A10-C Custom 6 foot LITENING TGP Utility Cable

Purpose:

This document details the construction of a new tool for Mission Systems groups that support the A10-C airframe. It is a 6' long custom LITENING TGP cable set that provides the ability to hook up the targeting POD to an A-10-C (modified) airframe without the need to lift the POD to the aircraft. Those that understand this procedure will realize that not having to raise up the POD to the pylon will result in a large time and labor savings. Eliminating this step also decreases wear on ground support equipment and increases overall safety by eliminating the lift procedure.

Additionally, this document has been written at an Apprentice level to educate and assist less experienced Airmen that may be tasked with this project.

Acknowledgment:

Greetings to all ANG units around the country that find this documentation helpful and my personal thanks to several members of the IDANG 124th MXS that provided me with technical information and training that enabled me to build this tool.

SMSgt Patrick Handley, SMSgt Kirk Weinert, MSgt Charles Boyd, TSgt Aaron Hardin and SSgt Jacob Sams.

Concept:

The first thing to understand about this cable set; is that it is NOT a duplication of the wiring diagram as listed in ***TO 1A-10C-2-40TS-9/Fig6-8/pp 6-101***. The T.O. lists the wiring as it is connected from the airframe to the pylon. Since we are building an extension to the cable, the internal wiring of this cable set is a straightforward 1 for 1 pass –through, pinned-out as listed on the (right hand side) (Targeting POD) side of ***TO 1A-10C-2-40TS-9/Fig6-8/pp 6-101***.

In other words: One end of these cables will have a pair of opposite sex jacks that will mate directly into the plugs in the pylon, the other end of the custom cables will then present the correct pylon plugs for the POD 6 feet away, (no more lifting the POD).

Additionally due to the nature of this cable: namely its extra length possibly affecting signaling and increased possibility of breakage due to stress from its greater length and weight; substitute wire has been selected that will increase the cables strength and lower resistance to maintain signal quality.

Required Parts:

You will need the 2 original plugs that are at the pylon and their opposite sex jacks.

Here are the NSN's for the 4 of them:

5935-01-315-4384 / 5935-01-169-9960 and **5935-01-371-4751 / 5935-01-282-8960**. See figure 1 and 2 at the bottom of this document for pictures of these plugs. These will all come with the required pins; **however:**

This one will not: There is a *unique miniature coaxial connector* located at pin 4 of 9480P77. You will need a male and female of this pin; the NSNs are: **5999-01-127-5756** and **5999-01-105-4962**. See figure 3 and 4 for pictures of this pin and its connector.

You will need 4 of the following back-shells: **5935-01-172-8574**.

You will need 8 of the following splice conductors NSN: **5940-01-356-6741**, order a box.

The T.O. shows that the less complex cable (9480P77) uses both 12 and 16 gage wire. Use instead ALL 16 gage wire NSN **6145-01-195-3395** for this cable. For pin 4 of this cable (the miniature coax pin) use wire NSN: **6145-01-232-7484**.

The T.O. shows that the more complex cable (9480P75) uses 24, 22 and 20 gage wire. Use instead ALL 20 gage wire NSN **6145-01-006-5530.**

The T.O. diagram also details 6 more pins that use a shielded twisted pair. Use wire NSN **6145-01-127-7181** for this. The shielding of the 3 runs of this wire, are the ones connected to the back shells using the above listed splice conductors.

You will require a bag of terminal lugs NSN **5940-00-557-1629**

Of course don't forget all the usual cable supplies such as F-4 tape, wax string, 15' of cable sheathing (snake skin), tie wraps, etc.

Pre Assembly Notes:

*Notes on wiring to **Apprentice** Airmen:*

All lengths of wire will be drawn to 7' (seven feet); to provide a buffer for mistakes (re-pinning) and trimming.

Don't forget to comb the wires as you tie them into a bundle. If the wires are not combed and tied down in a smooth straight pattern throughout the entire length of the cable; then the ends of the different wires will move back and forth (appear to change length) as the cable is handled during assembly. This will make it very difficult to get the wires trimmed to an even length. This will cause most of the stress to be placed on just a few pins and shortly after the cable is assembled; those few pins might rip out of the connector. ---FAIL---

Also, the miniature coax connectors are extremely changeling to solder, requiring the use of lighted magnification. The main challenge is that the connector is so small and the center conductor hole so deep inside the connector: that the end of both wires will have to be inserted simultaneously. The length of the wires will have to be precut precisely (there is literally no room for error). To make matters worse, the center conductor hole is so small, that you will not be able to 'tin" the end of the wire as it will become too fat to be inserted. What does this mean? It means that unless you make a perfect shot with the center conductor wire as both of them are being inserted, some of the wire strands in the wire will hit the center connector hole and peel-off, deflect 90 degrees and ground against the side of the plug. Unless you use a lighted magnifying glass you will never see it, until it is too late. Oh, and while you are trying to do this, the second conductor wire will be constantly obstructing your view, good luck.

Now that you finally have all this in position and are literally holding your breath to keep it there, try to solder the connector into place with a heat gun without knocking the wires out of position! (Don't be a hero; I highly suggest you get help with this). Once you get the first micro coax on; thoroughly function check it before terminating it into the plug. Then function check it again! Sometimes just inserting this pin in the plug will break it.

*Readers Digest version for **Journeymen**:*

This is a long cable; take care to make sure it is properly stress relieved and watch out while terminating that micro coax connector, it's a tricky one.

A note for Supervisors:

If you plan to assign your most skilled assembler this task, order at least 3 of each end of pin #4; If not,,,,,,,,,,, order more.

Assembly:

Let's start with the less complex (9480P77) cable.

Draw 7 lengths of 16 gage wire NSN **6145-01-195-3395** and 1 length of the mini-coax wire NSN: **6145-01-232-7484.** Bundle then up to create the core of the 9480P77 cable.

> *This is the cable that uses the miniature coaxial connectors, please re-read the above note on the miniature coaxial connectors and make sure* ***you are using the correct sex*** *of the special pin in each plug. Please see example pictures.*

Pin out one end of the cable assembly (it does not matter which end you decide to do first) and attach the correct plug or jack. Then slip on the cable sheathing, wrap up, and seal the end. At this point, this end of the connector is done except for the grounding strap from the splice conductor that should be sticking out near the base of the plug through the A-4 tape. Carefully measure and then crimp a terminal lug onto the strap, so that it will just barely reach the backshell clamp bolt leaving no extra slack. See figure #5 and 6 before crimping.

Now that all the wires are terminated into one connector, you will be able to properly lengthen the wires. Straighten out and fully stress-relieve the cable, then trim the wires until perfectly even. At this point the cable should be about 6.5 feet long. That's OK. The extra 6" is a safety net in case you have to cut off some kind of mistake later on.

Don't forget to slip on the other backshell (facing the right way of course) at this time.

Finish by terminating and sealing up the other end of the cable and connect a terminal lug the same way as described above.

Exercise the cable a bit; (better it fail now then on the flight line); then fully function check the cable with a multimeter.

Cable #1 complete.

Cable #2 9480P75

Draw 14 lengths of 20 gage wire NSN **6145-01-006-5530** and 3 lengths of shielded twisted pair NSN **6145-01-127-7181** and bundle then up to create the core of the 9480P75 cable.

The nice thing about this cable is that all the pins are the same on each respective end (male on one end and female on the other) in other words, no difficult to terminate micro-coax pins like the first cable. The downside is that the 3 shielded twisted pair wires will require extra work. You will have to strip the insulation from all 6 ends of the 3 shielded twisted pair wires to expose the shielding to a length of 3.5". Then cut all the shielding away except for ½ inch. Fold the ½ inch of shielding back over itself on top of the insulation to create a soldier point for the splice conductors. Then slip on and heat gun the splice conductors into place.

Finish pinning and terminating one end of the cable (does not matter which one).

Special note here: there are 3 splice conductors at both ends of this cable. All 3 splice conductor grounding straps will have to be inserted into a terminal lug so that they can be grounded on the backshell bolt. The problem is; they won't fit.

You will be unable to get all 3 grounding straps inside one of these terminal lugs unless you modify it a bit first. Put the terminal lug in a vice and carefully drill out the center of the lug removing the minimum amount of metal that will allow all 3 straps through. Then carefully measure and crimp the terminal lug onto the strap, so that it will just barely reach the backshell clamp bolt leaving no extra slack. See Figure #5

Finish sealing up the cable and then exercise and function check the whole thing again.

Cable #2 complete.

Once both cables are complete bind them together with tie-wraps leaving each end open enough so the "Y" will spread about 8"-10". See figure #7

Author:

SrA Stephen Arnone
Avionics Backshop
124thMXS
23APR10

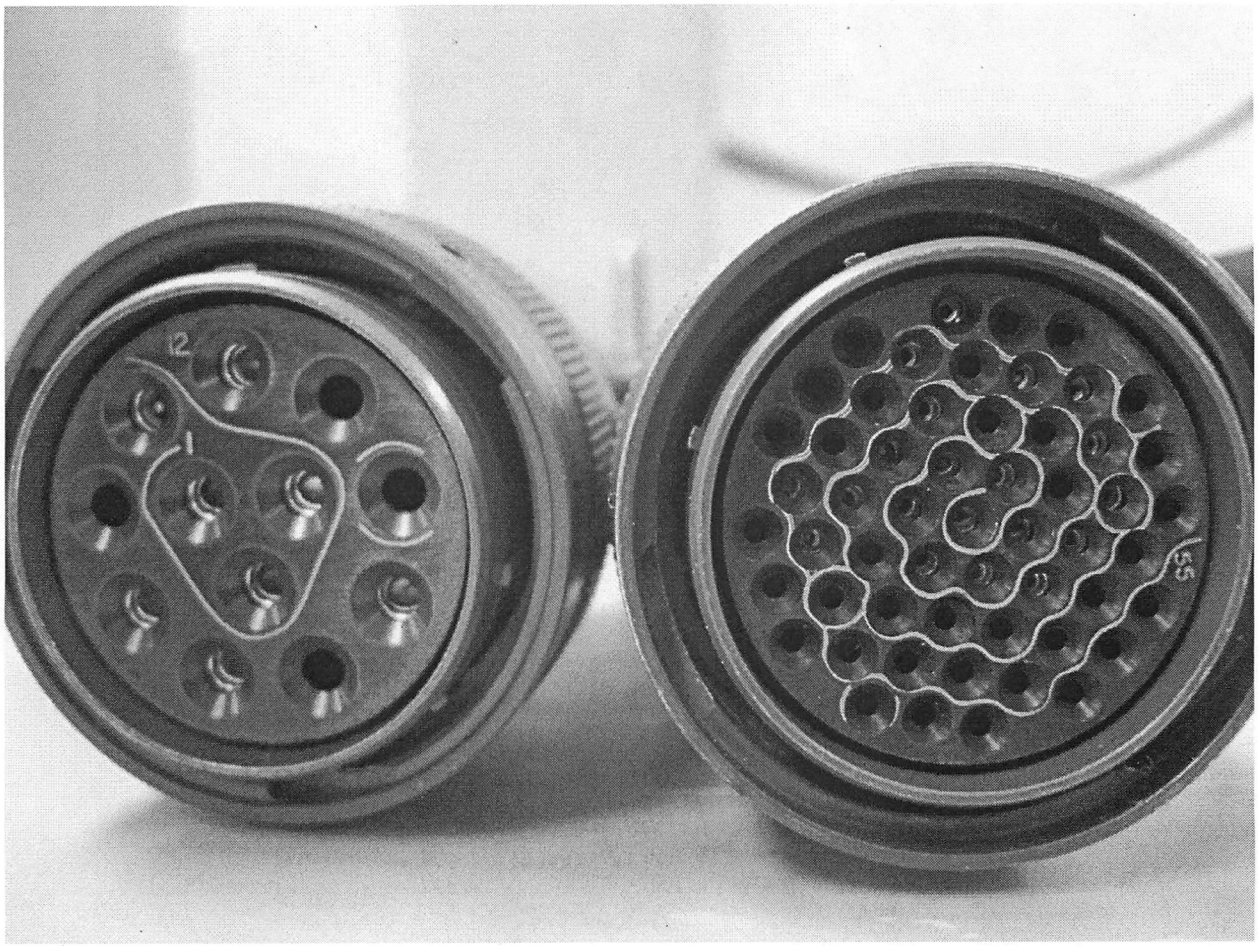

FIGURE #1 Connector #1 &2 the 12 pin and 55 pin connectors (connects to POD)

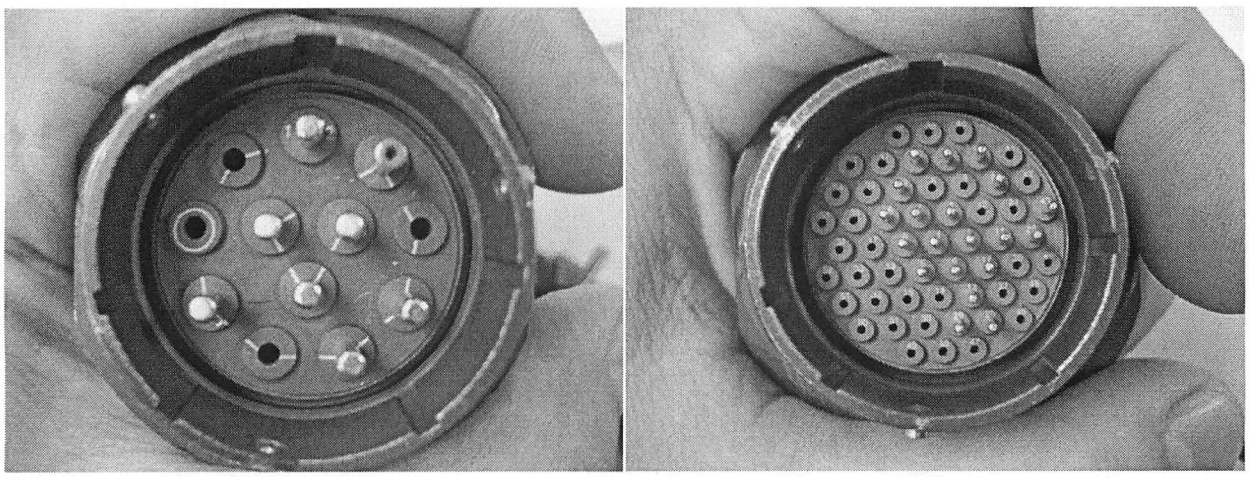

FIGURE #2 Connector #3 &4 the 12 pin and 55 pin connectors (connects to PYLON)

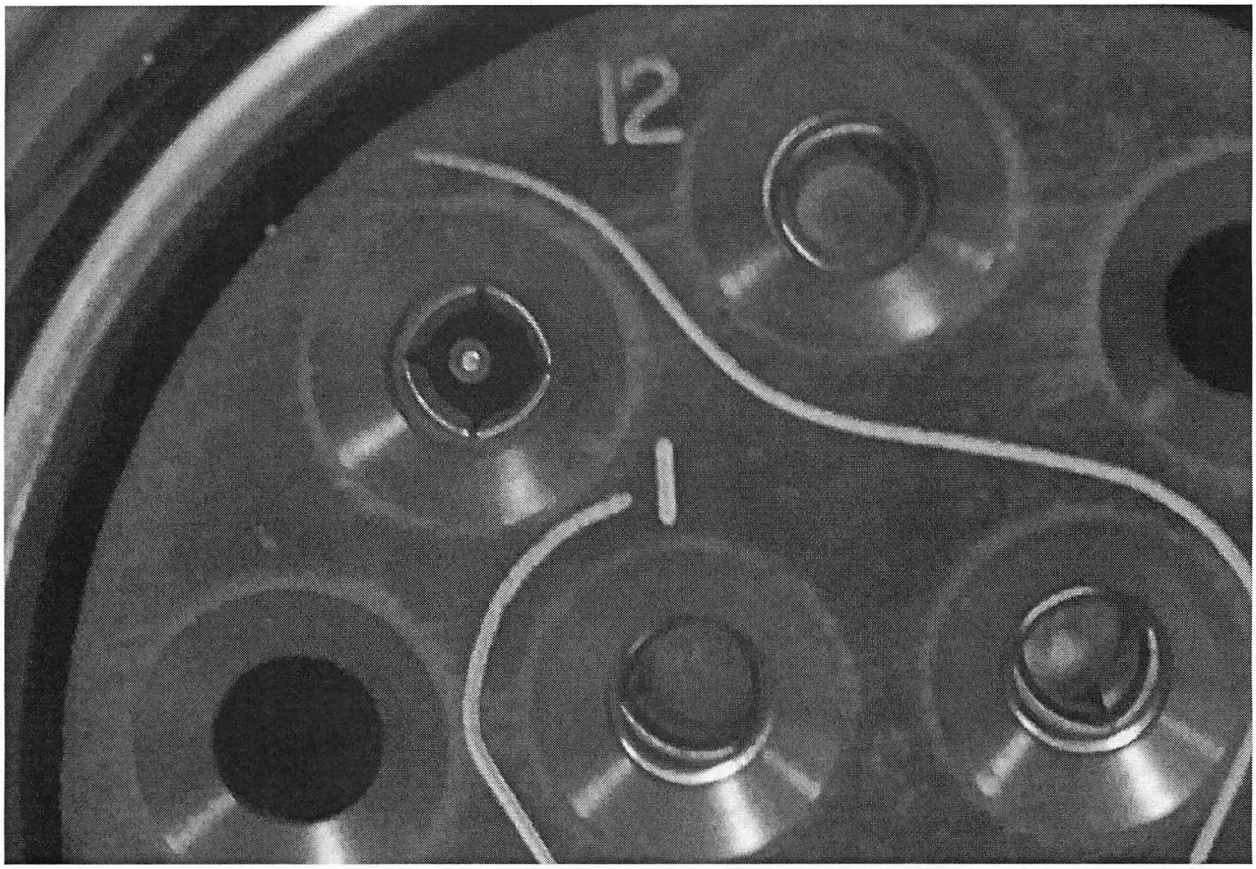

FIGURE #3 Pin # 4 (The micro-coax pin)

tyco Electronics

Shielded Contacts

Raychem

SolderTacts Shielded One-Piece Solder Contacts (Continued)

SolderTacts Series:
MIL-C-38999, Series I, II,
III, IV Circular Connectors

SolderTacts Product Construction, MIL-C-38999 Series

FIGURE #4 Pin # 4 (The micro-coax pin) Male and Female

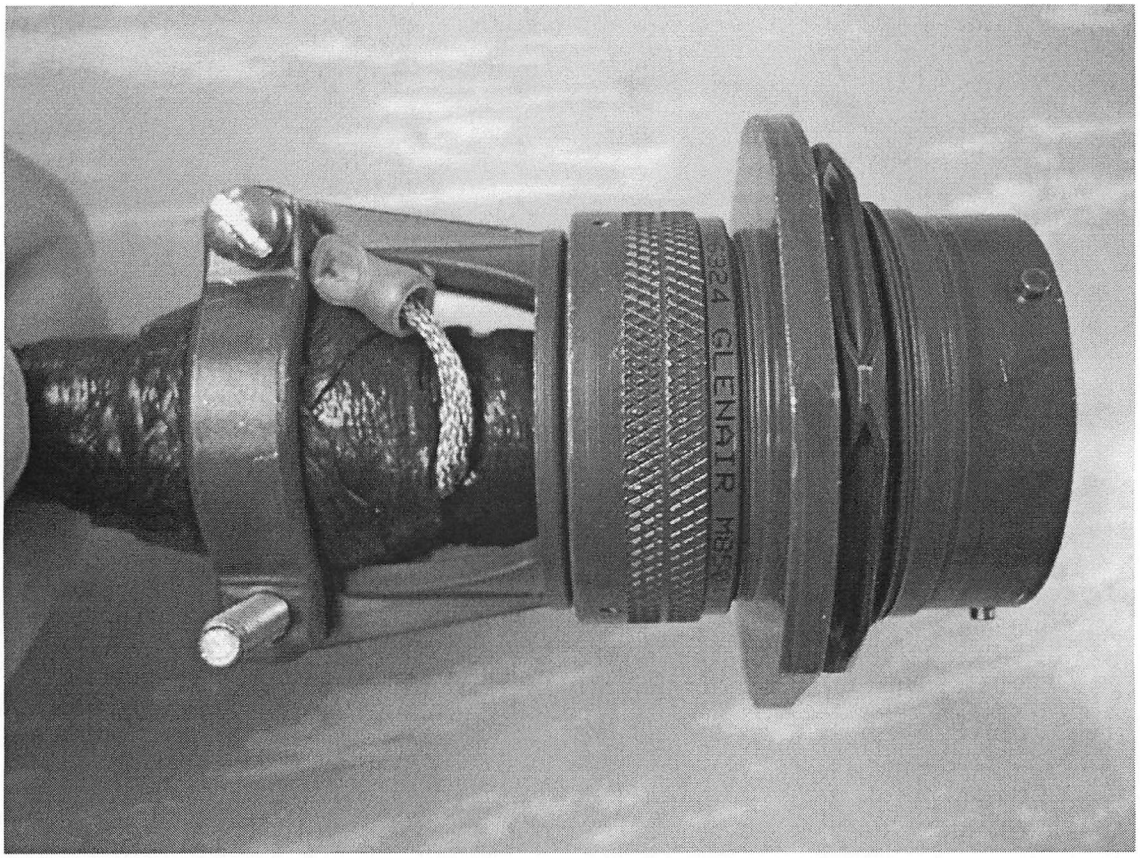

FIGURE #5 The modified terminal lug with 3 grounding straps

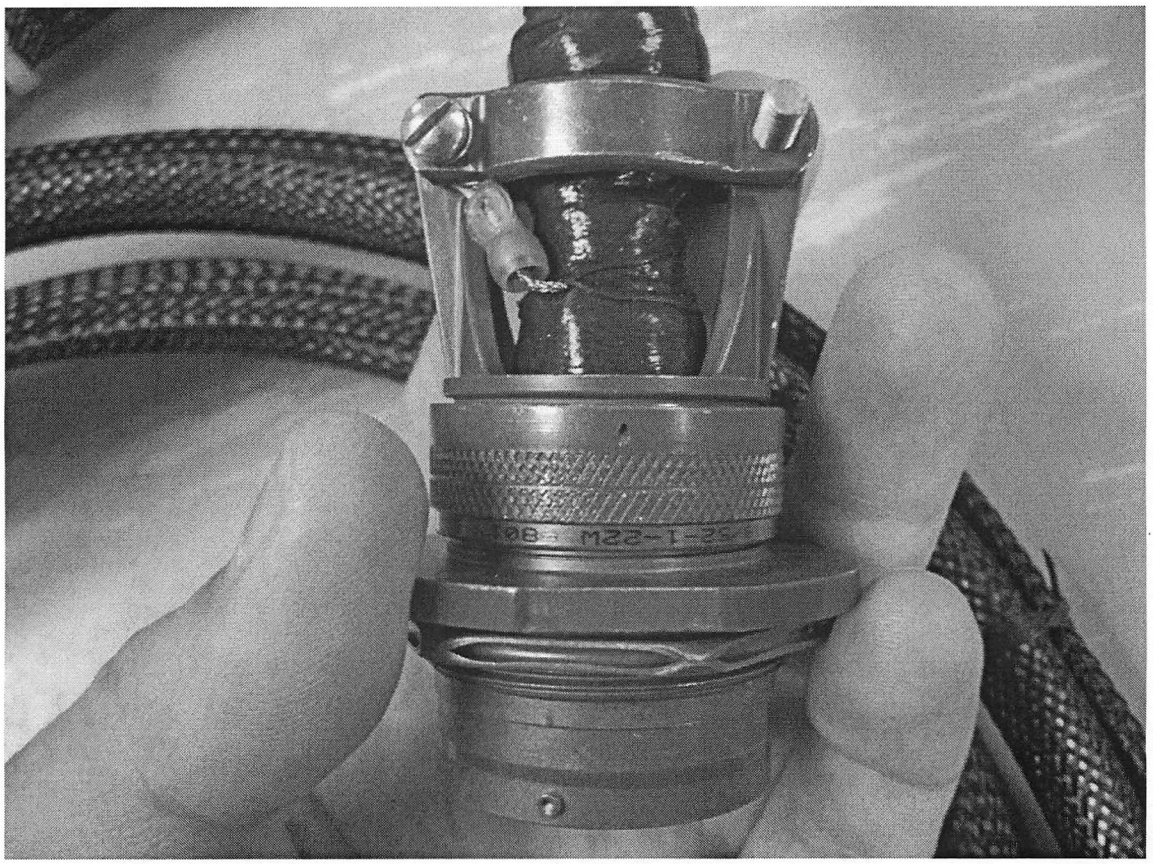

FIGURE #6 Properly Grounded terminal lug

FIGURE #7 the finished product

Turn the completed cable in to Mission Systems for a full function check. If upon hooking up this cable, the LITENING pod activates on its own and melts a hole in the hangar door. You did something wrong. Change your AFSC to 4D0X1 and go hide for awhile.

----------Just a little IDANG Humor----------

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