AIR FORCE QUALIFICATION TRAINING PACKAGE (AFQTP)



FOR
STRUCTURAL
(3E3X1)

MODULE 21

FINISH CARPENTRY

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MODULE 21

FINISH CARPENTRY

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Career Field Education and Training Plan (CFETP) references from 1 August 2002 version.

OPR: HQ AFCESA/CEOF
(SMSgt Dan Sacks)
Supersedes AFOTP 3F3X1-20, 14, Jul 00

Supersedes AFQTP 3E3X1-20, 14 Jul 00

Certified by: HQ AFCESA/CEOF (CMSgt Myrl F. Kibbe) Pages: 20/Distribution F

AIR FORCE QUALIFICATION TRAINING PACKAGES FOR

STRUCTURAL (3E3X1)

INTRODUCTION

Before starting this AFQTP, refer to and read the "AFQTP Trainer/Trainee Guide"

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. **It is important for the trainer and trainee to understand** that an AFQTP <u>does not</u> replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:

AFQTP completion Hands-on certification

Diamond task:

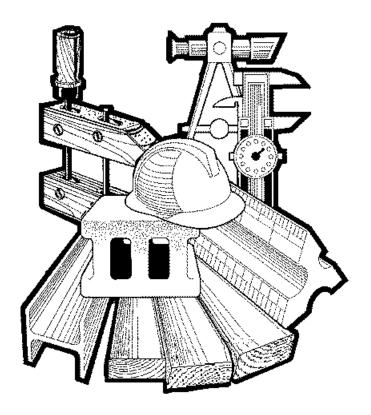
AFQTP completion CerTest completion (80% minimum to pass)

<u>Note</u>: Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOF revised this AFQTP. If you have any recommendations for improving this document, please contact the Career Field Manager at the address below.

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GYPSUM BOARD

MODULE 21 AFQTP UNIT 2

INSTALL (21.2.1.)

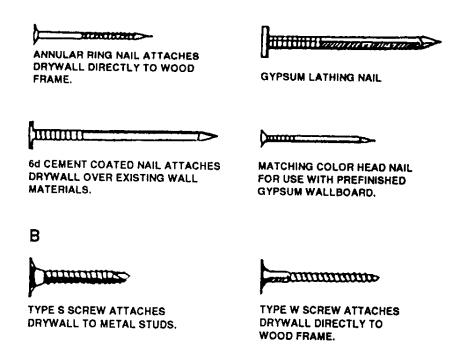
INSTALL GYPSUM BOARD Task Training Guide

STS Reference Number/Title:	21.2.1 Install gypsum board.
Training References:	 Career Development Course (CDC) Structural Journeyman 3E351C, Volume 1, Unit 3, Section 3-1; Wall and Ceiling Coverings. Commercial Manual, Modern Carpentry by Willis H. Wagner, 1992. Navy Advancement Training (NAVEDTRA Course 14044, Builders 3 & 2, Volume 2.
Prerequisites:	 Possess as a minimum a 3E331 AFSC. Review the following references: CDC Structural Journeyman 3E351C, Volume 1, Unit 3, Section 3-1; Wall and Ceiling Covering. Modern Carpentry, Unit 14, Interior Wall and Ceiling Finish, pages 359 - 369. NAVEDTRA 14044, Chapter 5, Interior Finish of Walls and Ceilings.
Equipment/Tools Required:	 General 3E3X1 tool kit. Personal safety equipment. 16' tape measure. 4' level. T-square. Screw gun. Chalk line. 4- or 6-foot stepladder. 1/2- or 5/8-inch gypsum board. 1 1/4-inch drywall nails. 1 1 1/4-inch drywall screws. Drywall hammer. Utility knife. Scaffolding (for high ceilings). Drywall jack (if available).
Learning Objective:	Trainee should be able to install gypsum board sheets on ceilings and walls.
Samples of Behavior:	Trainee will install gypsum board on ceilings and walls using appropriate materials, tools, and methods.
Notes:	
Any safety violation is an	automatic failure.

INSTALL GYPSUM BOARD

- 1. Background. As a structural journeyman, you will probably have more than one opportunity to install gypsum board. Gypsum board is a type of drywall material that has seen an increase in use over time. Years ago, plaster was the standard interior wall covering. But, with the advent of new drywall materials, plaster is used less-and-less. One of the main reasons that many craftsmen opt to use gypsum board over plaster is time. Plastering walls required three coats with drying time in between. Another reason is cost. We all know that time is money. Regardless of the many reasons for drywall materials, one thing is for sure—gypsum board is prevalent throughout Air Force facilities. Before you decide to tackle an installation project, you should become familiar with the different types available on the market today.
- **2. Gypsum Board.** Gypsum board is a fire retarding material that comes in standard 4' widths and lengths from 8' to 16'. Gypsum board is available in thickness from $\frac{1}{4}$ to 1-inch. The most commonly used thicknesses are $\frac{1}{2}$ and $\frac{5}{8}$ -inch. Gypsum board comes in several different types, such as regular, fire resistant (type "X"), insulating, backing board, and moisture resistant or water resistant (green-board). Tapered, beveled, round, square, and tongue and groove are some of the many different edge styles available. For the remainder of this AFQTP, we will deal specifically with the installation procedures for regular gypsum board manufactured with tapered edges.
 - **2.1.** Three types of fasteners are commonly used for installing gypsum board. They are nails, screws, and adhesives, see Figure 2-1. Regardless of the fastener type used, it is most important that the wallboard is drawn tightly against the framing. For wood framing, the minimum penetration depends on the type fastener. The minimum penetration for smooth-shank nails is $^7/_8$ -inch; ring-shank nails is $^3/_8$ -inch; and screws is $^5/_8$ -inch. For screws used to attach gypsum board to metal framing, the penetration depth is $^3/_8$ -inch minimum.

Figure 2-1. Drywall Fasteners.

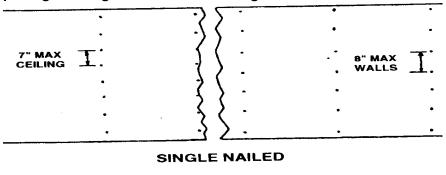


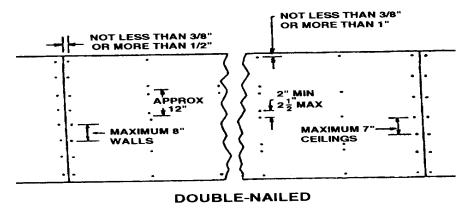
SAFETY:

DUE TO THE SIZE AND WEIGHT OF A FULL SHEET OF GYPSUM BOARD, TRAINEE MAY NEED HELP SETTING UP AND INSTALLING IT.

2.2. There are two nailing methods for installing gypsum boards: single and double nailing. When single nailing, the nails are spaced 6 to 8-inches apart on walls and 5 to 7-inches apart on the ceiling. Place nails at least $^3/_8$ -inch from any outside edges. For double nailing, the edge spacing is the same, except the nails in the field are spaced 12-inches on center with 2 to 2 ½-inches between nail pairs, see Figure 2-2. Because of their greater holding power, screws may be spaced 12-inches apart on ceilings, and 16-inches apart on walls. Because of this, screws are often the fastener of choice in today's building construction. Dimple each nail or seat each screw below the gypsum board surface. This will provide a pocket that can be filled with joint compound later when finishing.

Figure 2-2. Spacing for Single and Double Nailing.

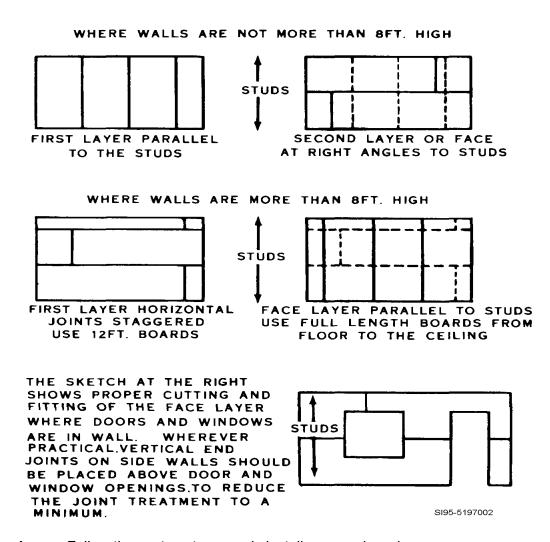




- **2.3.** Adhesives are used to fasten gypsum panels on certain applications. When used, you should also use temporary nails or braces to hold the sheets until the adhesive dries.
- **2.4.** When installing gypsum board on the ceiling always start in a corner, with the sheet length at a right angle to the joists. Attach it with nails or screws in the center first, working outward. You need to stagger all butt seams to minimize long joints and increase strength. Leave a ¹/₈-inch gap between sheets to help hold joint compound. When necessary, sheets may be cut by scoring with a utility knife, and snapping off or using a saw (i.e. drywall, keyhole, etc).

2.5. Gypsum board may be installed either horizontally or vertically on walls. Horizontally is preferred because it reduces the number of vertical joints. Be sure to stagger all end joints and place them above and below windows or above doors as shown in Figure 2-3. Be sure to position sheets so that no tapered edges border any rough openings. This will prevent the bevel on the sides of the sheet from interfering with the finish trim.

Figure 2-3. Placing Gypsum Wallboard.



3. Procedures: Follow these steps to properly install gypsum board:

NOTE TO TRAINER/CERTIFIER:

If a gypsum board project is not available, the minimum required for upgrade training is the following: give trainee a scenario based on steps 1, 2 & 4 below. Have trainee measure and mark one gypsum board sheet for receptacle boxes and any openings. Next, have the trainee demonstrate the installation sequence and proper nail spacing ensuring trainee has complete task knowledge.

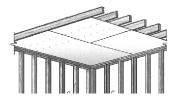
Step 1: Gather required tools and materials. Having the proper equipment will save time by preventing you from having to go back to the shop and retrieve additional tools.

Step 2: Determine layout. Determine the gypsum board layout for ceilings and walls. Try to minimize continuous seams and attach sheets at right angles to framing members to increase strength.

Step 3: Ceiling installation.

- **3.1.** Install gypsum board sheets on the ceiling starting in one corner, at right angles to ceiling joists (Figure 2-4).
- **3.2.** Any openings or fixtures in ceilings will require sheets to be cut before being raised into position.
- **3.3.** Use a deadman or T-brace to hold the sheet firmly against the joists. Secure with appropriate fasteners beginning in the center and working towards the outside edges.
- **3.4.** Use scaffolding for application on high ceilings.
- **3.5.** Be sure to stagger all butt seams and leave $^{1}/_{8}$ -inch gap between sheets to help hold joint compound.

Figure 2-4. Ceiling Installation.



HINT:

Use a drywall square to mark lines on sheets referencing all framing members. This will aid in the placement of fasteners.

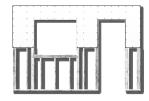
SAFETY:

ENSURE YOU HAVE YOUR EYE PROTECTION ON BEFORE CUTTING AND NAILING OPERATIONS.

Step 4: Wall installation.

- **4.1.** Place marks on the ceiling and floor to identify stud locations.
- **4.2.** Layout and then saw or cut for any openings or fixtures on walls.
- **4.3.** Door or window openings may be cut out after sheets are secured to wall.
- **4.4.** Sheets should be raised to meet ceiling using a foot lifter or blocks (Figure 5).
- **4.5.** Secure sheets to walls using appropriate fasteners and spacing.
- **4.6.** Be sure to leave a $\frac{1}{8}$ -inch space between sheets to help hold joint compound.

Figure 5. Horizontal Wall Application.



REVIEW QUESTIONS FOR INSTALL GYPSUM BOARD

QUESTION	ANSWER
1. Gypsum board is a fire retarding material	a. 3, 6, 16
that comes in standard foot width and	b. 3, 8, 16
lengths from to feet.	c. 4, 6, 16
	d. 4, 8, 16
2. What are the three common types of	a. Nails, screws, and adhesives.
fasteners used for gypsum board?	b. Nails, screws, and joint compound.
	c. Nails, screws, and anchor bolts.
	d. Nails, corner bead, and adhesives.
3. What are the two most common thickness	a. ³ / ₈ -and ½-inch.
of drywall?	b. ${}^{3}_{/8}$ -and ${}^{5}_{/8}$ -inch.
	c. $^{1}/_{2}$ - and $^{5}/_{8}$ -inch.
	d. $\frac{1}{4}$ - and $\frac{1}{2}$ -inch.
4. Ring-shank nails should be long enough	a. ½-inch.
to penetrate the wood at least	b. ⁵ / ₈ -inch.
·	c. $\frac{3}{8}$ -inch.
	d. ¾-inch.
5. When single nailing gypsum board on	a. 6- to 10-inches apart.
walls the nail spacing should be	b. 4- to 6-inches apart.
·	c. 8- to 10-inches apart.
	d. 6- to 8-inches apart.
6. Always leave a inch space between	a. ¹ / ₁₆ -inch.
sheets to help hold joint compound.	b. ¹ / ₈ -inch.
	c. ${}^{3}/_{16}$ -inch.
7 Our cours also at a grant la continue and a	d. ³ / ₃₂ -inch.
7. Gypsum sheets may be cut by scoring	a. hawk-bill knife. b. putty knife.
with a	c. broad knife.
	d. utility knife.
8. What can be used to firmly hold gypsum	a. Deadman or T-brace.
board sheets against ceiling joists?	b. Foot lifter or T-brace.
board sheets against ceiling joists:	c. Foot lifter or deadman.
	d. All of the above.
9. Why should you position sheets so that	a. To prevent weakening the opening.
no tapered edges border any rough	b. Because all tapered edges should be saved
openings?	for joining other sheets.
geomigo.	c. To prevent the bevel on the sides of the
	sheet from interfering with the finish trim.
	d. Because tapered edges are only used on
	ceiling.

INSTALL GYPSUM BOARD

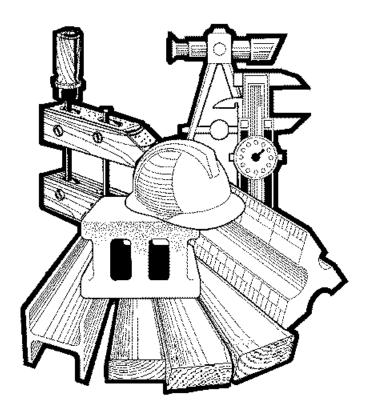
PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE	YES	NO
1. gather the required equipment, tools, and materials?		
2. correctly determine layout for gypsum sheets?		
3. install gypsum board on the ceiling correctly?		
4. install gypsum board on the walls correctly?		
5. use the proper nail spacing?		
6. comply with all safety requirements?		

FEEDBACK: Trainer/Certifier should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer/certifier.



GYPSUM BOARD

MODULE 21 AFQTP UNIT 2

PATCH (21.2.3.)

PATCH GYPSUM BOARD Task Training Guide

1	
STS Reference Number/Title:	21.2.3 Patch gypsum board.
Training References:	 Career Development Course (CDC) Structural Journeyman 3E351C, Volume 1, Unit 3, Section 3-1; Wall and Ceiling Coverings. Commercial Manual, Modern Carpentry by Willis H. Wagner, 1992. Navy Advancement Training (NAVEDTRA Course 14044, Builders 3 & 2, Volume 2.
Prerequisites:	 Possess as a minimum a 3E331 AFSC. Review the following references: CDC Structural Journeyman 3E351C, Volume 1, Unit 3, Section 3-1; Wall and Ceiling Covering. Modern Carpentry, Unit 14, Interior Wall and Ceiling Finish, pages 359 - 369. NAVEDTRA 14044, Chapter 5, Interior Finish of Walls and Ceilings.
Equipment/Tools Required:	 General 3E3X1 tool kit. Personal safety equipment. Drywall finish knifes (4", 6" & 12" or suitable sizes). Gypsum board. Joint tape. Joint compound. Backing material. Mud pan.
Learning Objective:	Upon completing this section, you should be able to describe the procedures for repairing gypsum board.
Samples of Behavior:	Trainee will be able to successfully and safely patch gypsum board.
Notes:	
Any safety violation is an a	automatic failure.

PATCH GYPSUM BOARD

- 1. Background. As a structural journeyman, you will more than likely have the opportunity to repair gypsum board during your Air Force career. Gypsum board can become damaged from any number of things—water leaks, slammed doors, or structural shifting to name a few. Like any other repair job, be sure to correct the underlying problem before making the repairs. You wouldn't want to have to come back out in a few weeks to re-accomplish the task. The type of damage will determine the repair method. For example, a small crack requires a little joint compound, whereas a hole may require backing material to support a patch. Larger damage may result in replacing part of or an entire sheet. Being familiar with the procedures for hanging and finishing drywall will benefit you in understanding this section.
- **2. Procedures:** Follow these steps to patch gypsum board:

NOTE TO TRAINER/CERTIFIER:

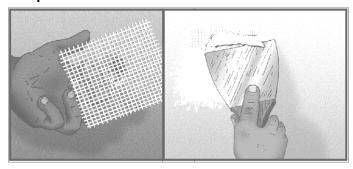
The trainee need not complete each repair type for upgrade. At a minimum, trainee must complete either Step 3 or 4 and Step 5.

Step 1: Gather required equipment. Having the proper equipment will save time by preventing you from having to go back to the shop and retrieve additional tools.

Step 2: Cracks and small holes.

2.1. Holes. If a sharp object has dented the drywall, sand around the cavity and fill it with spackling compound. If the hole goes through the drywall, you can apply fiber mesh tape and joint compound to the area (not recommended for holes larger than ½" in diameter) as shown in Figure 2-5.

Figure 2-5. Small Hole Repair.



2.2. Cracks. To easily repair small cracks, you can gouge out the crack with a utility knife and fill it in with joint compound. You need to be sure to remove any loose gypsum and paper from the crack before applying the joint compound. For large cracks, install joint compound and joint tape over the crack.

Step 3: Medium (fist-size) holes.

- **3.1.** Cut the damaged area square/rectangular to eliminate the need for irregular cuts. Keep the hole size to a minimum. Cut out only what's needed to remove the damaged area. Lightly sand around the edges of the hole to ensure proper adhesion of the joint compound.
- **3.2.** Install backing into the hole.

NOTE:

Different types of backing can be used. Some craftsmen install wood strips secured with screws, while others use gypsum panels secured with adhesive. Commercial backing clips are also available and preferred by craftsman for their quickness and ease of use.

- **3.3.** Cut patch from like materials and secure to backing material.
- **3.4.** Apply joint tape and compound to finish the repair (explained in Step 5).

Step 4: Large holes.

- **4.1.** Mark and cut out a square/rectangular section around the damaged area. Extend your cut area to the centers of the nearest studs (Figure 2-6). Cut out only what's needed to remove the damaged area. Lightly sand around the edges of the hole to ensure proper adhesion of the joint compound.
- **4.2.** Install backing behind the unsupported sides (top/bottom) of the hole.
- **4.3.** Cut and install patch securing it to the stude and backing material.
- **4.4.** Apply joint tape and compound to finish the repair (explained in Step 5).

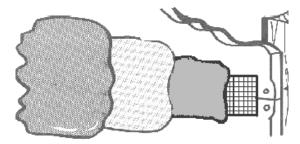
Figure 2-6. Repairing a Large Hole in Drywall.



Step 5: Finishing gypsum patch.

- **5.1.** Gypsum patches are finished the same way finishing is accomplished in new construction—with three coats (Figure 2-7).
- **5.2.** Apply first coat of joint compound and joint tape to the patch edges.
- **5.3.** Let dry, sand and apply second coat of compound.
- **5.4.** Let dry, sand and apply third coat of compound.
- **5.5.** Let dry and smooth to an even finish or apply texture to match surrounding surface.

Figure 2-7. Joint Compound Coats.



REVIEW QUESTIONS FOR PATCH GYPSUM BOARD

QUESTION	ANSWER
What are the primary causes of	a. Structural shifting and water damage.
drywall blemishes?	b. Improper backing material.
	c. Joint compound dried to fast.
	d. Cuts were irregular.
2. Why is it necessary to sand the	a. To eliminate the need for irregular cuts.
edges of the repair hole?	b. To support the backing material.
	c. To ensure proper adhesion to the joint
	compound.
	d. In order to let the mud dry faster.
3. Small cracks can be easily repaired by	a. cutting out the damaged area and placing a patch in the hole.
	b. gouging out the crack and filling it with joint compound.
	placing backing behind the crack and filling it with joint compound.
	d. placing tape over the crack and finishing as normal.
4. Backing material is not required on	a. True.
medium-sized holes.	b. False.

PATCH

PERFORMANCE CHECKLIST

INSTRUCTIONS:

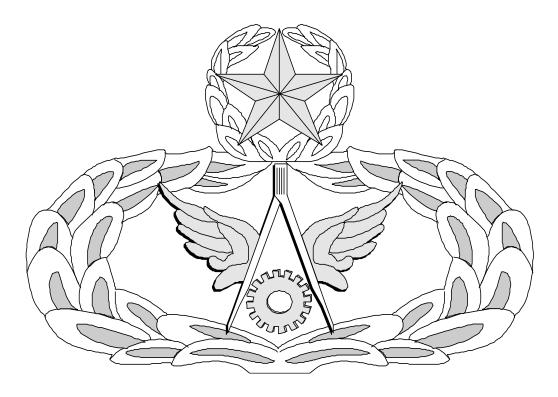
The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE	YES	NO
gather the required tools and equipment?		
2. properly prep the damaged area?		
3. use the proper methods for installing patching?		
4. use the proper methods for installing backing?		
5. finish the patch properly?		
6. comply with all safety requirements?		

FEEDBACK: Trainer/Certifier should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer/certifier.

Air Force Civil Engineer QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



FOR STRUCTURAL

(3E3X1)

MODULE 21

FINISH CARPENTRY

INSTALL GYPSUM BOARD (3E3X1-21.2.1.)

QUESTION	ANSWER
Gypsum board is a fire retarding material that comes in standard foot width and lengths from to feet.	d. 4, 8, 16.
What are the three common types of fasteners used for gypsum board?	a. Nails, screws, and adhesives.
What are the two most common thickness of drywall?	c. $\frac{1}{2}$ - and $\frac{5}{8}$ inch.
4. Ring-shank nails should be long enough to penetrate the wood at least	d. ¾-inch.
When single nailing gypsum board on walls the nail spacing should be	d. 6- to 8-inches apart.
6. Always leave a inch space between sheets to help hold joint compound.	b. ¹ / ₈ -inch.
7. Gypsum sheets may be cut by scoring with a	d. utility knife.
8. What can be used to firmly hold gypsum board sheets against ceiling joists?	a. Deadman or T-brace.
9. Why should you position sheets so that no tapered edges border any rough openings?	c. To prevent the bevel on the sides of the sheet from interfering with the finish trim.

PATCH GYPSUM BOARD (3E3X1-21.2.3.)

QUESTION	ANSWER
What are the primary causes of drywall blemishes?	a. Structural shifting and water damage.
2. Why is it necessary to sand the edges of the repair hole?	c. To ensure proper adhesion to the joint compound.
Small cracks can be easily repaired by —— .	b. gouging out the crack and filling it with joint compound.
Backing material is not required on medium-sized holes.	b. False.

MEMORANDUM FOR HQ AFCESA/CEOF 139 Barnes Drive Suite 1 Tyndall AFB, FL 32403-5319

5. Thank you for your time and interest.

FR	OM:
SU	BJECT: Qualification Training Package Improvement
1.	Identify module.
	Module # and title
2.	Identify improvement/correction section(s):
	STS Task Reference Performance Checklist Training Reference Feedback Evaluation Instructions Format Performance Resources Other Steps in Task Performance
3.	Recommended changesuse a continuation sheet if necessary.
4.	You may choose to call in your recommendations to DSN 523-6445 or FAX

DSN/Commercial 523-6488 or (850) 283-6488 or email ceof.helpdesk@tyndall.af.mil.

YOUR NAME, RANK, USAF Title/Position