for the rear of the mount, a cable clip with an attaching screw, pile fastener for attachment of the ANVIS battery pack to the helmet, and moleskin lens guards for visor protection. Perform the modification as follows:

1. Remove the outer visor lock from the dual visor assembly by removing the center screw, lock, and washer. Set aside for reinstallation.
2. Remove the top two screws from the dual visor assembly, lift the housing from the tracks, and reinstall the screws beneath the housing and into the tracks. Repeat the procedure for the bottom visor assembly screws, and remove the housing from the helmet. This will ensure that the visor assembly remains intact during the ANVIS mount installation.
3. Remove and discard the four screws from the rear of the ANVIS mount. Place the mount on the ANVIS mounting platform at the center of the dual visor housing, and align mount the holes with the four holes in the platform. Secure mount to housing by inserting four 3/16" pan-head screws (supplied) through the inside of the housing and into mount. Fasten the screws securely, but do not tighten them too much.
4. Attach moleskin lens guards to the inside of the visor housing around the ANVIS mounting platform as shown in Figure 8.
5. Reattach the visor housing to the helmet using the four screws removed in from the housing in Step 2.
6. Position the cable clip on right side (as worn) of the visor housing, and secure using the 5/16" screw supplied. Insert the screw through the clip and into the insert on the bottom of right-side of the upper visor track. Feed the cable through the clip, and tighten the screw securely, but do not tighten it too much.
7. Install the outer visor lock by reinstalling the screw, lock, and washer removed in Step 1.
8. Attach the pressure-sensitive pile fastener to the center rear of the helmet as shown in Figure 8.

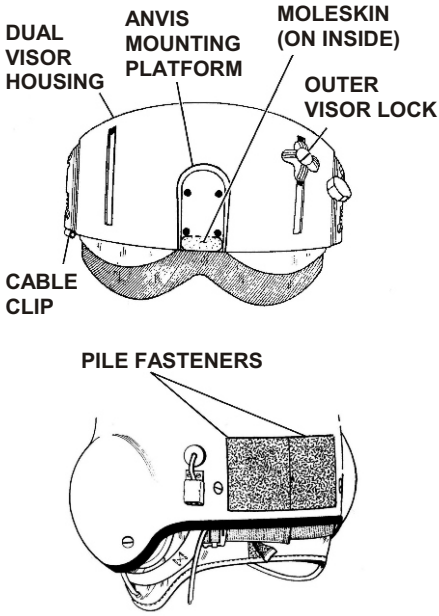

Figure 8. Dual Visor Assembly

ILLUSTRATED PARTS LIST

The SPH-4B Helmet may be ordered as a complete assembly; the components shown in Figure 9 and listed on Page 11 also may be ordered separately. For further information, contact GENTEX Corporation, Carbondale, PA 18407, phone (570) 282-3550, fax (570) 282-8555, or visit our web site at www.gentexcorp.com.

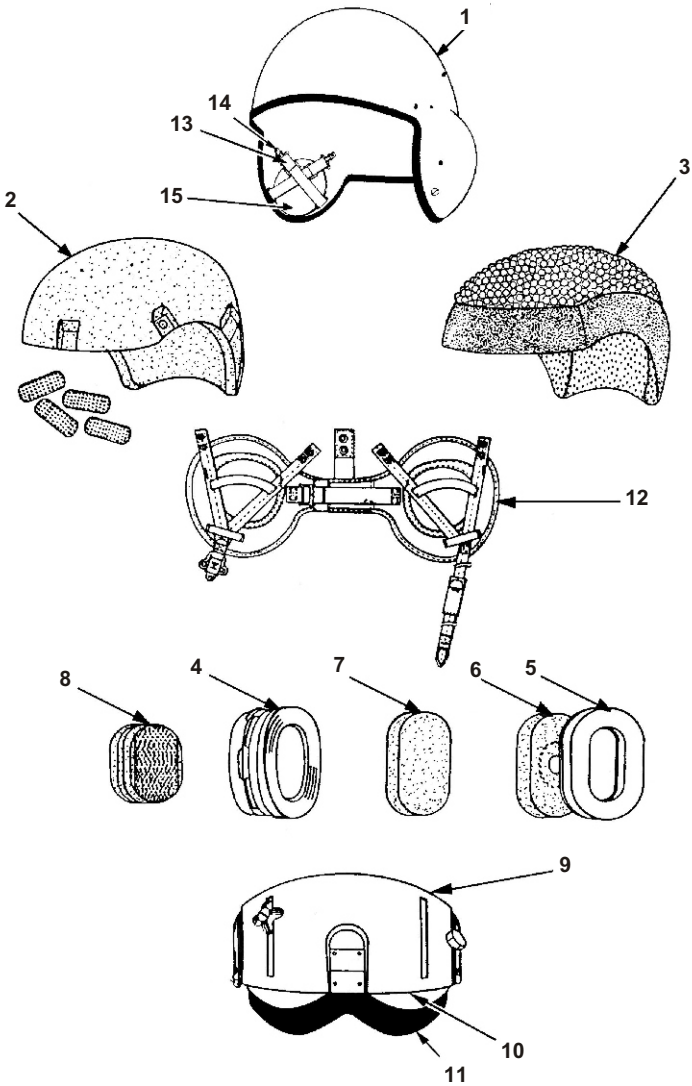

Figure 9. SPH-4B Components

FIG. NO.	DESCRIPTION	QTY.	PART NO.
	SPH-4B Helmet Assembly, Regular	REF	89D7825-1
	SPH-4B Helmet Assembly, X-Large	REF	89D7825-2
-1	Helmet Shell, Regular	1	83A6162-4
	Helmet Shell, X-Large	1	83A6163-4
-2	Energy Absorbing Liner, Regular	1	85D7286-1
	Energy Absorbing Liner, X-Large	1	85D7211-1
-3	TPL, Small/Regular	1	85D7087-11
	TPL, Regular	1	85D7087-4
	TPL, X-Large	1	85D7087-5
	Earcup, Left*	1	85C7135-1
-4	Earcup, Right	1	85C7135-2
-5	Earseal	2	75C2990-1
-6	Earcup Cushion Insert	2	83C6573
-7	Filler Pad	2	83B6572-5
-8	Spacer Pad Set	1	71B2302
-9	Dual Visor Assembly	1	90C7930-12
-10	Outer Visor, Clear	1	90D7932-2
-11	Inner Visor, Neutral	1	90D7933-3
-12	Retention Assembly, O.G.	1	89D7639-3
-13	Cross Strap	4	67B1732
-14	Adapter	4	69A2118
-15	Chafing Pad	4	67A1777
	Earphone*	2	73B2619
	Microphone*	1	78A4046-1
	Communication Cord*	1	77C3523-1
	Microphone Cord*	1	69C2080
	Boom*	1	91B8125
	Swivel Assembly*	1	78A4047
	Screw, 8-32 x 3/16" (Rear cross straps)*	2	75A3093-5
	Screw, 8-32 x 1/4" (Retention, keeper)*	5	75A3093-9
	Screw, 8-32 x 5/32 (Comm. cord)*	1	75A3093-2
	Screw, 5-40 x 7/8" (Visor housing)*	4	75A3096-49
	Washer, Spring*	7	76A3443
	Post, 1/16" (Rear cross straps)*	2	69A2104-1
	Post, 1/8" (Rear retention, keeper)*	3	69A2104-2
	Post, 3/16" (Front retention)*	2	69A2104-3
	Attachment Kit, ANVIS*	1	88A7526

* Not Shown

NOTES

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