Analysis of the November 26, 1971 Loss of Owl 08 (REFNO 1781) Report Date: November 11, 2022

Acknowledgments

The authors are grateful to the Steadman and Beutel Families for trusting a group of strangers to help tell their loved one's stories. We admire the families' relentless pursuit of the truth in spite of the passage of time. Additionally, we would like to thank the many, many people who provided inputs, assessments, and critiques of this report, in particular, the Center for MIA Research (CMIAR). Finally, the majority of information analyzed in this report – in particular, all forensic field evidence – was provided by the Defense POW/MIA Accounting Agency (DPAA), without which this report would not have been possible.

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Executive Summary

The League's Archival Research Committee (ARC) Team (hereafter "Team") has spent years and thousands of volunteer hours researching and analyzing the information and evidence available for REFNO 1781. It has led us to conclude that Capt Jim Steadman and 1Lt Bob Beutel, USAF most likely died on Friday, November 26, 1971 between approximately 3:28 AM and 3:50 AM local time while on a combat mission over eastern Laos. Whether their deaths were related to enemy action or not cannot be determined based on the evidence available (and is likely not determinable). However, the Team believes that during the May 2013 excavation of an unrelated O-1 Bird Dog loss (REFNO 0572), the uncorrelated F-4 (UNC 3153) DPAA found at site LA-00527 (Grid Coordinates 48Q XD 03046 83292) is that of REFNO 1781. This assessment is based on the following.

1. UNC 3153 is near where the team determined the aircraft's last-known position was and is consistent with two post-target projected flightpaths identified by the Team. (Circumstantial Information)

2. At least one man was aboard, making it an MIA loss. In January 2020, DPAA assessed that, "Analysis of the material evidence from a previous excavation [2013] indicates that one individual was in the aircraft at the time of impact." (Forensic Factual Information)

3. The wreckage must be from an F-4C or F-4D series aircraft. This assessment is based on a data plate DPAA found at UNC 3153 and the Team later assessed to be from a General Electric J79-15 jet engine, the -15 subtype being exclusive to F-4C, RF-4C, and F-4D aircraft. Additionally, since a Sparrow missile launcher component was found, this ruled out this site as being an RF-4C reconnaissance aircraft because that variant did not have such launchers. (Forensic Factual Information)

4. This F-4C or F-4D aircraft must have been lost on/after April 1, 1966. This conclusion is based on the Team's assessment that a Hose Tag (Part # 656200-3-0190) found at 3153 is from an F-4 Outboard flap emergency down line and had an Assembly Date of April 1966. (Forensic Factual Information)

5. For two different reasons, the Team disputes DPAA's conclusion that 3153 cannot be 1781's crash site because a fresh crater said to be the 3153 crash site is seen in satellite imagery on December 21, 1966, almost 5 years earlier. First, the Team analyzed the 1966/1967 imagery and the crater size and round shape suggest a bomb/ordnance detonation, not an aircraft crash crater, and there is no debris present. Many bomb craters were observed on the 1966/1967 and October 30, 1972 (declassified satellite) imagery, and can be seen on modern satellite images. Second, if DPAA's imagery assessment is correct, the 3153 aircraft must be an F-4C or F-4D lost between April 1 (Hose Tag assembly date) and December 21, 1966 (imagery taken date). However, only two such losses over Laos occurred during this period, both of which were OPLOSSES (both men out of the aircraft). This is not compatible with the life support equipment found. Furthermore, these OPLOSSES were 72 and 9 miles respectively from 3153, too far away. (Circumstantial Information) In sum, the identity of the aircraft found at 3153 cannot be determined by imagery alone. (Scientific Information)

6. Of the six F-4 off-the-scope losses over Laos the Team is aware of, we believe five – REFNOs 1101, 1366, 1518, 1772, and 1794 – can be ruled out as being associated with 3153 due to last-known positions being too far away and/or incompatible engine subtypes. This leaves only 1781 as a potential match for 3153. (Circumstantial Information)

However, the Team is also aware the 2021 REFNO 1781 Scrub Sheet clearly states, "There are still multiple uncorrelated F-4 crash sites in the loss area that analysts have yet to be associated with known incidents." This means that while multiple lines of evidence point to 3153 being 1781's location, it's possible one of these uncorrelated crash sites is actually that of 1781. Among the Next Steps is for DPAA to provide both the final 3153 excavation Life Support assessments and the coordinates of all uncorrelated F-4 crash sites in Laos to the families so this case can move forward.

Purpose, Research Methodology, and Overview

Thank you for taking the time to read this report, the result of thousands of volunteer research hours by many people. Its purpose is threefold:

1. To provide the Steadman and Beutel Families a comprehensive and detailed analysis of the facts in their case. The goal is to understand what may have happened to their loved ones and where the aircraft may have gone down. It is our very best effort to tell their story and we hope our due diligence proves worthwhile.

2. To provide DPAA with useful and actionable analysis resulting a from a "deep dive", cross-functional (i.e., intelligence, linguistics, imagery, aircraft operations, and aircraft maintenance) case report.

3. To demonstrate the capabilities of the League's ARC Team (i.e., what a small group with complementary skillsets and a very narrow mission focus can accomplish to support the MIA Mission).

With that said, Department of Defense records show that on Friday, November 26, 1971, Capt Jim Steadman (pilot) and 1Lt Bob Beutel (Weapon Systems Officer, WSO) assigned to the USAF's 497th Tactical Fighter Squadron – "Nite Owls" – went missing-in-action while flying F-4D 66-7752 callsign "Owl 08". Their Mission Number was B-3-042 and they were scheduled as a night Forward Air Control (FAC) mission near the Ban Karai Pass in eastern Laos. The fate of the crew remains an enduring mystery more than fifty years later.

Of the basic questions – who, what, when, where, why, how? – only the "who" and "when" are known and this document is an attempt to answer the others. To do so, it takes the approach of working from the known to the unknown by presenting the facts of this case, analyzing them, and then attempting to explain what might have happened to the missing men. Nothing can be certain until DPAA resolves the case but this document is the Team's best assessment based on the available information and evidence to-date.

In order to establish a common language, the following definitions regarding types of information, excerpted from DoDI 3001.03, Enclosure 2 (March 14, 2008), were used:

E2.1 Circumstantial Information. Indirect information concerning matters surrounding a loss incident, rather than direct information on the event itself.
E2.2 Contested Information. Information that is challenged for its accuracy, completeness, and/or relevancy.
E2.3 Forensic Factual Information. Information of a statistical or empirical nature, together with any analysis thereof (e.g., material presented to provide a factual background to the case under consideration).
E2.6 Scientific Information. Information derived from examination of technical principles, methods, or data, at times requiring explicit technical measurements and/or analytic assessments.

Likewise, the reader should keep in mind that of the wartime records we do have, not all are complete and some accounts and evidence from that time are conflicting or contradictory. With that in mind, it is the Team's opinion the missing crew experienced a sudden and catastrophic event and did not (or could not) attempt ejection. This opinion was reached because no radio distress call was made and no ejection beepers were heard (the latter of which would have been picked up by any aircraft monitoring UHF Guard Channel operating within about 100 miles). This document evaluates three possible scenarios as to what might have happened and where the aircraft may have crashed.

1. Midair collision. This would be the simplest reason and explain the lack of a distress call or beepers and no definitive crash site in spite of an extensive Search-And-Rescue (SAR) effort. To wit, the only other aircraft lost in Southeast Asia on this date was a US Army OV-1 Mohawk reconnaissance aircraft that had a fatal takeoff accident in South Vietnam. (VHPA) On the Vietnamese side, according to the 2004 book "The

Martyrs of the People's Air Force of Vietnam", the Vietnamese People's Air Force (VPAF) did not lose any aircraft in November 1971. In fact, the nearest previous loss date was 5/30/1971 (IL-28 bomber that crashed near Hanoi) and the nearest later loss date was 12/18/1971 (MiG-21 fighter shot down).

2. Broke up before impact somewhere in/around its target area. This would also explain the lack of communication from the crew as well as the reason why extensive SAR efforts (reviewed in detail in the section Search-and-Rescue Details) never found any trace of the aircraft. (Unfortunately, this is the worst possible scenario for recovery of remains.) It does not explain why the aircraft was lost, however. A translated Vietnamese air defense forces document listing all claimed shootdowns of US aircraft in Laos in the November 1971 timeframe does not match 1781 or any US losses for that period (see the section Vietnamese Air Defense Records for details). However, this doesn't mean the aircraft wasn't shot down as such records are far from authoritative.

3. Crashed somewhere outside the areas searched. Regardless of why and how the aircraft crashed, perhaps the reason no definitive location has ever been found is that we've been looking in the wrong places all along. During an interview with the pilot who led the first mission to search for the missing crew, he said they arrived over Owl 08's target area between 7:00-7:30 AM local time (about 3-4 hours after the crash) but saw no new crash sites, only existing ones. According to him, "We were out at first light and spent days searching all the passes they covered for wrecks. I think the number we found was in the dozens but no new ones. The aircraft had been falling at a great rate for years up that way. I made so many passes on pieces and parts during the week following the loss they could not be counted. Over the days I looked for them I covered all four passes we flew around [i.e., Nape, Mu Gia, Ban Karai, and Ban Raving]. Mu Gia was the place I found the most parts and pieces but I found many sites with many pieces but none could have been too new. We did not give up for a long time and spent any time we had free on later missions looking in unlikely places." (Yates) Likewise, the extensive weeklong SAR effort turned up nothing (again, reviewed in detail in the section Search-and-Rescue Details).

That said, this document uses the following sequence in the Team's quest to determine what happened to the crew and where their final resting place may be.

1. Reconstruction of the mission from Official Records
2. Resolving Discrepancies in Official Records (important for the families' peace-of-mind)
3. Details of the extensive, weeklong Search-and-Rescue effort
4. Analysis of wreckage found at UNC 3153
5. Analysis of Wartime Imagery and Narrowing Down the Identity of 3153
6. Conclusions and Next Steps
7. Appendices (additional information not central to the case but may be useful to the reader)

Reconstructing the REFNO 1781 Mission

The following sequence of events was compiled from multiple sources (i.e., Air Force Form 484, SAR Logs, and interviews with former "Nite Owls", members of the 497th Tactical Fighter Squadron) and intends to document what we know about the mission up to the point where the crew was declared missing.

2:30 AM – Owl 08, F-4D 66-7752, assigned to the 497th Fighter Squadron, 8th Fighter Wing and crewed by pilot Capt. Jim Steadman and WSO 1Lt. Bob Beutel, took off from Ubon Airbase, Thailand. Jim Steadman was on his second tour of duty with the 497th and this was his 317th combat mission. This was Bob Beutel's first operational assignment and he was on his 88th combat mission. Weather conditions were: 4,000 feet broken to overcast ceiling with rain showers, poor visibility, and moderate turbulence below 10,000 feet. The aircraft had a gross weight of 53,000 pounds and was configured for a night Forward Air Control (FAC) mission with:

- 1 600-gallon centerline fuel tank
- 3 CBU-24 800-lb. cluster bombs
- 2 M36 690-lb. incendiary cluster bombs
- 2 SUU-42 flare dispensers with 16 LUU-2 illumination flares each
- 2 AIM-7E Sparrow air-to-air missiles (serial numbers 524 and 558)

Figure 1: F-4D 66-7752 circa 1969 Source: Wendell Keller

2:31 AM – Owl 08 checked in with "Lion" (radar site at Ubon), who cleared them for Air-to-Air Refueling (AAR) at 24,000 feet MSL (above Mean Sea Level) for an offload of 5,000 pounds. Note that Lion logs from that night are not available but we do have the written statement of 1Lt David Drew, the Lion Weapons Controller on-duty that night. He reported that all communications with Owl 08 were normal (see below).

STATEMENT

7 December 1971

I was working Radar Monitor scope at 0300 local, 26 November 1971. Aircraft call sign Owl 8 called on my frequency after a normal tanker rendevous for radar monitor. Radar contact was called and after a few minutes Owl 8 notified me he was going tactical. There was no indication at any time that the aircraft had any difficulties. Upon completing his mission it would be expected that Owl 8 would return to my radar monitor frequency for either additional gas or for RTB information, neither of which he in fact did.

David H. Drew

DAVID H. DREW, 1st Lt, USAF
Weapons Controller

Figure 2: Lion Weapons Controller Statement Source: USAF

2:45-3:00 AM – Owl 08 took 6,000 pounds of fuel (1,000 more than planned) from Cherry 67, a KC-135A from Plattsburgh AFB, NY flying out of U-Tapao RTAFB, Thailand. The refueling was conducted in the Cherry AAR Track

(approximately 40 miles north of Ubon) at 24,000 feet MSL at 315 knots. Owl 08 departed the refueling track with the maximum fuel load it could carry in this configuration – 15,000 pounds.

3:00 AM – Owl 08 was headed 025° over 16 02' N 105 48' E (2 miles southeast of Ban Napham, Laos) at 24,000 feet MSL and contacted "Lion" who cleared them to their target area near Ban Karai. Owl 08 then did a brief check-in with "Moonbeam", the Airborne Command and Control Center or ABCCC (an airborne command post, pronounced "A-B-triple C"), then switched to their tactical working frequency (the frequency they would use during weapons delivery). Normally, Moonbeam would give a weather update from other aircraft in the target area. However, as we will see later in this document, Owl 08 was the only aircraft headed to Ban Karai at this time, so this did not happen. This was the last documented communication with Owl 08.

3:10 AM (estimated) – Upon reaching the target area, the crew would have set up for the first illumination flare drop. The weather minimums (rules) for weapons delivery required clouds be 4,500 AGL (Above Ground Level) or higher with 3 statute miles inflight visibility or better. In order to see ground targets, flares needed be dropped below the lowest cloud deck, so assuming there were no clouds below them, it was squadron practice to overfly the target level at 8,000-9,000 feet MSL (approximately 6,000-7,000 feet AGL) and 420 knots.

In order to be effective, flares would have to be placed within 1 mile horizontally of the target and since the crew could not see the ground, they would have used the aircraft's "Offset Bomb" weapons delivery mode. Bob Buetel would have cued the radar to an Offset Aimpoint and had the aircraft's Weapons Release Computer System (WRCS, an analog bombing computer; pronounced "W-R-C-S") automatically release the flares. If the crew did not see any trucks, they would likely have continued to drop flares and search for targets along the trail routes that snaked through their target area. Upon encountering targets, they would have attacked them by dropping a single CBU-24 or M36 bomb from a 20° or 30° dive, releasing between 6,200 and 4,100 feet MSL (approximately 4,500 to 2,500 feet AGL) at 450 knots.

4:30 AM – Owl 08 was reported as overdue and a search-and-rescue operation was initiated by the 8 TFW.

Resolving Discrepancies in the Official Record

Before continuing with what may have happened to the crew, we need to address the 3 key discrepancies in the official record up to this point that had caused the families a great deal of consternation over the years.

Discrepancy 1: Owl 08 did not fly the planned route as shown below in the Air Force Form 484 - MISSING PERSON(S) SUPPLEMENTARY REPORT. 8th Combat Support Group, 8 December 1971. (This is the official record of the crew's disappearance.)

The Form 484 (below) shows a planned route of Ubon → Target Area → Tanker → Target Area → Ubon. Instead, they flew Ubon → Tanker → Target Area → ?

MISSING PERSON(S) SUPPLEMENTARY REPORT

(See AFM 30-4 For Detailed Instructions)

DATE OF REPORT: 8 Dec 1971

THRU: (Command Channels)

TO: USAFMPC (AFPMSCB) Randolph AFB TX 78148

FROM: 8 Cmbt Spt Sq (DR?) APO SF 9639?

1. MISSING

A. DATE: 26 Nov 1971

B. MISSING: 0300 Local

2. TYPE OF AIRCRAFT AND MISSION: F-4D FAC Mission

3. DEPARTURE

A. TIME: 0230 Local

B. PLACE: Ubon AFB Thai

4. INTENDED DESTINATION OR TARGET: Between 1712N10509E and 1703N10558E

5. INTENDED ROUTE: Ubon - Area - Tanker - Area - Ubon

6. WEATHER CONDITIONS IP APPROACH (Include ceiling, visibility, winds, sea conditions, temperature of water, etc.)

Broken to overcast skies, bases 4000 ft msg with rain showers. Visibility varies from poor to none. Moderate turbulance below 15,000 feet.

7. LAST KNOWN LOCATION (Exact coordinates and name of place)

Heading 025 degrees NE at 1620N10458E

Figure 3: REFNO 1781 Air Force Form 484 Missing Person(s) Report, 8 December 1971 Source: USAF

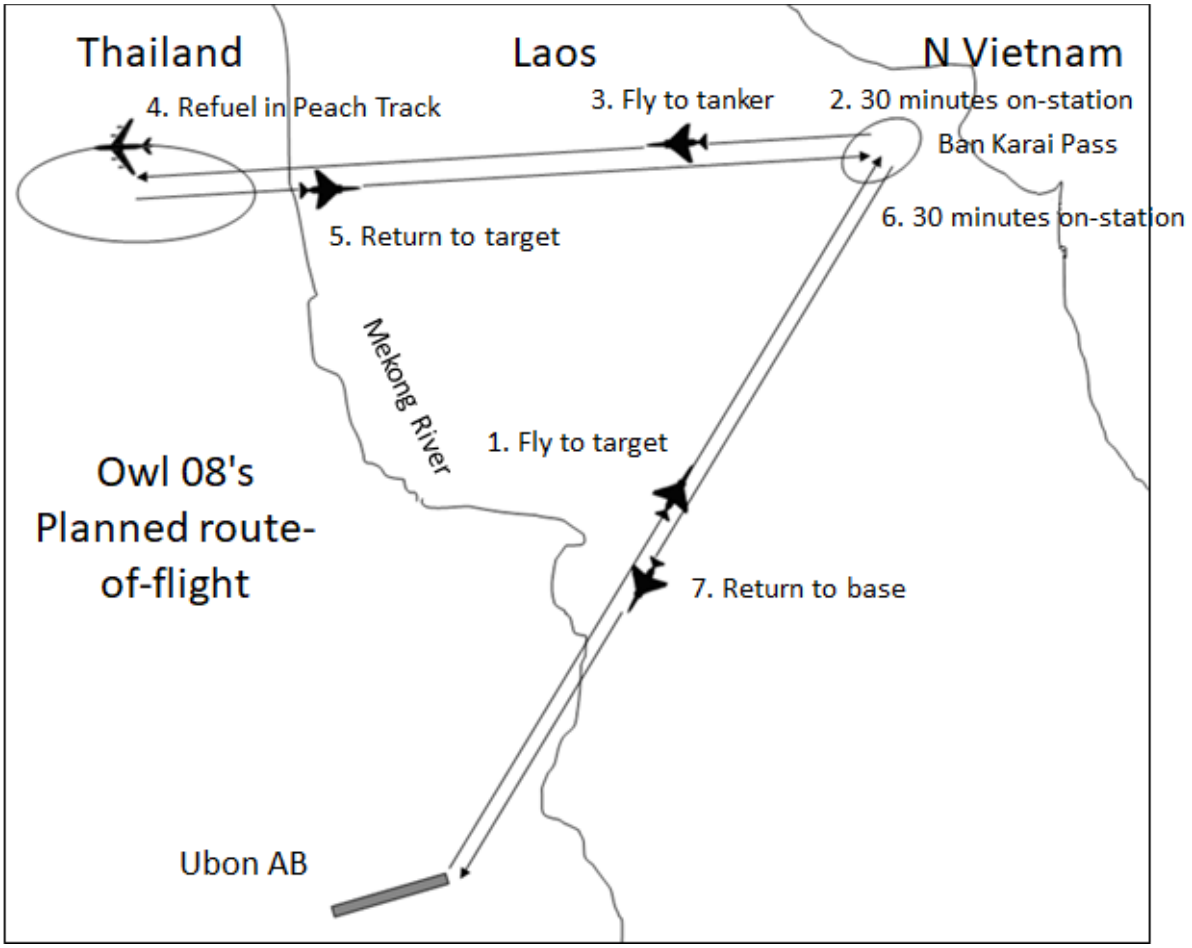
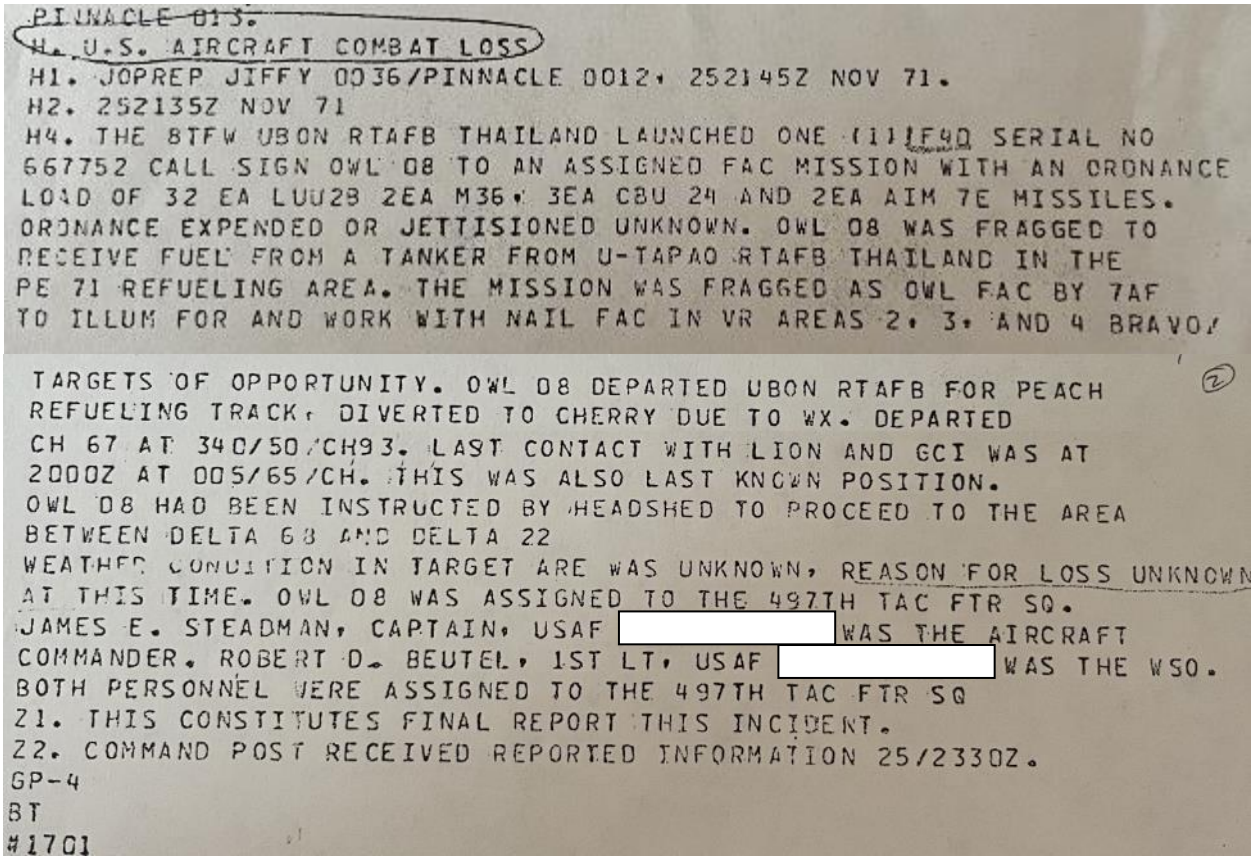


Figure 4: Owl 08's Flight Planned Route

The Team was at a loss to explain this discrepancy until we found the following 8 TFW message (dated November 26, 1971, declassified April 22, 1997) and the declassified SAR logs (dated November 26 to December 8, 1971, declassified November 2, 2000). Interviews with former Nite Owls answered the remaining questions.



PINNACLE 013.
H. U.S. AIRCRAFT COMBAT LOSS
H1. JOPREP JIFFY 0036/PINNACLE 0012. 252145Z NOV 71.
H2. 252135Z NOV 71
H4. THE 8TFW UBON RTAFB THAILAND LAUNCHED ONE (1) F4D SERIAL NO
667752 CALL SIGN OWL 08 TO AN ASSIGNED FAC MISSION WITH AN ORDNANCE
LOAD OF 32 EA LUU2B 2EA M36. 3EA CBU 24 AND 2EA AIM 7E MISSILES.
ORDNANCE EXPENDED OR JETTISIONED UNKNOWN. OWL 08 WAS FRAGGED TO
RECEIVE FUEL FROM A TANKER FROM U-TAPAO RTAFB THAILAND IN THE
PE 71 REFUELING AREA. THE MISSION WAS FRAGGED AS OWL FAC BY 7AF
TO ILLUM FOR AND WORK WITH NAIL FAC IN VR AREAS 2. 3. AND 4 BRAVO/

(2)

TARGETS OF OPPORTUNITY. OWL 08 DEPARTED UBON RTAFB FOR PEACH
REFUELING TRACK. DIVERTED TO CHERRY DUE TO WX. DEPARTED
CH 67 AT 340/50/CH93. LAST CONTACT WITH LION AND GCI WAS AT
2000Z AT 005/65/CH. THIS WAS ALSO LAST KNOWN POSITION.
OWL 08 HAD BEEN INSTRUCTED BY HEADSHED TO PROCEED TO THE AREA
BETWEEN DELTA 68 AND DELTA 22
WEATHER CONDITION IN TARGET ARE WAS UNKNOWN, REASON FOR LOSS UNKNOWN
AT THIS TIME. OWL 08 WAS ASSIGNED TO THE 497TH TAC FTR SQ.
JAMES E. STEADMAN, CAPTAIN, USAF [redacted] WAS THE AIRCRAFT
COMMANDER. ROBERT D. BEUTEL, 1ST LT, USAF [redacted] WAS THE WSO.
BOTH PERSONNEL WERE ASSIGNED TO THE 497TH TAC FTR SQ
Z1. THIS CONSTITUTES FINAL REPORT THIS INCIDENT.
Z2. COMMAND POST RECEIVED REPORTED INFORMATION 25/2330Z.
GP-4
BT
#1701

Figure 5: 8 TFW Message Traffic about Owl 08 Loss Source: 8 TFW DTG MSG Z 0 260420Z NOV 71

Here is the message transcription with terms explained.

> H4. The 8 TFW Ubon RTAFB Thailand launched one (1) F-4D serial no 667752 call sign Owl 08 to an assigned FAC mission with an ordnance load of 32 each LUU-2B [illumination flares] 2 each M36 [firebombs], 3 each CBU-24 [cluster bombs] and 2 each AIM-7E missiles [air-to-air missiles]. Ordnance expended or jettisoned unknown. Owl 08 was fragged [assigned] to receive fuel from a tanker from U-Tapao RTAFB Thailand in the "Peach" refueling area.
>
> The mission was fragged as Owl FAC by 7th Air Force [HQ in Saigon] to illuminate and work with Nail FAC in VR [Visual Reconnaissance] Areas 2, 3, and 4 Bravo/targets of opportunity. Owl 08 departed Ubon RTAFB for Peach refueling track, diverted to Cherry [other refueling track] due to weather. Departed Cherry 67 [the tanker] at 340/50/CH93 [50 miles northwest of Ubon]. This was also last known position. Owl 08 had been instructed by Headshed [Task Force Alpha Command Post at Nakom Phanom Airbase in Thailand] to proceed to the area between Delta 68 and Delta 22.
>
> Weather in target area was unknown, reason for loss unknown at this time. Owl 08 was assigned to the 497 Tactical Fighter Squadron.

James E. Steadman, Captain, USAF [deleted] was the aircraft commander. Robert D. Beutel, 1Lt, USAF [deleted] was the WSO. Both personnel were assigned to the 497th Tactical Fighter Squadron.

Z1. This constitutes final report for this incident.

Z2. Command post received reported information 25/2330Z.

The message clearly stated Owl 08 was "fragged" (assigned) to work with a Nail FAC, an OV-10 Bronco turboprop aircraft operating out of Nakom Phanom, Thailand ("Nail" was a common callsign for OV-10 FACs). Owls occasionally worked with Nail FACs in a "hunter-killer" profile. That is, OV-10s ("hunters"), which flew at slower speeds and had greater maneuverability would operate at lower altitudes that put them closer to see and mark targets. F-4s ("killers") flying at higher altitudes provided flare illumination and ordnance. This message was enlightening because it resolved the first discrepancy. This means the original flight profile was: Takeoff from Ubon → Refuel in the "Peach" refueling track → Fly direct to D52 (near Ban Karai Pass; "D" = Delta Point, a codeword for a point on the ground) → Work with an OV-10 FAC aircraft → Refuel in the "Peach" refueling track → Return to D52 and work with the OV-10 FAC aircraft → Return to Base. However, Owl 08's actual route of flight (Figure 6) was direct to Peach Track, approximately 100 miles north of Ubon but due to weather, they had to turn around and head back south to the Cherry AAR Track, only 50 miles north of Ubon. This explains both why Owl 08 took so much fuel and would have arrived over its target area late even though they took off on time.

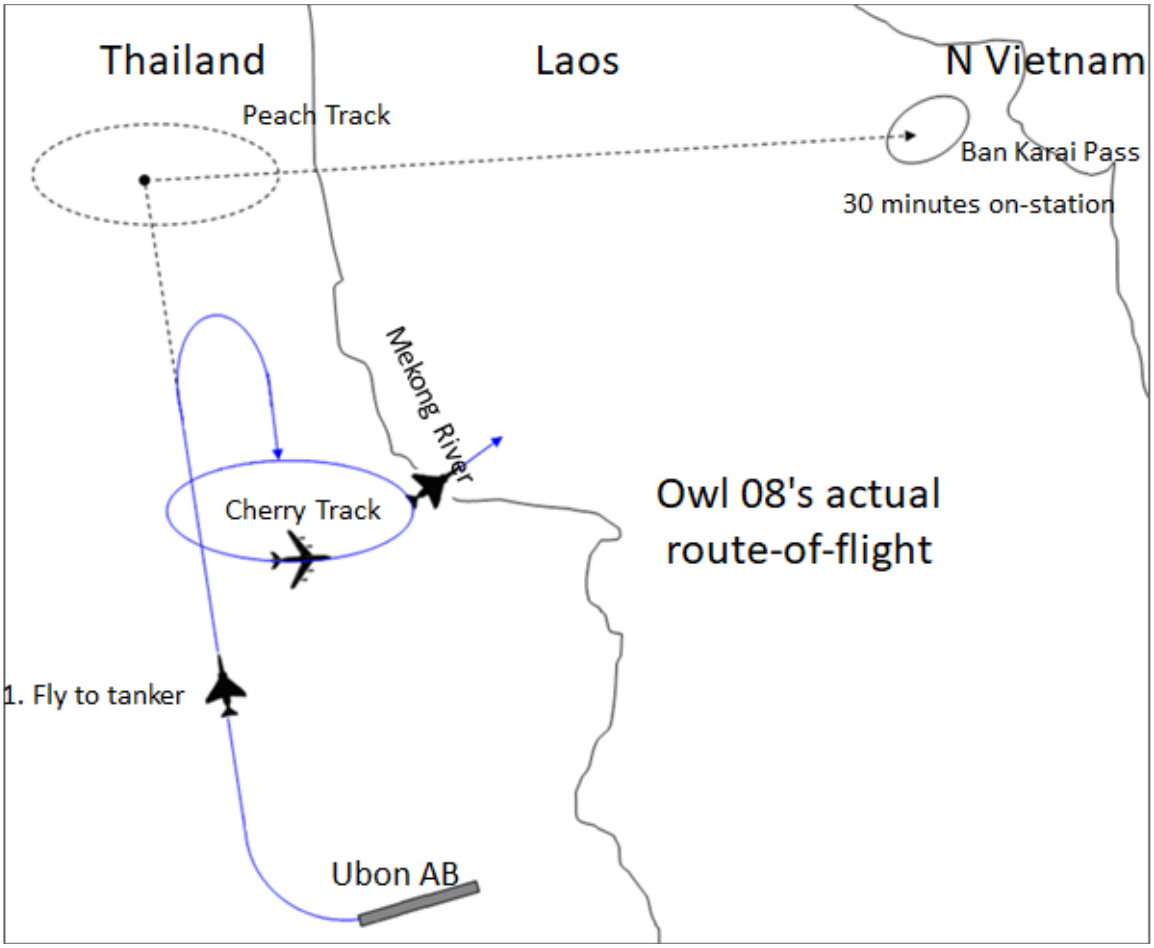


Figure 6: Owl 08's actual route of flight

Discrepancy 2: There is no record of Owl 08 communicating with any other aircraft.

At a minimum, they should have checked-in with at least one other Owl (497th Fighter Squadron) aircraft. Not doing so was counter to long-established squadron communication procedures to do a radio handoff between the aircraft departing the target area to the tanker and the aircraft. Some 497th operational context is needed here. From interviewing former Nite Owls (Sheldon Goldberg, who knew Jim Steadman on Jim's first tour (69-70), and Skip Harrington, who was the 497th Operations Officer in 1969), they explained the Nite Owls would usually stagger launch 8 aircraft, alternating sending one from Ubon → Target → Tanker and the next from Ubon → Tanker → Target. By doing so 8 aircraft could cover a target area from dusk to dawn. As one Owl approached the target area coming from the tanker, they would have received an inflight brief from the Owl departing the target and going to the tanker. They would have discussed things like weather, targets, and anti-aircraft defenses encountered.

The table below shows the 497th was scheduled to launch 8 aircraft – Owls 01-08 – the night of November 25-26, 1971, all to or near the Ban Karai area. However, while the first 4 Owls (01-04) completed their missions, of the remaining 4, Owl 05 cancelled due to weather, Owl 06 was a ground abort (i.e., never took off due to an aircraft problem), and Owl 07 was an air abort (i.e., returned to base after experiencing an inflight problem and did not complete its mission). This means that after 11:30 PM local time the only 497th aircraft to get airborne was Owl 08, which explains why there was none of the normal radio traffic – *there was no one else to talk to*. Additionally, it's interesting to note that Owls 07 and 08 have Actual TOTs about 2 hours *earlier* than originally planned, which may have been moved up due to the weather being forecast to be worse later and/or updated intelligence on ground activity. Also note that Stinger 09, an AC-119 gunship, was fragged on a single-ship armed reconnaissance mission to a target at 16 54' 47" N 105 55' 13" E (48Q WD 9800 7000). According to the Records About Air Sorties Flown in Southeast Asia, 1/1970 - 6/1975 - Record Group 218, Stinger's actual TOT was 3:40 AM, which would put the aircraft about 8 miles southwest of the southernmost point of the Owl 08's target area. This fact has relevance in the section Search-and-Rescue Logs Details.

Likewise, the 23rd Tactical Air Support Squadron (TASS; pronounced "tass") at Nakom Phanom was fragged to launch two OV-10s that night. While it appears that one may have taken off (Mission # 1121), the other was clearly a 'Weather Cancel' and had an additional note of 'Steel Tiger East', a target sector that encompassed Ban Karai. We know for certain that Owl 08 did not work with a Nail that night so Mission # 1124 was almost certainly the one they were supposed to meetup with.

Date	Mission ID #	Launch Base	Unit	Callsign	Aircraft Type	Planned Local TOT	Actual Local TOT	Mission Flown
11/25	8035	Ubon	8 TFW	Owl 01	F-4	8:00 PM	8:20 PM	Strike
11/25	8037	Ubon	8 TFW	Owl 02	F-4	8:30 PM	7:30 PM[1]	Armed Recon
11/25	8039	Ubon	8 TFW	Owl 03	F-4	11:00 PM	11:00 PM	Strike
11/25	8041	Ubon	8 TFW	Owl 04	F-4	11:30 PM	11:30 PM	Strike
11/26	8043	Ubon	8 TFW	Owl 05	F-4	2:00 AM	N/A	Weather Cancel
11/26	8045	Ubon	8 TFW	Owl 06	F-4	2:30 AM	N/A	Ground Abort
11/26	8047	Ubon	8 TFW	Owl 07	F-4	5:00 AM	2:45 AM	Air Abort
11/26	8049	Ubon	8 TFW	Owl 08	F-4	5:30 AM	3:15 AM[2]	Strike
11/26	5231	NKP	18 SOS	Stinger 09	AC-119	4:45 AM	3:40 AM	Armed Recon
11/26	1121	NKP	23 TASS	?	OV-10	?	?	FAC
11/26	1124	NKP	23 TASS	?	OV-10	?	N/A	Weather Cancel

Table 1: Key Mission Summaries for November 25/26, 1971 Source: National Archives (NARA)

[1] This may be a typographical error as it's unlikely Owl 02 would have a TOT 50 minutes *earlier* than the prior aircraft's.

[2] Owl 08's actual TOT is listed as 3:15 AM, which must have been an estimate given there was no information from the crew as to when they actually got there.

Discrepancy 3: Owl 08's ordnance was not the standard configuration for the mission profile flown.

The ordnance Owl 08 was carrying was not consistent with an Owl FAC mission, which normally called for carrying CBU-49 cluster bombs. CBU-49 was identical in size and weight to CBU-24 but carried BLU-59 bomblets (externally similar to BLU-26s) that instead of exploding on contact, would detonate randomly for up to 30 minutes. By dropping CBU-49 on roads or intersections a single aircraft was effectively able to deny ground forces the ability to move through a football field-size area for about half an hour. It also gave Owl FACs time to call in other aircraft with ordnance to destroy the trucks, which was done as an economical measure that precluded launching strike aircraft to a target area without knowing if there would be any targets. It was a standard Nite Owl tactic if no vehicles were sighted, they would drop a CBU-49 every 10-15 minutes on areas through which they vehicles might be moving.

Since we now know Owl 08 was fragged to work with a Nail FAC who didn't make it and since control of the flight was done by Headshed (Task Force Alpha Command Post) versus Moonbeam (Airborne Command Post), it must have meant that Headshed was informed of Nail's mission cancel but launched Owl 08 single-ship anyway. Likewise, an ordnance load of M36 and CBU-24 would have been appropriate for working with a Nail FAC. Given news of Nail's cancelation likely came within a few hours or less of takeoff time, there would have been no time to reconfigure the aircraft's ordnance load so they launched as-is. This also explains why there was only a "momentary handoff" with Moonbeam since there was no coordination with other aircraft for ABCCC to do for Owl 08's mission.

Search-and-Rescue Logs Details

Now that the discrepancies are behind us, we know Owl 08 took off on-time from Ubon but was delayed getting to their target by bad weather that required aerial refueling in an area that took longer to get to than planned. The SAR Logs (see Appendix A – Search-And-Rescue Logs Transcriptions for details) show that several ground-based sensors (part of the then highly-classified Igloo White Program) detected one or more aircraft flying near Ban Karai, at least one of which we think was Owl 08. Igloo White was an early attempt at having an "Electronic Battlefield", a string of sensors to detect vehicle movement along the Ho Chi Minh Trail. Thousands of seismic (movement), acoustic (sound), and ignition (to detect spark plug activity) sensors were placed along the Trail from January 1968 to February 1973. (For technical details, please see Appendix E – Igloo White Sensor Technical Analysis.) Likewise, the Logs record that Palmer, an unrelated, single-ship F-4 transiting about 25 miles west of the center of Owl 08's target area saw 3 flares in that area. These may or may not have been from Owl 08. With that in mind, this section will analyze both pieces of evidence but first, we need to point out the weeklong SAR for the missing crew, to include multiple reconnaissance aircraft runs, was among the most extensive the Team has ever seen. While the SAR proved fruitless it did show the deep commitment to find two missing brothers-in-arms and provided the Team with a very good idea of where Owl 08 *did not crash*.

Igloo White Sensor Detections

The Team took Owl 08's last-known position and using dead reckoning with a ground track of 043° (direct D52) and assuming an enroute TAS of 480 knots followed by a descent to 8,000 MSL with a TAS of 420 kts., the aircraft would have arrived over D52 at 03:10 AM local. The November 27, 1971 SAR Log shows that four Igloo White sensors were activated by aircraft between 3:09 and 3:28 AM as shown below.

Time	Aircraft Type	Sensor Coordinates (India 1960 Datum)
3:09 AM	Prop	48Q XD 18749667
3:10 AM	Jet	48Q XD 06629154
3:15 AM	Unknown	48Q XD 05638723
3:28 AM	Unknown	48Q XD 12269473

Table 2: Sensor Data Source: SAR Logs

Interestingly, at 3:10 AM an acoustic sensor registered a "jet" aircraft approximately 4 miles southwest of D52, about 40 seconds away at F-4 speeds. While we can't prove the aircraft detected was Owl 08, given no other aircraft was assigned to this target area at that time this is very strong circumstantial evidence the crew reached their assigned target area about 75 miles northeast of their last-known radar position crossing into Laos (Record Loss Location). Additionally, at 3:09 AM a "prop" aircraft was detected and at 3:15 AM and 3:28 AM an aircraft was detected but both were classified as "unknown". The ground distance between sensors is also listed, which will become important when creating a sensor detection model later in this section.

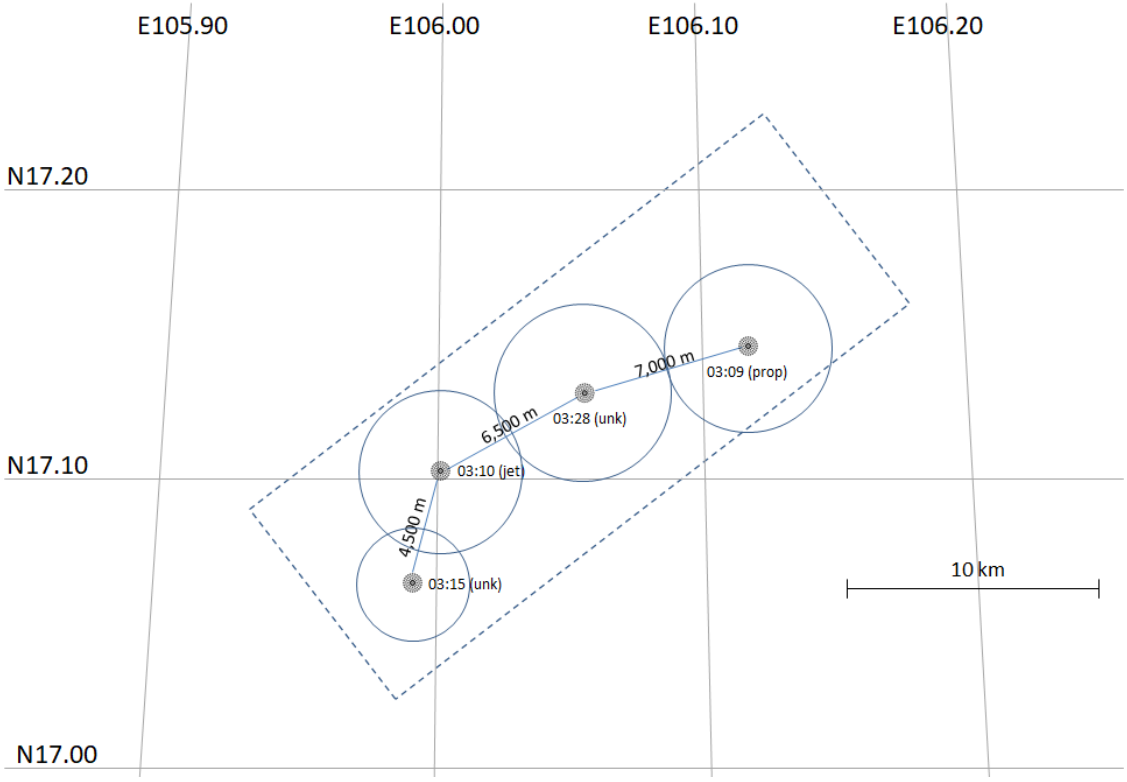


Figure 7: Sensor Activations on November 26, 1971

Vehicle detection ranges were well-documented in testing and operational use but aircraft detection ranges were notoriously inconsistent due to acoustic attenuation from vegetation, terrain, and weather. That is, while not designed to detect aircraft, if an aircraft caused a sensor to receive sufficient input (seismic or acoustic) that would trigger an activation, it would be detected. In order to determine a possible aircraft detection envelope, in 2015 a Team member interviewed Mr. Bill Serstad, a Magnavox electrical engineer who worked on Igloo White sensors and deployed to Thailand in support of them. He provided technical and operational details to build the model that follows. Likewise, in 2015 a Team member traveled to the Pentagon to interview the US Navy's Director for Water Sensors, a former Anti-Submarine Warfare Officer and expert on sound detection, who validated the fitness of the Team's approach.

Acoustic sensors had a "doughnut" pattern (null zone) but they were not uniform due to vegetation, terrain, and weather conditions, making plotting a standard pattern impossible. Mr. Serstad said that during Operational Testing and Evaluation of the sensors prior to combat deployment, "Vegetation raised hell with the acoustics." (Serstad) However, according to him, detection angle (Θ) was as high as 50° above the horizon but detection range dropped dramatically as the angle approached the horizon (i.e., aircraft flying at higher altitudes would be detected sooner). He estimated aircraft detection ranges (x-component) varied from 1,600-3,200 meters (m) to as much as 8,000-11,000 m under ideal conditions. Additionally, operational evidence showed that EC-121 aircraft (used as airborne relays between sensors and a central computer at Nakom Phanom Airbase in Thailand) sometimes received sensor data triggered by their own aircraft flying overhead. Since they operated in the 16,000-18,000 foot/4,800-5,500 m Above Ground Level (AGL) range, this should be considered the maximum detection altitude (y-component). (Project Checo 1970-1971)

However, this profile needs to be tempered by the fact ground distances between the four sensors activated varied from 4,500-7,000 m (from Figure 7) and multiple sensors were not activated at the same time, which means the average maximum ground distance at which an aircraft could be detected that night must be <= ½ the distance between sensors or 2,250-3,750 m. Using 7,750 m as the maximum x-distance and a Θ range from 10° (a guess) to 50° above the horizon, this dramatically decreases the detection capabilities, resulting in a "doughnut" that was likely much closer to Figure 8. This puts the effective maximum detection zone between 0-3,750 m across the ground and 0-4,500 m above the ground assuming that vegetation and atmospheric conditions (temperature, pressure, clouds, and relative humidity) were the same at all four sensor locations, which was highly-unlikely.

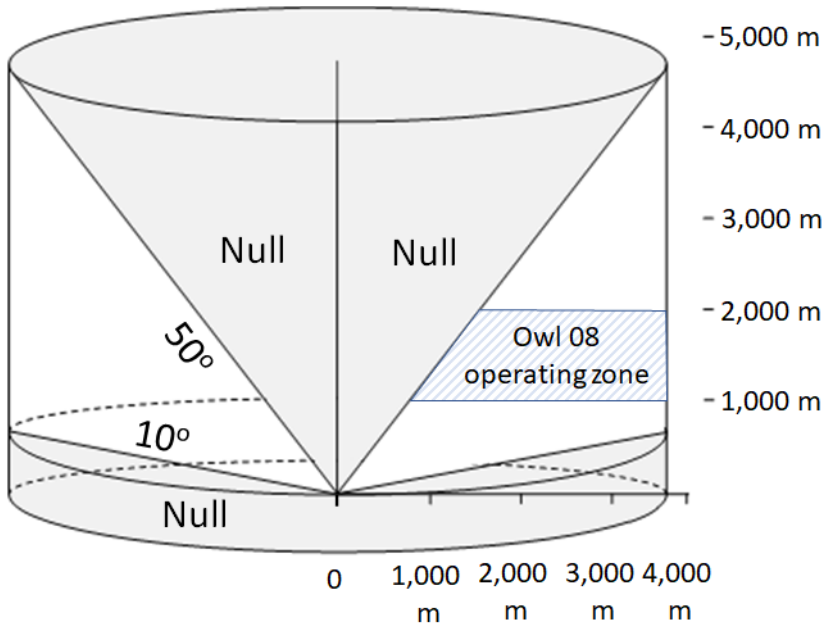


Figure 8: Igloo White Expected Aircraft Detection Zones

Interviews with 497th aircrews flying in the 1971 timeframe explained that weather-permitting, Owl 08 would have initially overflown the target at 420 knots (kts) between 6,000-7,000 ft/1,800-2,100 m AGL (Owl 08 operating zone in Figure 8), which is within the y-distance model. Likewise, since the crew would have been operating under night Instrument Flight Rules (IFR), the pilot would have limited turns to 30° or less of bank angle (steepness of turn). That said, the following table lists the likely aircraft performance measures: true airspeed (TAS), bank angle, G loading, turn rate (degrees/second), turn radius and diameter, time to complete a 180° turn, and estimate of the time to complete one orbit. An "orbit" here refers to the aircraft completing 1 racetrack pattern that covers the length and width of the target area as shown in Figure 9.

TAS (kts)	Bank Angle	G	Turn Rate (°/sec)	Turn Radius (ft)	Turn Radius (m)	Turn Diameter (ft)	Turn Diameter (m)	Complete Orbit* (sec)	Complete Orbit* (min)
420	30°	1.2	1.50	27,180	8,236	54,360	16,473	287	4.78
420	45°	1.4	2.59	15,695	4,756	31,390	9,512	185	3.09
420	60°	2.0	4.49	9,065	2,747	18,130	5,494	127	2.11

Table 3: Turn Radius Calculations Source: Turn Information Calculator

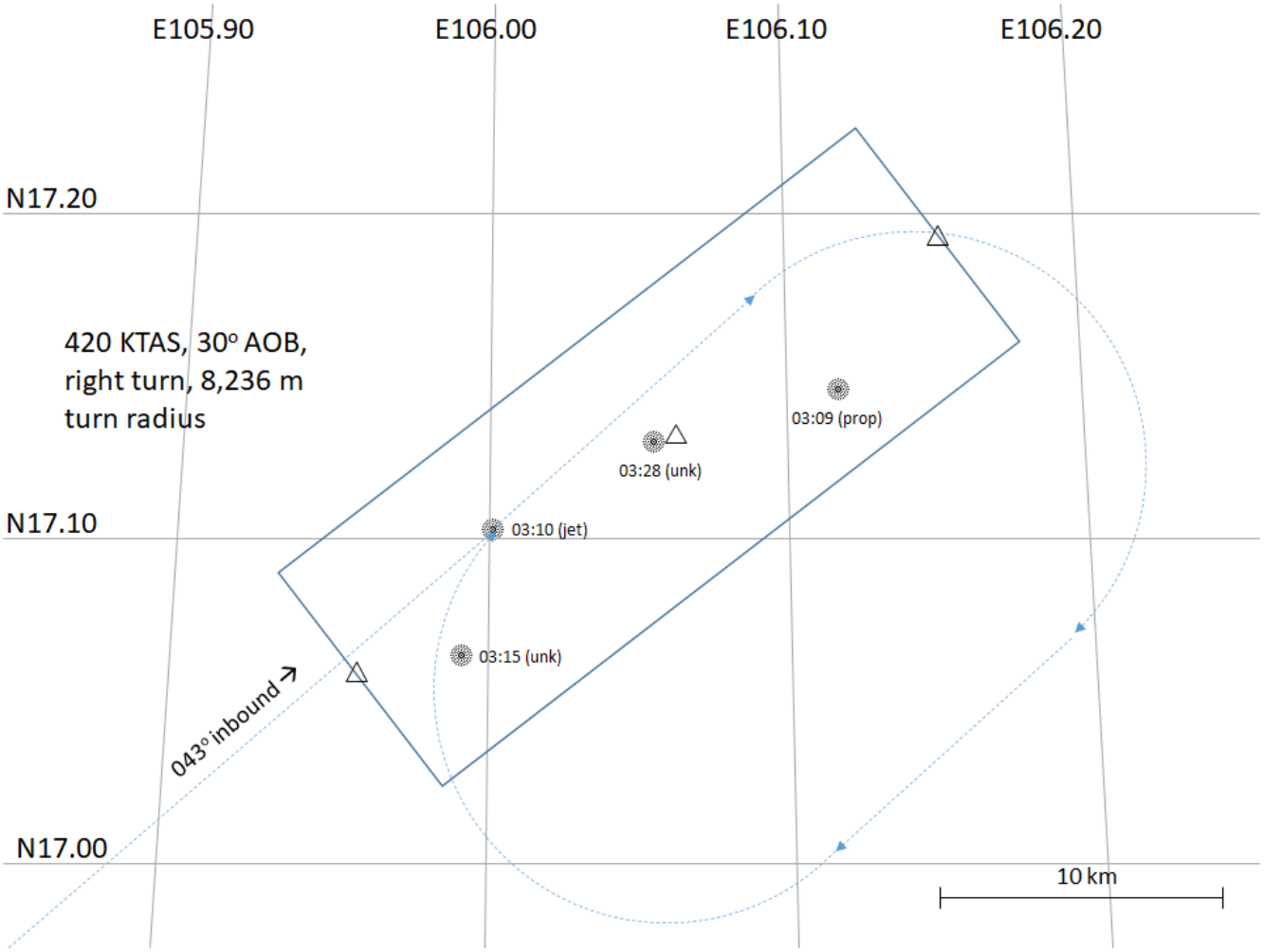


Figure 9: One possible flightpath that matches the sensor data

Based on the flightpath shown above, the Team thinks the 3:15 AM activation is possibly from Owl 08. That is, at 420 knots and a 30° bank angle the aircraft would have completed an initial orbit and passed near this sensor in about 5 minutes (287 seconds). This makes it feasible for it have to triggered both the se activations if a righthand pattern was used. Since most people are righthanded, the human body turns naturally to the left and consequently most aircraft patterns are left turns. However, the terrain to the left of the inbound course (northwest) rises rapidly so the crew may have elected to use a righthand pattern to stay below the clouds and avoid this higher terrain. The Team further believes the 3:28 AM activation is from Owl 08 (see Appendix E – Igloo White Sensor Technical Analysis for full details).

We have not yet discussed the 3:09 AM detection of a "prop" airplane because it has proven to be the most-problematic and something for which the Team could not come to a conclusion. That is, we know no other US aircraft were assigned to that target area that night. While Stinger 09 was propellor-driven, it didn't arrive over

its target area till about 30 minutes later and was much too far away to be detected. We considered the possibility the aircraft was a helicopter but if it was friendly, we were unable to explain what it would have been doing at night, in poor weather, and in an active target zone. Two theories are it was operating on a covert mission or maybe it was just lost. Alternately, on rare occasions the North Vietnamese flew helicopters into Laos but again, night and bad weather make this less-likely.

We also considered the possibility the aircraft was from Air America (the covert, CIA-run "airline" that flew propellor-driven aircraft and helicopters exclusively). However, Air America did not operate in this part of Laos because of the air defense threat. Likewise, a friendly aircraft operating in this area would have been required to check-in with Moonbeam (ABCCC). Had Moonbeam been aware of its presence, they would have advised Owl 08 as such when they checked-in. This makes it highly-improbable a friendly prop aircraft was flying near Ban Karai at the same time Owl 08 was in the area.

This led the Team to consider another option. The VPAF occasionally flew Russian-built AN-2 "Colt" propellor-driven transport aircraft into eastern Laos. However, the Colt had limited night/weather capabilities, making it unlikely but not impossible for one to be there that night. After an exhaustive effort to determine the possible identity of this prop aircraft, the Team decided doing so was not central to resolving REFNO 1781 so the question was left unanswered (and is likely unanswerable). If you are interested in an explanation of the math and reasoning behind our analysis, please see Appendix E – Igloo White Sensor Technical Analysis for full details.

To sum up this section, in spite of hundreds of hours of analysis, the only thing the Team can say with confidence regarding the Igloo White sensor evidence is the 3:10 AM activation most-likely came from Owl 08. (Circumstantial Information)

Flare Sightings

Normal 497th Squadron procedures called for a 30-minute time-on-station before aircraft would either go to the tanker to refuel then return to the target area or, if all ordnance was expended, return to Ubon and land. Assuming Owl 08 arrived over target at 3:10 AM, the crew would likely not have departed the area any earlier than about 3:40 AM but this could have been sooner or later depending on weather, target positions and direction of movement, defenses, and fuel state.

We know from the SAR Logs that Palmer, an unrelated single F-4 transiting west of Ban Karai, noticed 3 flares east of their position at 3:45 AM. While this is 5 minutes past the end of Owl 08's normal time-on-station, it's possible the crew decided to stay over the target longer to see if they could still accomplish their mission. However, the logs provide contradictory accounts as to the azimuths: one says 3 flares were seen at "9 to 9:30 position" while the other says 3 flares were seen at "9:30 - 10:00 position" (Figure 10).

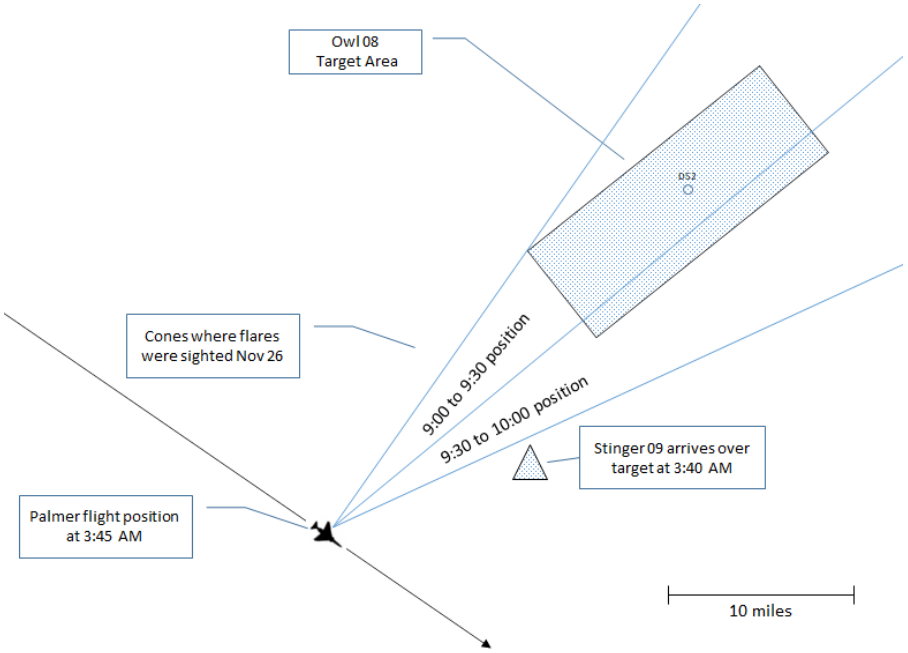


Figure 10: Palmer Flare Sightings

The 15/30-degree cone sighted by Palmer in Figure 10 includes the entirety of Owl 08's target area and excludes Stinger 09's. F-4s normally launched two flares at a time – one from each wing – in order to maintain a symmetrical weight. (While flares only weighed 30 pounds apiece, each flare dispenser could carry 16 flares for a total launchable weight of 480 pounds, so given flare launchers were on the weapons stations farthest from the fuselage (Stations 1 and 9), this could create an asymmetric configuration.) It is possible an even number of flares was launched but only an odd number ignited. Conversely, since AC-119s released flares from the fuselage (center of the aircraft), they did not have asymmetry problems and could drop even or odd numbers. However, Stingers had night optics and an infrared sensor so they had options that did not require dropping flares to employ their weapons at night. Phantoms, on the other hand, had no such devices and required flares for illumination. Regardless, since no other flare-dropping aircraft were in that part of Laos at that time, they must have come from either Owl 08 or Stinger 09. Both options are considered next as well as the possibility what was seen were not flares at all.

Scenario 1 – Flares sighted were from Owl 08

We know the fourth and final Igloo White sensor activation occurred at 3:28 AM and very close to D52. If the flares came from Owl 08, the crew must have remained somewhere within the vicinity of their target area for at least another 17 minutes but they couldn't have been operating within about 2-3,000 meters of any of these sensors, otherwise, they would have been activated again. This would require them being either southwest or northeast of the center of their target area (away from where we know sensors were). In order to extend their time-on-station, they may have moved their orbit southwest so as to be closer to the refueling track as their fuel supply dwindled. Alternately, they may have been working the northeast sector in the higher and more rugged terrain, closer to Ban Karai Pass. If the crew was still dropping flares at 3:45 AM, they would have been within 5-10 minutes or less of departing the area. Had they encountered significant ground activity, they would have radioed ABCCC to see what other aircraft were available to attack those targets. Had they done so and been informed none were available they would have likely attacked as many targets as possible by themselves. Since this didn't happen, the Team suspects they had ordnance remaining, which would indicate a return to the tanker to refuel profile rather than a return to Ubon to land profile. Upon completion of the target area part of the mission, they would have changed radio frequency to notify ABCCC they were departing. We

know this radio call never happened, meaning the aircraft must have crashed sometime *after* flares were sighted at 3:45 AM but *before* about 3:50 AM when fuel state would dictate leaving the area.

Scenario 2 – Flares sighted were from Stinger 09

According to Stinger 09's mission summary, the aircraft arrived over its target about 15 miles southwest of Owl 08's target at 3:40 AM. If the flares were from Stinger and since there was no call to ABCCC from Owl 08 this means one of two things.

1. Owl 08 was still engaged in their mission but had not yet begun a return-to-base/tanker profile that would necessitate a radio call. Had they made the call, ABCCC would have advised them Stinger 09 was southwest of their position and a potential midair collision risk while heading to the tanker or Ubon. This would make it more likely they crashed in the northeast sector, farther away from Stinger.

2. Owl 08 had already crashed. If so, this must have happened sometime *after* 3:28 AM (last sensor activation), which would place them closer to the center of their target area.

The mission summary doesn't say Stinger 09 expended any flares or any other ordnance but that doesn't necessarily mean that none were expended. Likewise, back in 2012 a Team member contacted the AC-119 Association and provided a flier with Owl 08 details and asked if anyone remembered Stinger 09's mission. The flier that was enlarged up and placed on an easel at their annual convention but no one came forward with a recollection from that night.

Scenario 3 – Palmer saw something other than flares

The account from the pilot of Palmer is limited but here are all the details we have from what the Command Post Controller at Ubon wrote in the "Statement of Aircraft Loss" on December 6, 1971, ten days after Owl 08 was declared missing.

> "At 0530 the aircraft commander of Palmer flight, a single ship strike, reported that at 0345, when his position was about twenty miles from the area that Owl 08 was to be working, he saw three flares in that areas. Another check of Head Shed revealed that an AC-119, call sign Stinger 09, was operating on the same tactical frequency that Owl 08 was assigned. A call to the Aircraft Commander of that aircraft produced no new facts, since he had never heard Owl 08 of [sic] the radio." (Nester)

That said, a USAF Vietnam veteran suggested to the Team that perhaps Palmer didn't see flares but saw AAA and an aircraft possibly being hit and downed. Given Palmer was transiting the area, the aircraft would have been cruising at an altitude of around 25,000 feet MSL. Owl 08 would have likely been operating at about 8,000 feet MSL and below. This would put the two aircraft 15-23 miles apart with as much as a 17,000 feet altitude differential, resulting in a 10^{o}-15^{o} lookdown angle. Given what we know about the weather that night, it's not inconceivable that Palmer actually saw 37mm or greater AAA shooting at Owl 08 and one or more of these rounds may have struck the aircraft, resulting in its destruction. While AAA always goes up (at least until tracers burnout) and flares always go down, if the aircraft broke into pieces, it's possible given the distance and lookdown angle, what appeared to be flares was actually aircraft wreckage falling to the ground. If so, this would explain why 3 – an odd number – of "flares" were seen and why the extensive, weeklong SAR found no trace of Owl 08 and no definitive crash site has ever since been identified. It also fits with the lack of wreckage found at 3153. That said, while plausible, this scenario is highly circumstantial and unverifiable.

To sum up this section, the Team concluded it's more-likely the 3 flares observed by Palmer Flight at 3:45 AM were from Owl 08 rather than Stinger 09.

SAR Areas Searched

The SAR Logs detail all areas searched visually and/or photographically by date (Figure 11). It's interesting to note that after the 7-day SAR effort turned up nothing in the most-likely areas, 8th Fighter Wing leadership requested an additional area measuring about 8 by 18 miles and east of Owl 08's target area be searched. This area has much higher and more rugged terrain than the other areas searched and it would have been more difficult to locate a missing aircraft. Likewise, since the early 1990s, DPAA has excavated multiple sites in/around Owl 08's target area, which makes them familiar with losses in this area. This leads the Team to believe that if the aircraft did not break up before it hit the ground, it must have crashed somewhere other than areas searched in November to December 1971 or excavated since then.

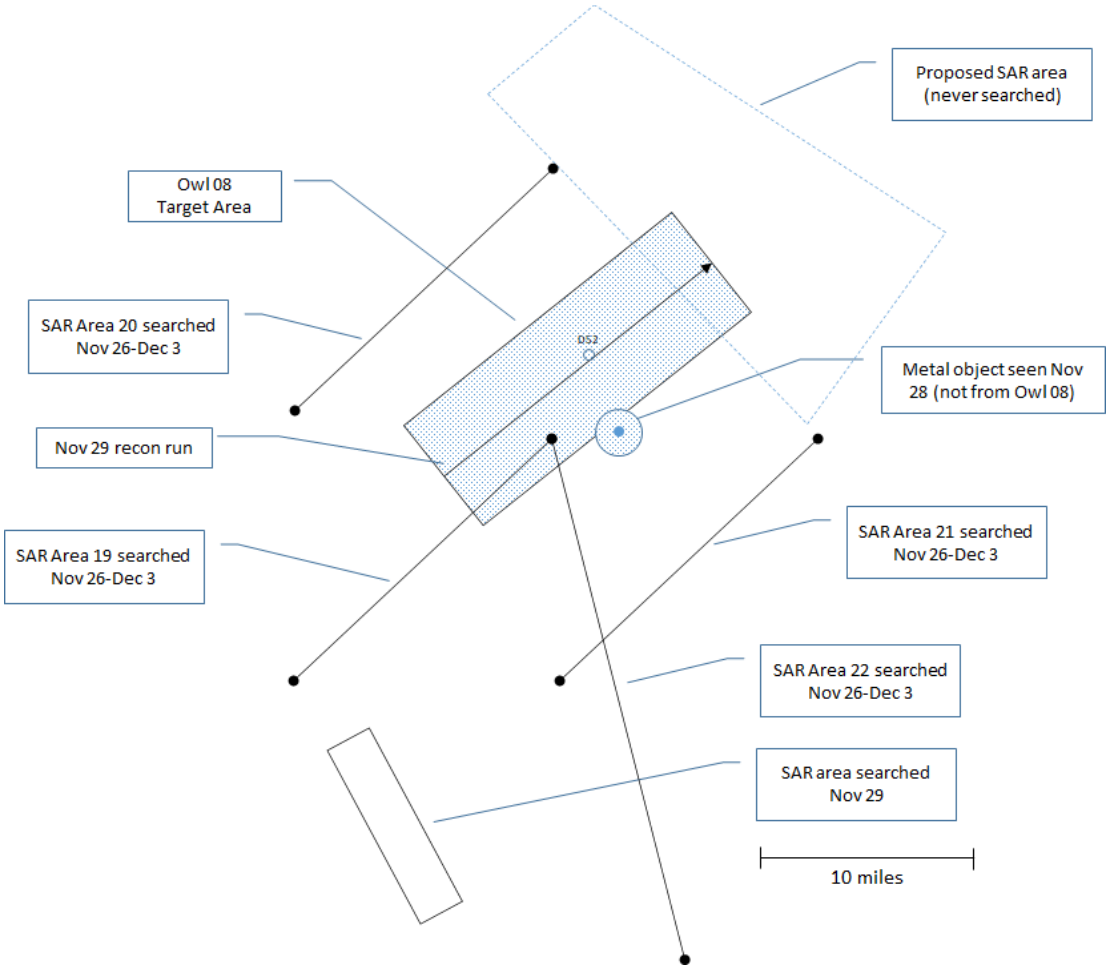


Figure 11: Areas searched in 1971 and proposed search area Source: SAR Logs

Figure 12 shows the areas searched/excavated to-date and we can be reasonably sure this is not where the aircraft will be found. As was stated previously, the Team believes flares sighted were more-likely to be from Owl 08 given the center of the 15/30-degree cone sighted by Palmer flight is much-closer to Owl 08's target area than Stinger's. Given this, there are three possibilities for where Owl 08 could have crashed, listed in descending order of probability.

1. The aircraft was lost before departing the target area. Given there were no additional sensors activated after 3:28 AM and knowing they had the ability to detect aircraft within about 3,000 meters and below about 10,000 feet, the aircraft may have been working on the northeast side of the target area, closer to the Ban Karai Pass. Alternately, it may have been working closer to the southwest side, which would have put it closer to both the tanker and Ubon. If the aircraft was lost before departing the target area, it seems highly-

likely it broke up before it hit the ground. (A less-likely possibility is they were flying 10,000 feet or more AGL, above the detection altitude of the sensors.) An inflight breakup anywhere in the target area or a crash 8-10 miles northeast of where the SAR was initially focused would explain why the first SAR flight on-scene saw nothing. It would also explain why the subsequent weeklong SAR effort also found nothing.

2. The aircraft was lost while returning to the tanker. Given Owl 08 never radioed ABCCC to request additional aircraft because targets were found, it seems more likely they did not see many targets and therefore did not expend all their ordnance. If so, this would dictate a flightpath back to the tanker (to refuel and return) instead of Ubon (to land because they were out of ordnance). Lack of targets may have also led them to continue searching past 3:40 AM. Regardless of their post-target flightpath, the change of radio frequency to check-in with ABCCC would have occurred sometime before departing the target area or immediately thereafter, assuming the aircraft's radio was functioning.

3. The aircraft was lost while returning to Ubon. Given the flightpath back to Ubon would have taken it directly over Stinger 09's target area and seeing that there was no radio call to ABCCC, it seems unlikely this path would have been taken unless the aircraft's radio had failed. However, it's possible the crew was tracking Stinger 09 on their radar and was thereby able to avoid a midair collision.

To sum up this section and looking at Figure 12 below, the Team believes the missing aircraft may have crashed either along the projected flightpaths from the target to the tanker or from the target to Ubon (outside the areas already searched) or in the northern corner of the proposed SAR area (labeled "Potential crash location"). It's important to note how close 3153 is to both projected flightpaths. Likewise, SAR Area 19 (searched 11/26/71 to 12/3/71) goes almost exactly over 3153. If 3153 is actually 1781, *then this is strong evidence the aircraft broke up inflight* because a new crash site crater would likely have been seen from the air.

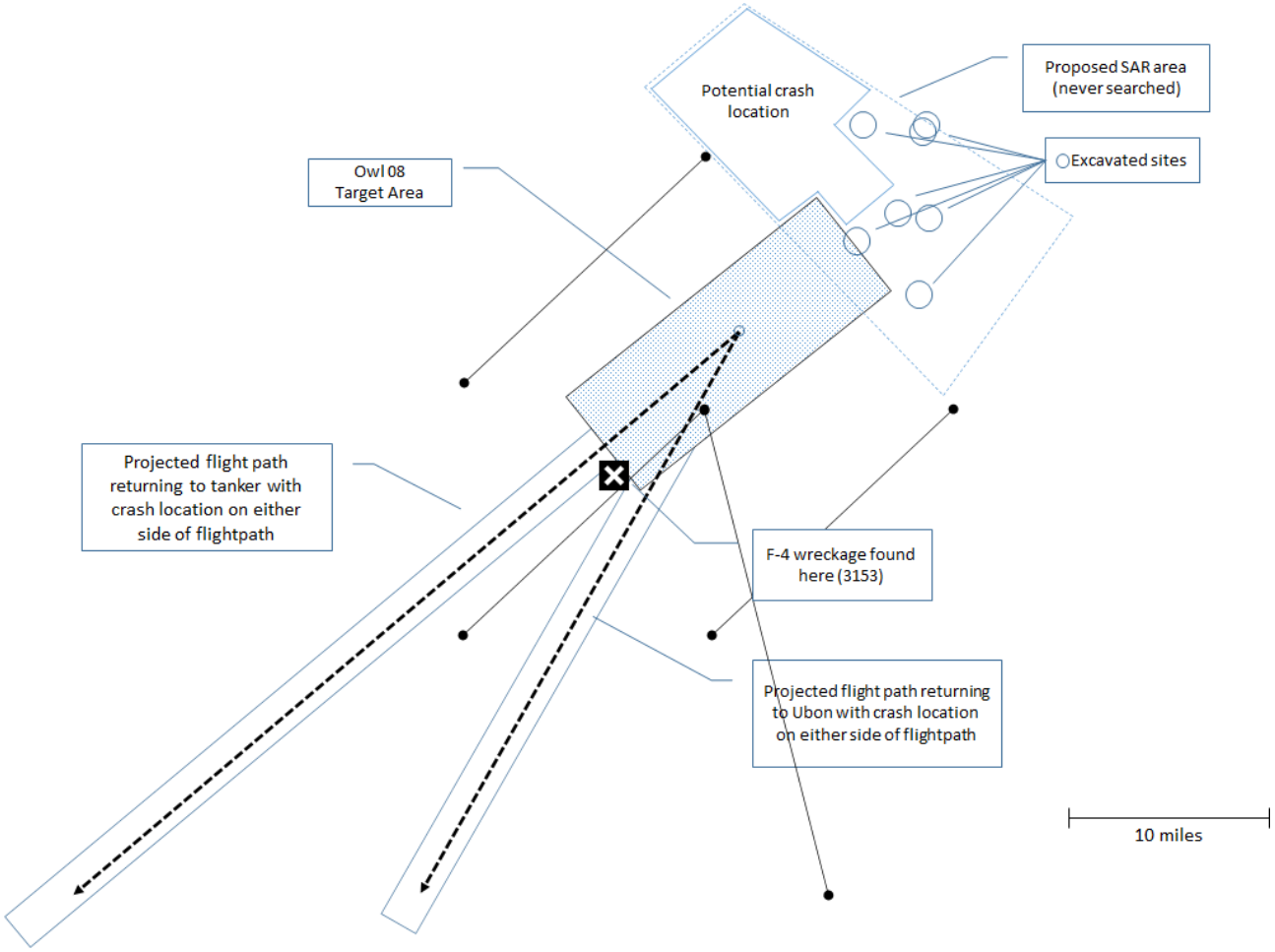


Figure 12: Possible crash locations for Owl 08 vs. areas already searched and UNC 3153's location

Analysis of Vietnamese Air Defense Records

Up till now we have looked at only US records from 1971 so in this section we will focus on the Vietnamese side. To wit, this section includes a translation of the book "History of The 377th Air Defense Division", which lists Vietnamese claims of US aircraft shot down. The 377th's area of operation was western Quang Binh Province, west of Route 15, into Laos and down the trail routes inside Laos to the area north of Tchepone -Na Bo. This includes the entirety of 1781's target area near Ban Karai as well as eastern Laos to about 30 miles south. None of the claimed shootdown accounts match 1781 nor any other US losses in this timeframe plus or minus one month, which are listed in the table below for reference. It is important to keep in mind that Vietnamese accounts that can be cross-referenced with US accounts sometimes differ by one day (it's unclear why) and/or one hour (most-likely due to time zone difference). The table below lists the 25 US aircraft (including helicopters) lost between October 30 and December 31, 1971.

Date	Aircraft	Service	Loss Location	REFNO	Notes
10/30/1971	O-2A	Air Force	Laos	OPLOSS	Shot down by AAA
11/1/1971	A-7A	Navy	Gulf of Tonkin	OPLOSS	Takeoff accident at sea
11/23/1971	F-4E	Air Force	Laos	1779	Lost at night
11/25/1971	HH-53C	Air Force	South Vietnam	1780	Shot down by AAA
11/26/1971	OV-1B	Army	South Vietnam	OPLOSS	Takeoff accident
11/26/1971	F-4D	Air Force	Laos	1781	Uncertain circumstances

Date	Aircraft	Service	Loss Location	REFNO	Notes
11/29/1971	A-37B	Air Force	Cambodia	OPLOSS	Shot down by AAA
12/10/1971	F-105G	Air Force	Laos	1782	Shot down by SAM
12/12/1971	C-2A	Navy	Gulf of Tonkin	OPLOSS	Lost overwater
12/14/1971	U-21A	Army	Gulf of Tonkin	1783	Lost overwater
12/16/1971	F-4D	Air Force	Cambodia	OPLOSS	Shot down by AAA
12/17/1971	F-4E	Air Force	Laos	OPLOSS	Shot down by SAM
12/18/1971	F-4D	Air Force	North Vietnam	1784	Shot down by MiGs
12/18/1971	F-4D	Air Force	North Vietnam	1785	Shot down by MiGs
12/18/1971	F-4D	Air Force	North Vietnam	OPLOSS	Ran out of fuel
12/19/1971	F-4D	Air Force	Laos	1786	Shot down over PDJ
12/19/1971	OH-6A	Army	Cambodia	1787	Shot down by AAA
12/21/1971	DC-3	Air America	Laos	1995*	Uncertain circumstances
12/24/1971	OV-10A	Air Force	Laos	1788	Uncertain circumstances
12/26/1971	F-4D	Air Force	North Vietnam	1789	Shot down by SAM
12/26/1971	OV-10A	Air Force	Laos	1790	Shot down near Ban Karai
12/27/1971	C-123K	Air America	Laos	1791	Shot down by AAA
12/30/1971	F-4B	Navy	North Vietnam	1792	Shot down by SAM
12/30/1971	A-6A	Navy	North Vietnam	1793	Shot down by SAM
12/31/1971	F-4D	Air Force	Laos	1794	Lost near Mu Gia Pass

Table 4: All US Aircraft Lost October 30 to December 31, 1971 (N=25) Sources: Hobson and DPMO Alpha, Chronological and REFNO Report, May 1997

* This REFNO is not in numerical sequence because it wasn't assigned until 1974, well after the REFNO chronological numbering system was established.

Likewise, each country's record-keeping had different purposes. US accounts were dispassionate listings of facts to give an accounting of what happened (e.g., "4 F-105D aircraft took off at 0900 with 6 750-pound bombs each to attack target X and only 3 aircraft returned…"). On the other hand, Vietnamese accounts were in part political statements intended to boost morale and as such, tended to dramatically overstate success and included soaring rhetoric (e.g., "Our hearts may stop beating, our blood may stop flowing, but we cannot allow our logistics supply artery providing support to the great front lines in South Vietnam to be blocked. "). While no specific shootdown reference can be correlated with Owl 08, it doesn't mean it wasn't shot down. Additionally, while some Vietnamese shootdown accounts include specifics such as time-of-day (to the minute), number of rounds fired and of what caliber, and crash locations, this specificity should not be taken as evidence of veracity, as you will see.

Excerpts from "History of The 377th Air Defense Division"
["Lịch Sử Lữ Đoàn Phòng Không"]
November 15-November 28, 1971

November 15, 1971

At 4:21 PM, two A-7 aircraft attacked Ford B in the Ta Le area. Just as they began their dives the soldiers of 13th Battalion/224th AAA regiment simultaneously opened fire. The A-7s hastily dropped their bombs and tried to climb to avoid the curtain of fire. Just as the aircraft leveled off, however, the 12.7 mm anti-aircraft machine-guns of 42nd Battery/13th Battalion, located in an ambush position north of Ford B, put up a murderous barrage. One A-7 was hit, burst into flames, and dove nose-first into the jungles of the Annamite Mountains. This was 13th Battalion's second outstanding combat victory and the first aircraft shot down on the spot by the division during its deployment along Group 559's supply corridor during the 1971-72 dry season. The American

air forces were surprised and shocked by the unexpected appearance of such heavy anti-aircraft fire so early in the dry season and at a choke-point which was under constant B-52 bombardment.

Analysis: the claim the A-7 "crashed on the spot" meant the air defense unit saw it crash within their sight. However, there is no record of any A-7s shot down on this date or any time in October, November, or December of 1971 in all of Southeast Asia. While two A-7s were lost in the previous 30 days both were takeoff accidents on carriers in the Gulf of Tonkin (October 12, 1971 and November 1, 1971). However, the NARA Records About Air Sorties summary for 11/15/1971 shows a flight of 2 Navy A-7s were fragged to hit a target near the Nam Ta Le area at 12:35 PM Local Time. Assuming this was their actual TOT, it's about 4 hours prior to the shootdown claim and both aircraft returned safely to the carrier.

November 17, 1971

At 7:05 AM an RF-4 flew over to reconnoiter the area of Kilometer 72 of Route 20. 4th Battery/21st Battalion/224th AAA Regiment fired five 37mm rounds, shooting down this reconnaissance aircraft which crashed on the spot about 15 kilometers from the unit's firing positions, to the accompaniment of loud cheers from soldiers at the observation stations at Cao Lam, Troop Station 14, and 33rd Engineer Battalion. This was the second aircraft to be shot down on the spot by the division along Group 559's supply corridor during the 1971-72 dry season.

After this painful defeat the enemy sent a continuous stream of attack aircraft to savagely bomb the Route 20 entry point just as a convoy of 60 trucks was moving through the area. Under the command of regimental headquarters, all combat forces of the 224th AAA Regiment put up a ferocious barrage, setting one F-4 afire and enabling the truck convoy to pass through the entry point safely.

Analysis: There is no record of any aircraft lost on this date. It's interesting to note the specific reference to the first claim as a "reconnaissance aircraft", meaning they must have had some way of distinguishing it as a reconnaissance Phantom. Likewise, the claim the RF-4 was shot down "on the spot" meant the air defense unit saw it crash within their sight. However, the NARA Records About Air Sorties summary for 11/17/1971 shows of 9 RF-4 sorties fragged that day for Laos, only 8 took off and their TOTs (local times) were 8:23 AM, 8:29 AM, 11:00 AM, 11:18 AM, 12:42 PM, 1:30 PM, 1:40 PM, and 2:40 PM. No aircraft were lost. The closest match to either of these claims is the Air Force lost an F-4E (REFNO 1779) on November 23, 1971 (six days later).

November 18-20, 1971

Over the next several days the enemy launched a series of savage attacks along Route 20. Building on their victories, the cadre and soldiers of the 224th AAA Regiment resolutely held their ground, fought courageously, cleverly, and innovatively, and scored a series of victories.

Analysis: There is no record of any aircraft lost during these dates. Again, the closest match to these claims is REFNO 1779 on November 23, 1971 (3-5 days later).

November 20, 1971

Enemy aircraft expanded their attacks to cover the entire Ho Chi Minh Trail. The 243rd AAA Regiment hit one F-4, setting it on fire. Because their combat resolve was low and their combat preparations were inadequate, the 227th and 250th AAA Regiments and the anti-aircraft artillery units subordinate to the 275th Missile Regiment not only did not shoot down any enemy aircraft and allowed enemy attacks to hit their targets and block the flow of traffic, their own positions were hit by enemy attacks and these units suffered a number of losses.

Analysis: There is no record of any aircraft lost on this date. It's possible the claim an F-4 was "set on fire" could have been an aircraft that was damaged but returned to base. Again, the closest match to this claim is REFNO

1779, three days later. It's interesting to note the open criticism of the 243rd AAA Regiment whose combat resolve was said to be "low" and was said to have made "inadequate combat preparations". Such criticism was unusual in Vietnamese air defense records, which normally put their forces in a positive light.

November 21, 1971

At 7:02 PM the 13th Battalion shot down an F-4 aircraft with only ten 37mm rounds. The aircraft crashed south of Ford B, 10 kilometers from the unit's firing position.

Analysis: There is no record of any aircraft lost on this date. Again, the closest match to this claim is REFNO 1779 (two days later) but it crashed at about 5:00 AM local time.

November 24, 1971

At 6:47 PM the 42nd Battery/13th Battalion shot down another F-4, which crashed on the spot 10 kilometers from the unit's firing position. Besides these two victories, the 224th AAA Regiment also damaged or set ablaze three other aircraft.

Analysis: There is no record of any aircraft lost on this date. Again, the closest match to this claim is REFNO 1779 (the day before), but it crashed about 5:00 AM local time.

November 26, 1971

The enemy massed his forces to mount continuous attacks on two entry points: those of Route 12 and Route 20. 15th and 383rd Batteries of the 227th AAA Regiment and 11th and 42nd Batteries of the 224th AAA Regiment fought back ferociously but were unable to shoot down any enemy aircraft. A number of supply trucks moving down the roads were destroyed.

Analysis: There is no record of any aircraft lost on this date, which comports with the Vietnamese record. Had Owl 08 been observed to have been shot down, it would have showed up here. Route 12 ran from Vietnam through Mu Gia Pass down to the west of Ban Karai where it joined Route 20 (see Figure 13 below).

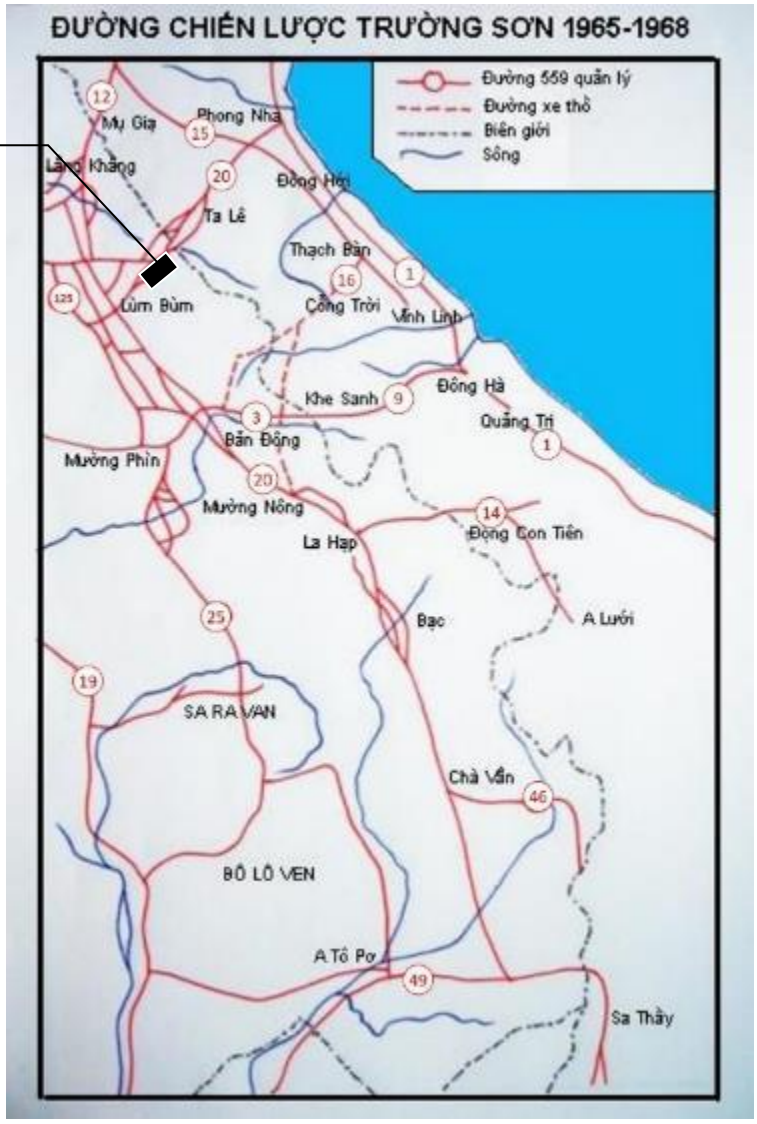


Figure 13: Ho Chi Minh Trail Map showing Owl 08 Target Area Source: War Memorabilia

November 28, 1971

All units vigorously engaged enemy aircraft. The 224th and 243rd AAA Regiments each shot down one F-4 aircraft. Of special note, at 2:13 PM the 11th Battalion/250th AAA Regiment shot down one F-4 on the spot south of Route 9 with a total of 38 37mm and 14.5mm rounds. The F-4 crashed about 20 kilometers from the battalion command post. This was the first outstanding victory scored by the regiment since its assignment to the division.

Analysis: There is no record of any aircraft lost on this date. The USAF lost an A-37B to AAA on November 29, but this was in Cambodia and cannot be a match. However, note the specificity of the F-4 shootdown claim with a time, unit, location, number and type of rounds, and crash location. Again, the closest match to this claim is REFNO 1779 (five days earlier), but it crashed about 5:00 AM local time.

To sum up, since the Air Defense Records do not claim an F-4 being shot down on/around November 26, 1971 that could correlate with REFNO 1781, the Team was unable to come a conclusion about whether Owl 08 was shot down or not.

Analysis of Wreckage Found at UNC 3153

During the April 2008 site survey of the suspected crash site of REFNO 0572 (1Lt Ray Krogman, USAF, shot down on 1/17/1967 in an O-1 Bird Dog), a parachute connector link not from an O-1 was found but no association to a case could be made. Then while excavating 0572 in May 2013 (JFA 13-4LA), several pieces of diagnostic F-4 wreckage (data plates) were found as well as possible Life Support. Site LA-00527 site was then designated Uncorrelated 3153. The proximity of 3153 to the edge of the 1781 target area led to 3153 being excavated twice as possibly associated with 1781. The first excavation (May-June 2019) turned up more F-4 wreckage and possible Life Support equipment. The second excavation (October-November 2019) turned up more F-4 wreckage, possible Life Support, and possible osseous (bony) remains, after which the site was closed, meaning the anthropologist assessed that no further possible evidence could be recovered.

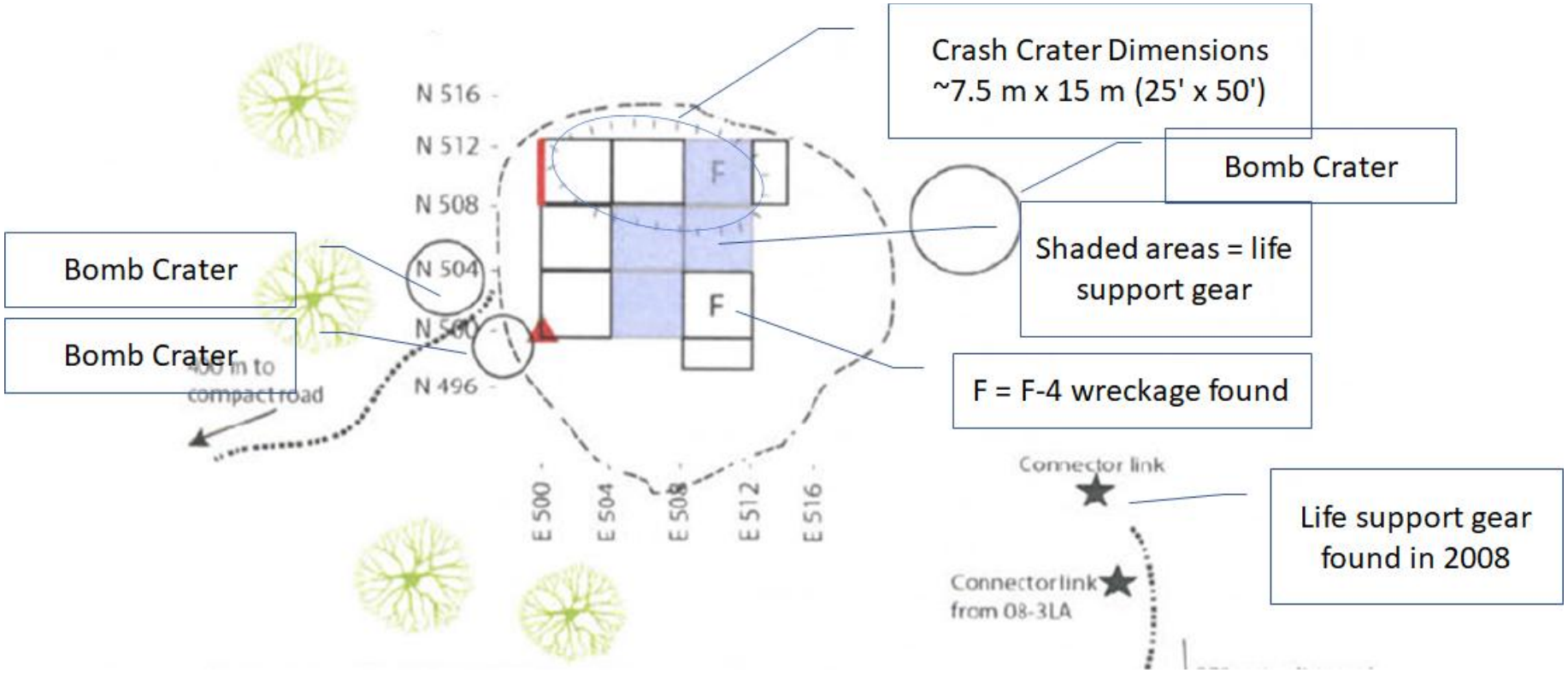


Figure 14: 3153 Excavation Area Source: Interim Search and Recovery Report CIL 2013-095-R

Let's recap Owl 08's configuration as shown below. (For a detailed list of ordnance carried please see Appendix C – REFNO 1781 Ordnance Review.)

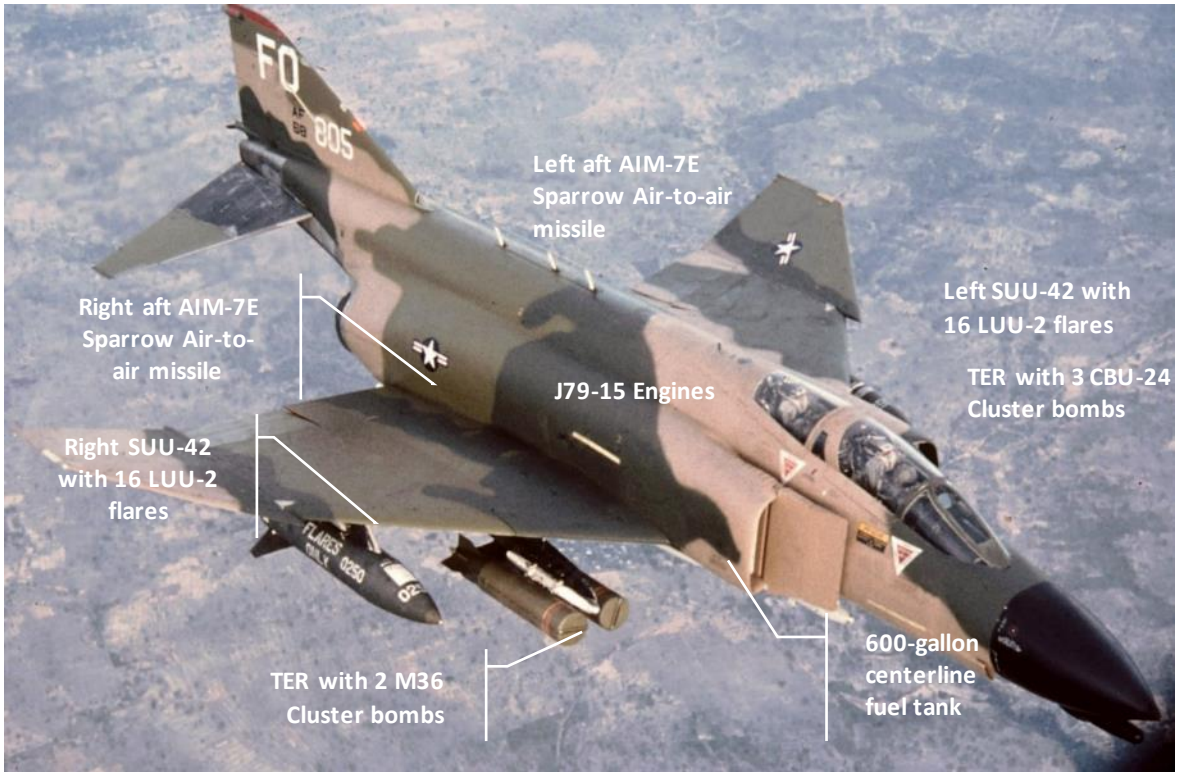


Figure 15: F-4D-66-8805, 435th TFS out of Ubon on Cherry tanker (January 1971) Source: Don Jay

While this image shows F-4D 66-8805, it was very similar to 66-7725 (being only 143 units later on the production line). The missing aircraft would have looked nearly-identical to what's shown here, the main difference would have been a black underside instead of white.

Here is the table from the 2013 excavation of 3153 that led to the 2019 statement "Analysis of the material evidence from a previous excavation indicates that one individual was in the aircraft at the time of impact." (Life Support Message) While subsequent analysis (2019) said the connector links could have come from an aircraft deceleration parachute, the assessment as a MIA loss was not changed.

Possible life support equipment recovered from Site LA-00527.		
Provenience	**Depth (cmbs)**	**Items believed to be**
N504 E504	0-50	Possible snap components (5)
N504 E504	0-50	Possible zipper pull tab
N500 E504	0-42	Possible timer plate
N508 E508	0-27	Parachute connector link
N504 E508	0-39	Possible zipper pull tab
N492 E540	Surface	Possible parachute riser connector link with suspension lines

Table 5: Possible Life Support found at 3153 Source: Interim Search and Recovery Report CIL #2013-095R

Parachute Connector

The parachute connector (a piece of metal that connected a person or object to parachute risers) shown here was found during the May-June 2019 excavation of 3153. DPAA initially assessed it as coming from a personnel (pilot's) parachute but later said it could also be from an aircraft deceleration (drag) chute since both parachutes had similar components. While Life Support analysis is beyond-the-scope of the Team's abilities, this struck us as odd seeing as the parachutes in question had different functions, materials (drag chutes were designed to be reusable; pilot's parachutes were not), and diameters. The table below shows there was a total of 39 parachutes of differing diameters aboard the aircraft. It seems unlikely both the pilots' and aircraft's parachutes had the exact same connectors.

Figure 16: Parachute Connector Source: DPAA during 2019 League Meeting

Parachute Type	Quantity	Diameter
Ejection Seat Drogue Parachute	2	2 feet
Ejection Seat Stabilizer Parachute	2	5 feet
Personal (Pilot) Parachute	2	28 feet
Illumination Flare Parachute	32	18 feet
Aircraft Drag Chute	1	16 feet
Total	39	

Table 6: Owl 08 Parachute Inventory

Drag Chute

A badly-burned F-4 drag chute piece was found. While on rare occasions such chutes were deployed in flight and released, it's likely that in such situations they made it to the ground intact. Since such items would have been in serviceable condition, they would have been useful to local ground forces so the Team suspects this one was aboard an F-4 at the time of impact, rather than being burned up later.

Figure 17: F-4 Drag Chute View Source: DPAA during 2019 League Meeting

F-4 Left Aileron Hydraulic Damping Cylinder

A data plate with Part Number 32-69413-5 was found, which DPAA assessed to be from an F-4 Left Aileron Hydraulic Damping Cylinder and was generic to most models of the F-4 Phantom. The aileron was a flight control surface use to control roll in conjunction with a corresponding spoiler on the opposite wing.

CONTROL, AIRCRAFT, HYDRAULIC DAMPING AILERON		
PART NO	RATING	SERIAL NO
32-69413-5	286????	3 642

Figure 18: F-4 Left Aileron Data Plate Source: Interim Search and Recovery Report CIL 2013-095R

F-4 Left Spoiler Assembly

A data plate with Part Number 32-12003-307 was found, which DPAA assessed to be from an F-4 Left Spoiler Assembly and was generic to most models of the Phantom. The spoiler was a flight control surface use to control roll in conjunction with a corresponding aileron on the opposite wing.

ACFT MOD	F- 4
PART NO	32-12003-307
CONT NO	[unreadable]
SERIAL NO	R33-1463
CONTR INSP	B 784
CUST INSP	
MODIFICATION INCORPORATED	

Figure 19: F-4 Left Spoiler Assembly Data Plate Sources: Interim Search and Recovery Report CIL 2013-095R MIL-HDBK-57H DOD List of Aircraft Fastener Manufacturer's Symbols and Aircraft Inspection Stamps

F-4 Spoiler and Aileron Positions

The image below indicates the spoiler and aileron locations. The spoiler is shown here in the raised position.

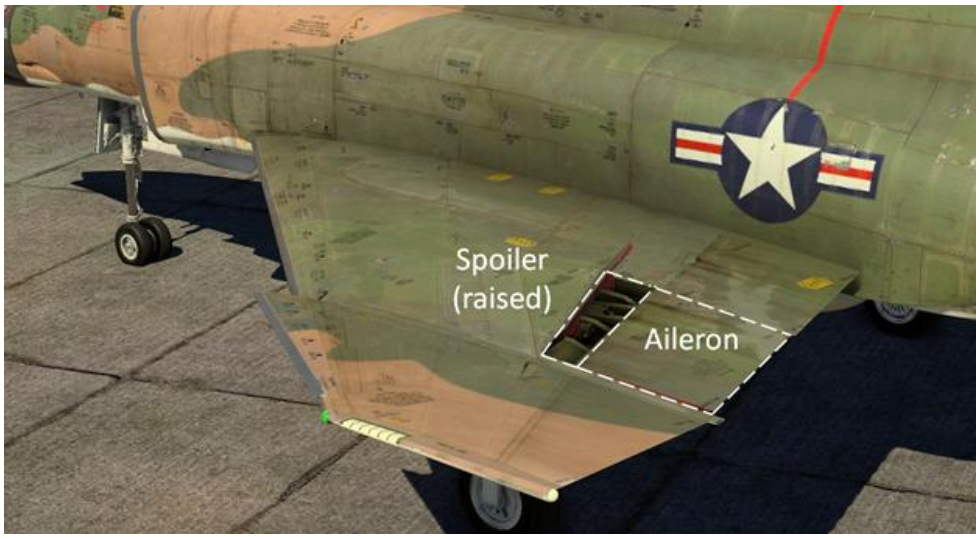


Figure 20: F-4 left spoiler and aileron locations Source: War Thunder 1

STU-20/A34 Starter Data Plate

A badly-burned data plate found by DPAA was subject to further analysis by the Team and determined to be from a STU-20/A34, which was the starter unit for the General Electric J79-15 Engine Series. This is an important assessment because it narrows down the type of aircraft from which it could have come.

Figure 21: STU-20/A34 Starter Data Plate Sources: DPAA and 1F-4C-10

The image below shows the location of the STU-20/A34 starter on the underside of the J79-15 engine.

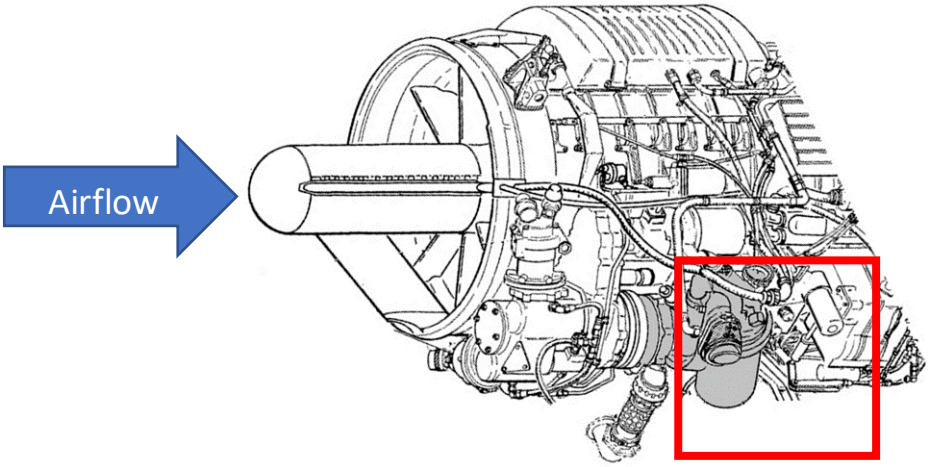


Figure 22: STU-20 Starter location Source: 1F-4C-10 J79-15 Series Engines, Power Package Build-up

There were 5 J79 engine subtypes that powered 8 aircraft models used in Southeast Asia (see below). Since we know whatever crashed at 3153 had a J-79-15 engine, it must be an F-4C, F-4D, or RF-4C aircraft.

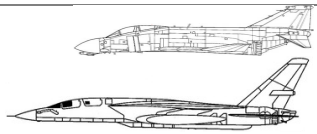
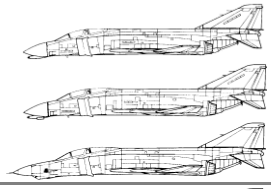
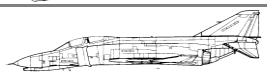
J79 Subtype	Aircraft (Branch of Service)	Aircraft Silhouette (to scale)
J79-7	F-104C Starfighter (USAF)	
J79-8	F-4B Phantom (Navy) RA-5C Vigilante (Navy)	
J79-10	F-4J Phantom (Navy)	
J79-15	F-4C Phantom (USAF) F-4D Phantom (USAF) RF-4C Phantom (USAF)	
J79-17	F-4E Phantom (USAF)	

Table 7: J79 Engine Subtypes used in Southeast Asia

AERO-7A Missile Timer Arm and Foot

The May-June 2019 excavation of 3153 also found the AERO-7A Missile Timer Arm and Foot shown below. This was part of the AIM-7 Sparrow air-to-air missile launcher on the Phantom and the "foot" was used to eject the missile from the aircraft upon launch.

Figure 23: AERO-7A Assembly Source: Interim Search and Recover Report CIL 2019-225-R UNC 3153

Figure 24 below shows the AERO-7A Missile Launcher Assembly position on the belly of the F-4 (there were a total of 4 such launchers) and the locations of the two feet that ejected the missile upon firing. This piece of evidence is important because since RF-4Cs did not have Sparrow Missile launchers we can rule out 3153 as being an RF-4C, *so it must be an F-4C or F-4D*.

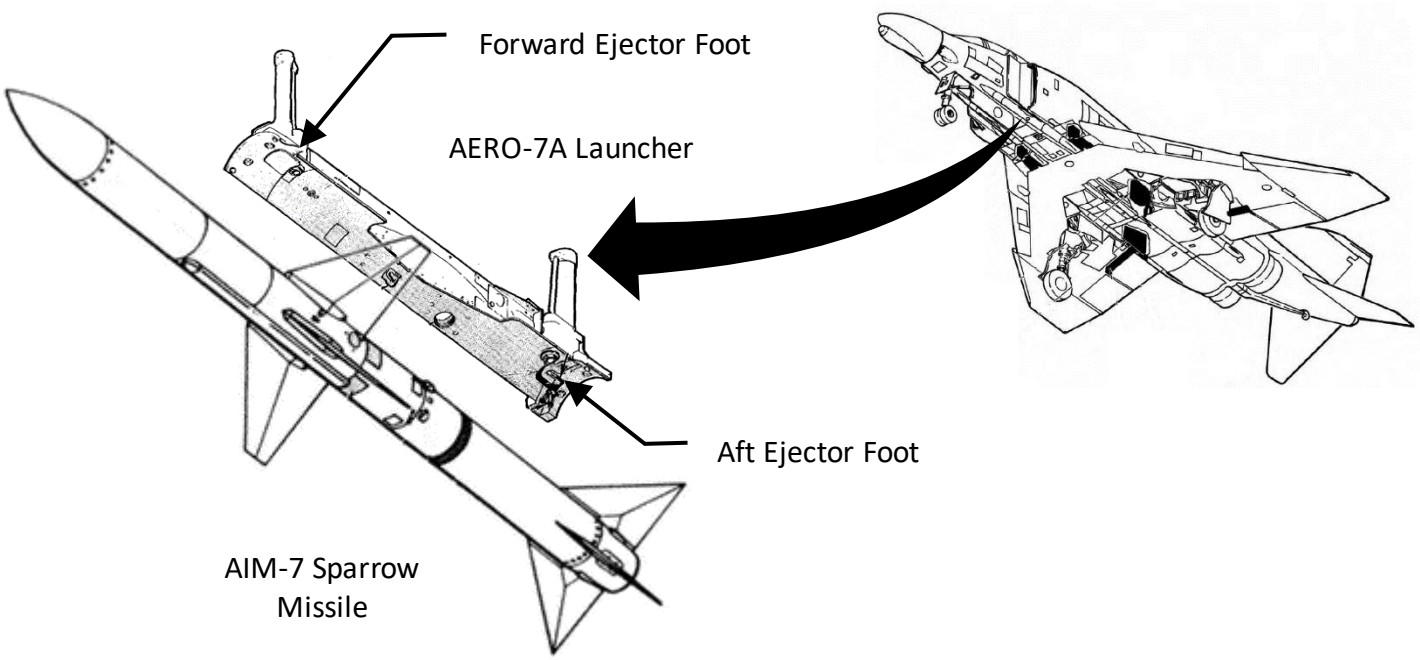


Figure 24: AERO-7A Missile Assembly location Sources: NAVAIR 01-245FDB-2-1.2 F-4B Aircraft Operating Procedures and T.O. 1F-4E-34-1-1 Aircrew Weapons Delivery Manual (Nonnuclear) USAF Series F-4E Aircraft

Remote Compass Transmitter Data Plate

Another data plate DPAA found came from a Remote Compass Transmitter (not the compass instrument in the cockpit but the actual magnetic sensing unit). This data plate was consistent with all F-4 models and was used in other aircraft.

Figure 25: Remote Compass Transmitter Data Plate Source: Interim Search and Recovery Report CIL 2013-095R

However, it's interesting to note that in the F-4, the Remote Compass Transmitter was found under Door 95, an access panel in the left wing very close to the spoiler and aileron assemblies.

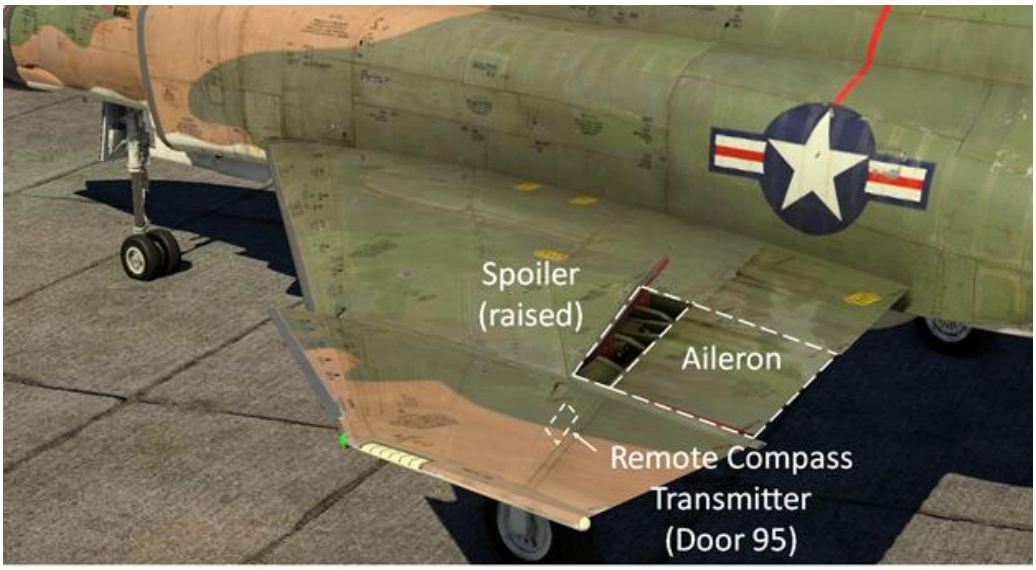


Figure 26: Remote Compass Transmitter Data Plate location at Door 95 Source: War Thunder 1

Hose Tag

After the starter plate, the next most-important artifact DPAA found was a Hose Tag Part # 656200-3-0190. The Team determined this to be an F-4 Outboard flap emergency down line, part of the

mechanism that used compressed air to extend the outboard leading edge flap during an emergency. Its importance is that it's the only piece of forensic evidence with a date on it.

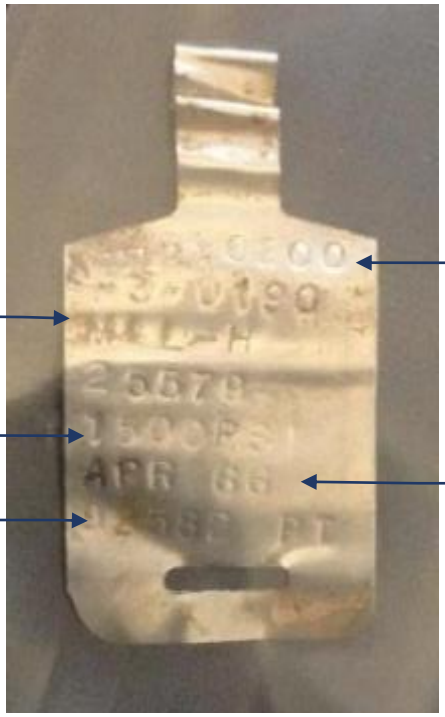


Figure 27: F-4 Outboard flap emergency down line hose tag Sources: DPAA during 2019 League Meeting, T.O. 1F-4C-4-3, and T.O. 1F-4C-4-7

The image below shows the schematic of the F-4 Outboard flap emergency down line (note the forward part of the wing is to the top).

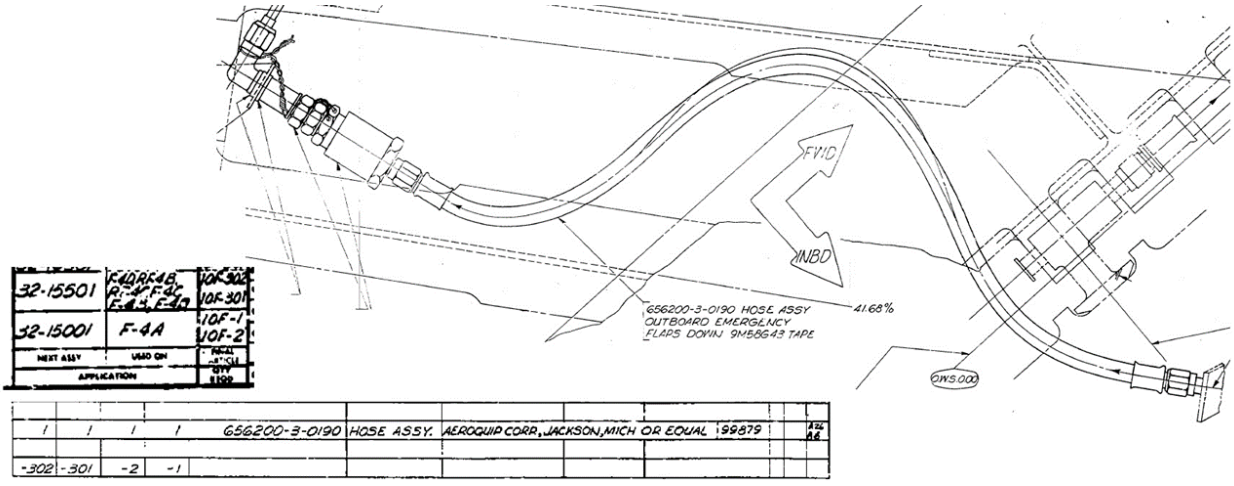


Figure 28: F-4 Outboard flap emergency down line schematic Sources: T.O. 1F-4C-4-3 and T.O. 1F-4C-4-7

The assembly date means the aircraft it came from must have been lost sometime on or after April 1, 1966. The following image shows the hose's position on the left wing but it may have come from the right wing, which had an identical assembly.

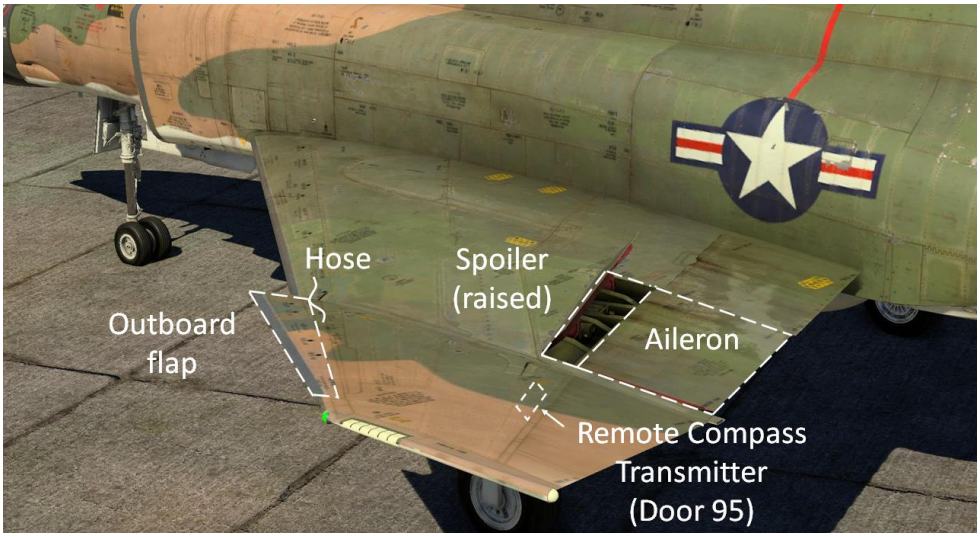


Figure 29: F-4 Outboard flap emergency down line location on wing Source: War Thunder 1

Triple Ejector Rack (TER)

A Triple Ejector Rack (TER) enabled an aircraft carry up to 3 bombs on a single weapons station as shown below.

Figure 30: Triple Ejector Rack (TER) on an F-4 Source: Modelwork

The view of the TER found at 3153 (below) shows the sway braces used to secure bombs to the rack and prevent side-to-side movement. Since TERs were jettisonable and carried by multiple types of aircraft, it's possible this one is coincidental to 3153. However, the TER was a very strong piece of equipment – stressed to carry thousands of pounds of ordnance at up to several times the force of gravity – so the fact this one is fractured leads the Team to suspect it was attached to the 3153 aircraft when it hit the ground rather than being coincidental. However, nothing conclusive can be taken here.

Figure 31: TER found at 3153 Source: Interim Search and Recovery Report CIL 2013-095R

Screws

Several screws with Part Number 32-33027-47 were found. DPAA assessed them to be large head screws used to attach the titanium panels to the aircraft near the engine afterburner exhausts; they were generic to all F-4 models.

Figure 32: Screws Source: Interim Search and Recover Report CIL 2019-225-R UNC 3153

Figure 33: Titanium screws behind port engine exhaust section Source: Flickr

Unidentified Data Plate

A data plate marked 'USAF Serial Number PABA 640516' was also found at 3153. While this appears to be a USAF serialized part (meaning it had a unique identifier), no F-4 had a tail number of 64-0516. Likewise, the only US aircraft with such a tail number was a C-130 Hercules transport that was later sold

to Israel in 1973. The best explanation the Team could come up with is this was some type of USAF-provided piece of equipment, as opposed to something provided by the manufacturer.

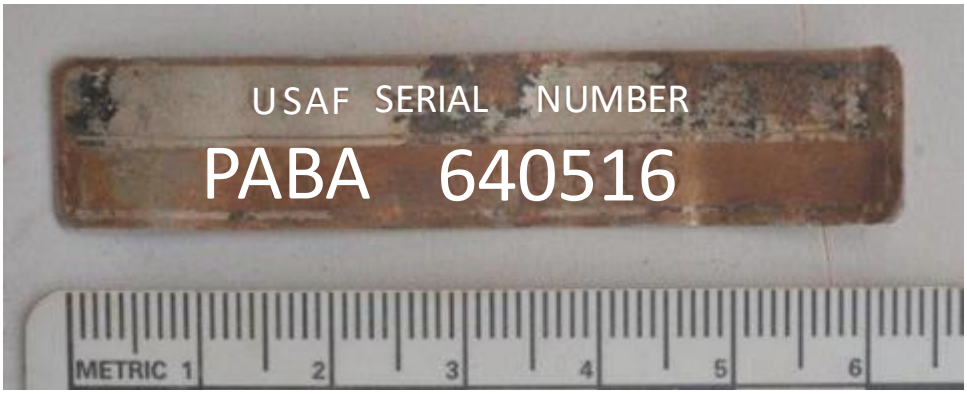


Figure 34: Unidentified Data Plate Source: Interim Search and Recovery Report CIL 2013-095R

Flare Timer Plate

An object suspected of being an illumination flare timer plate was also found. This could be related to 1781 because the aircraft was carrying 32 LUU-2 flares.

Figure 35: Suspected Flare Timer Plate Source: DPAA during 2019 League Meeting

However, upon further analysis by the Team, this timer plate was determined to be from a Mark 24 illumination flare used by C-123 and C-130 cargo aircraft and was calibrated to use number of *seconds* of fall before igniting (see below). Compare this with the LUU-2 illumination flare, which was calibrated to use number of *feet* to fall before igniting. Since the SUU-42 dispensers Owl 08 was carrying could not

accept Mk-24s, it is definitively not from this aircraft and since many thousands of Mk-24s were dropped during the course of the war, it was likely coincidental to 3153.

MK-24 Flare Timer (uses seconds)

LUU-2 Flare Setting (uses feet)

Figure 36: Comparison of Mk-24 and LUU-24 Settings

Source: TM 9-1370-202-12 OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL FLARE, AIRCRAFT: PARACHUTE Mk 24, ALL MODS

Source: Aviation Ordnanceman Course NAVE DTRA 14313

Ancillary Wreckage and TER

The image below shows ancillary wreckage DPAA found at 3153 as well as the TER. To give an idea of scale, the F-4 was about the same length and weight as an 18-wheel tractor-trailer so seeing how little wreckage was found, you can assess the difficulties DPAA had in drawing conclusions from it.

Figure 37: Ancillary Wreckage and TER Source: Interim Search and Recovery Report CIL 2013-095R

However, if we superimpose the wreckage to where they were located on the F-4 (plan view below), it's interesting to note that at least three pieces of wreckage – Items #6, 7, and 8 – (and possibly four more: #2, 3, 4, and 5) came from the *left* side of the aircraft.

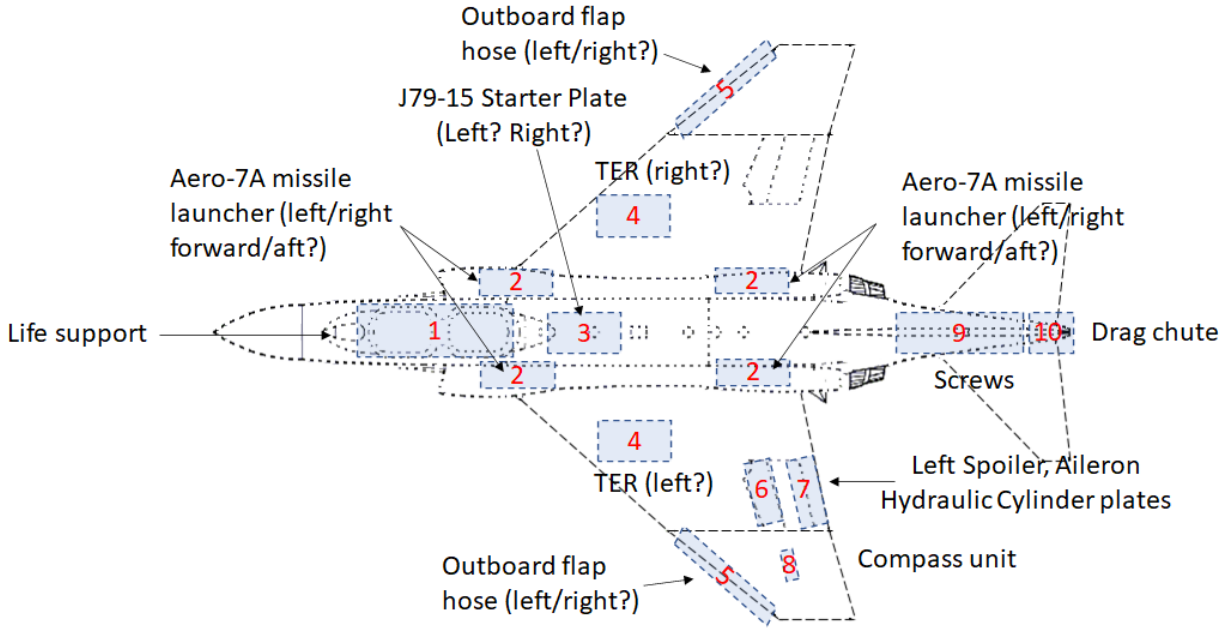


Figure 38: F-4D plan view with wreckage locations superimposed

Alleged Eyewitness to UNC 3153 Loss

According to the Interim Search and Recover Report CIL 2019-225-R REFNO 3153 (June 25, 2019), an alleged eyewitness claimed to have witnessed the 3153 loss.

> "On 10 June 2019, local worker [redacted] informed the RT2 [Recovery Team 2] linguist that he had been a soldier during the Vietnam War Era and had witnessed both REFNO 3153 and 0572 [1Lt Ray Krogman, USAF] loss incidents. He confirmed that the O-1 aircraft associated with REFNO 0572 crashed at the site just north of LA-00527 (potentially LA-00631) and that the F-4 aircraft had crashed immediately south of the current excavation area. He reportedly visited the F-4 aircraft crash site shortly afterwards and witnessed the front half of the aircraft, to include the cockpit prior to scavenging. He recalled children playing on/in the cockpit during his visit to the site post-incident. Further discussion with [redacted] and investigation of his account of the REFNO 3153 loss incident was not possible during 19-4LA JFA."

While this is a potential bombshell statement, many similar claims in other cases turned out to be incorrect due to faulty memory, confusion, or outright lying so this should not be taken as proof of anything. However, it's not clear why there was no follow-up with this alleged eyewitness, especially in light of the notebook showing that on November 7, 2019 at least 7 photos of this person were taken (see below).

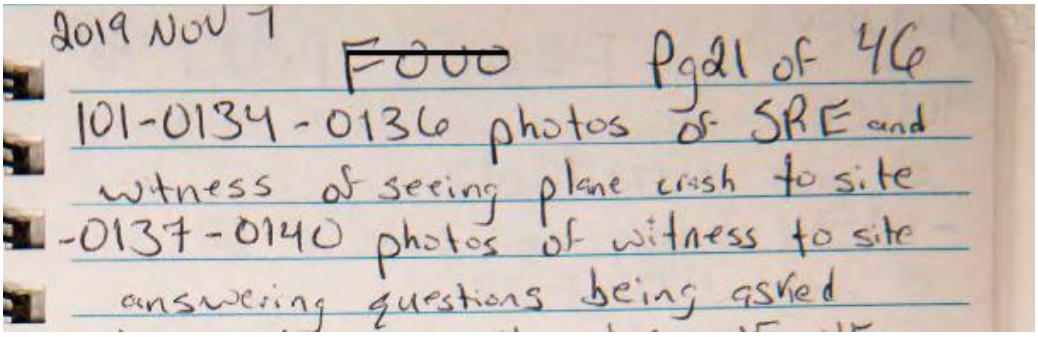


Figure 39: Photographer's picture log of alleged eyewitness Source: 20-1LA_3153_LA-00527_Photo Field Notebook_Redacted1

Analysis of Wartime Imagery and Narrowing Down the Identity of 3153

DPAA and the Team analyzed wartime imagery related to 3153, a mix of reconnaissance aircraft imagery and satellite imagery as shown in the table below.

Imagery Source	Imagery Date	Notes	Analyzed by
Aircraft	12/21/1966	Crater visible	DPAA/Team
Aircraft	1/28/1967	Crater visible	DPAA/Team
Satellite	10/21/1972	Ground disturbance visible	Team*
Satellite	10/30/1972	Ground disturbance visible	Team*

Table 8: Imagery associated with 3153 that was analyzed. Multiple sources

* It's unclear if this imagery was analyzed by DPAA or not.

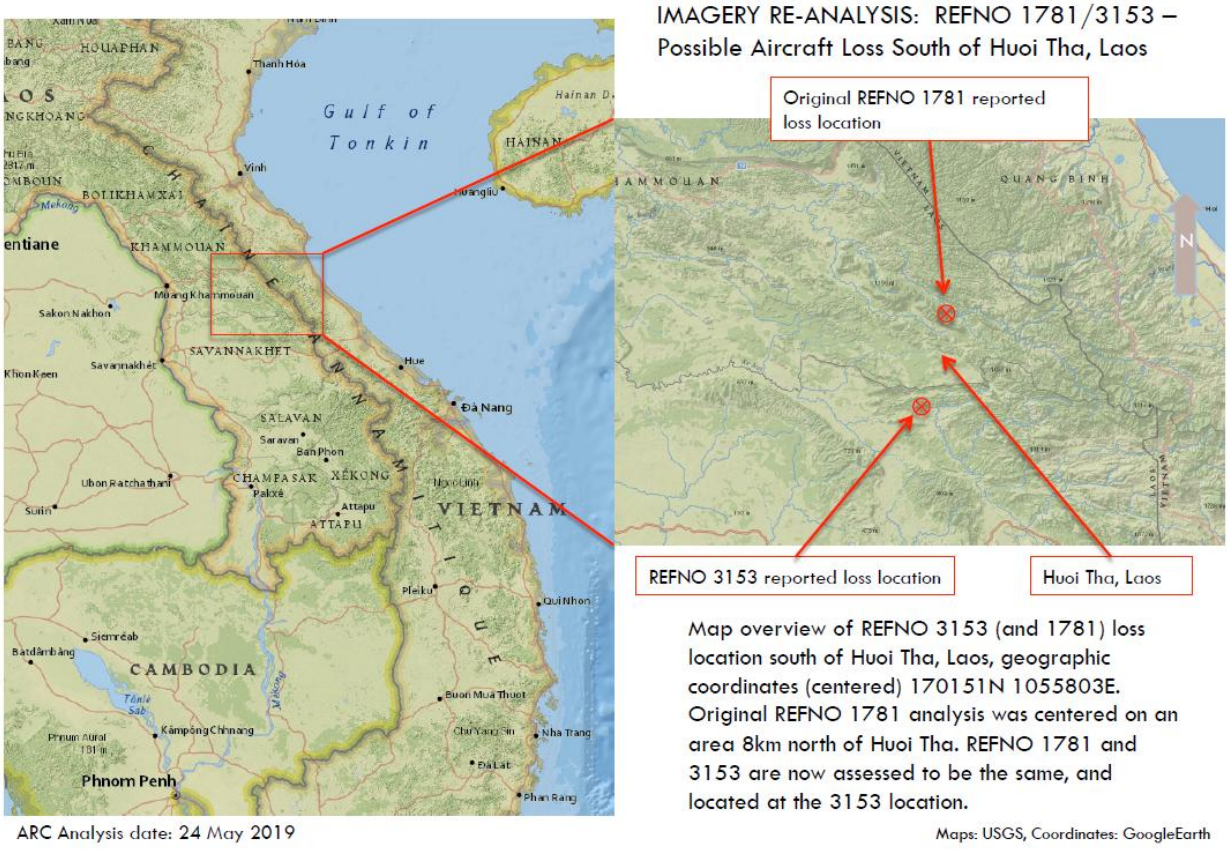


Figure 40: REFNO 3153 relative to the center of the 1781 Target Area Sources: ARC Imagery Analysis, USGS, Google Earth

Figure 40 takes a big-to-small approach of showing where REFNO 1781's target area was relative to the rest of Southeast Asia.

The Team reviewed the REFNO 3153 DPAA imagery release graphics (produced in April 2021) that included reconnaissance aircraft imagery from December 21, 1966 and January 28, 1967 overlaid on October 22, 2020 satellite imagery. However, descriptive text or analysis explaining the analyst's assessment was not provided. Likewise, we were unable to confirm the accuracy of the 1966 or 1967 imagery positioning on the modern (2020) image. That is, imagery taken from different points at different times needs to be aligned to common ground tie points. We are not saying DPAA's alignment is incorrect, just that we could not confirm it. Providing the Team the original 1966 and 1967 images would allow an independent assessment to align ground tie points.

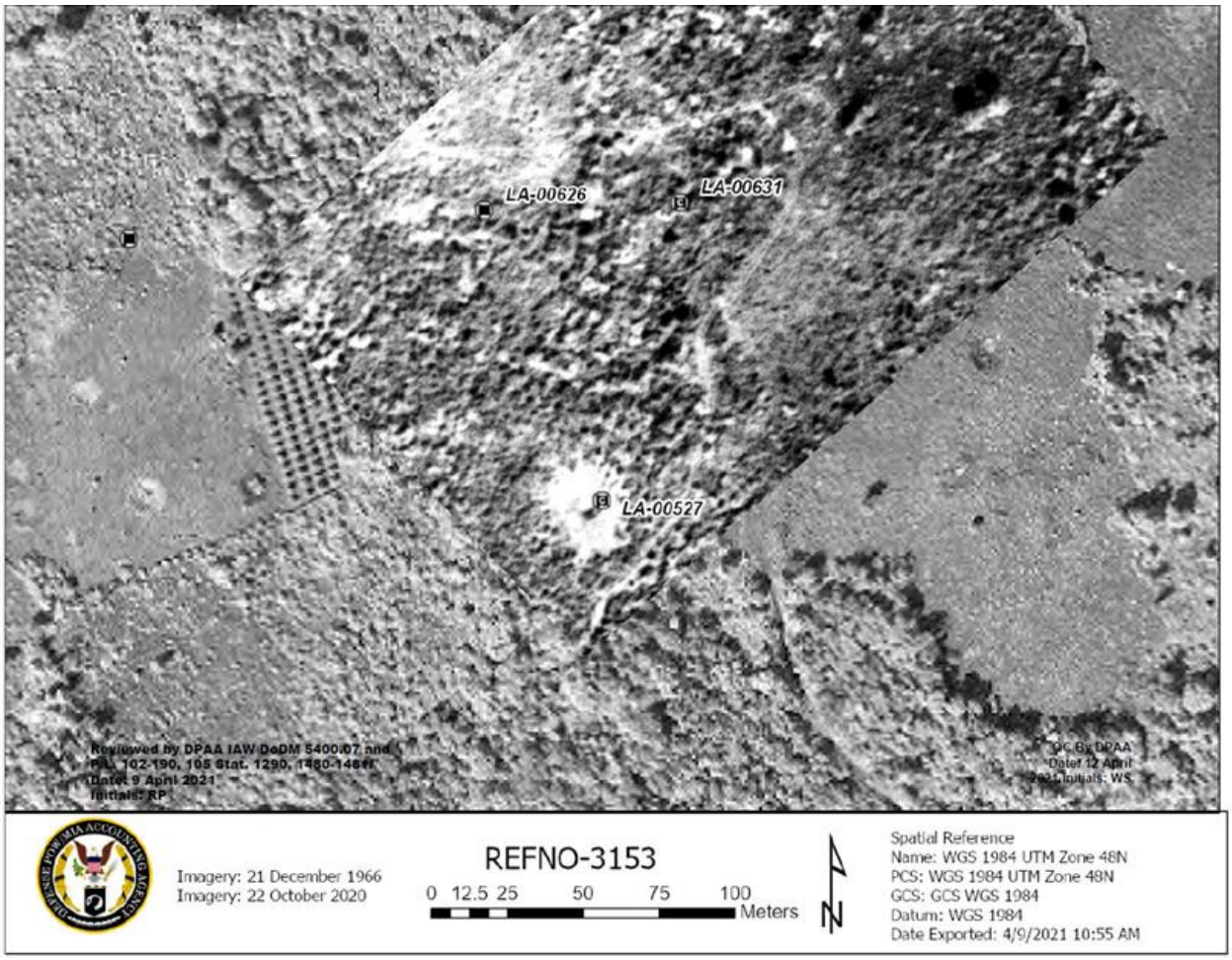


Figure 41: December 21, 1966 reconnaissance aircraft image; LA-00527 is REFNO 3153 and LA-00626 is REFNO 0572 Source: REFNO 3153 Imagery Release, 9 April 2021

Figure 41 shows December 21, 1966 imagery from a reconnaissance aircraft (most-likely a U-2). LA-00626 (later exclusively-correlated to REFNO 0572) and LA-00527 (later identified as REFNO 3153) are visible as is LA-00631 (the Team is unsure to which case this location is referenced). LA-00527 is circular and no wreckage is present.

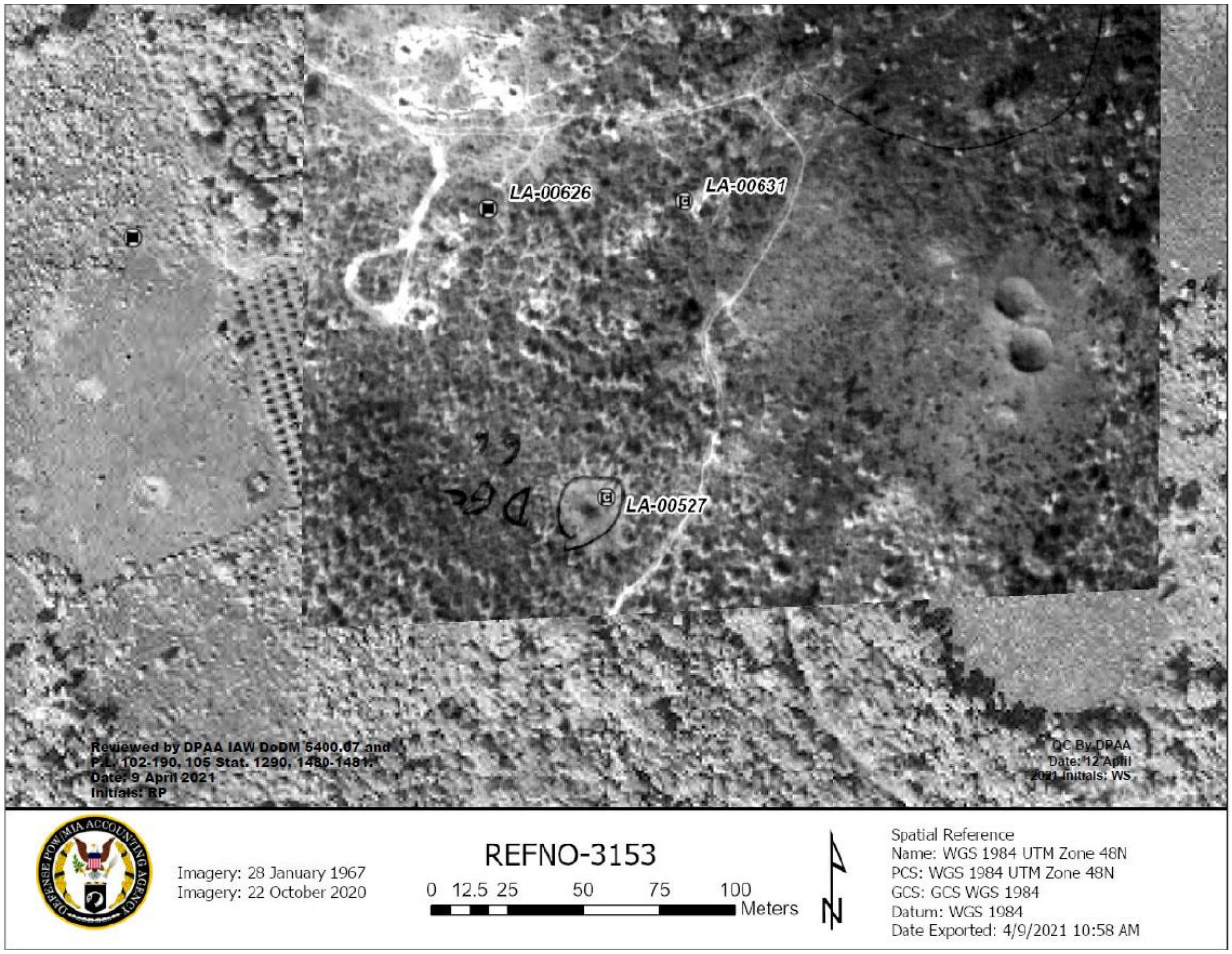


Figure 42: January 28, 1967 reconnaissance aircraft image; LA-00527 is REFNO 3153 and LA-00626 is REFNO 0572 Source: REFNO 3153 Imagery Release, 9 April 2021

Figure 42 shows January 28, 1967 imagery from a reconnaissance aircraft (again, most-likely a U-2). LA-00626 (later exclusively-correlated to REFNO 0572) and LA-00527 (later identified as REFNO 3153) are visible as is LA-00631 (the Team is unsure to which case this location is referenced). LA-00527 is circular and no wreckage is present.

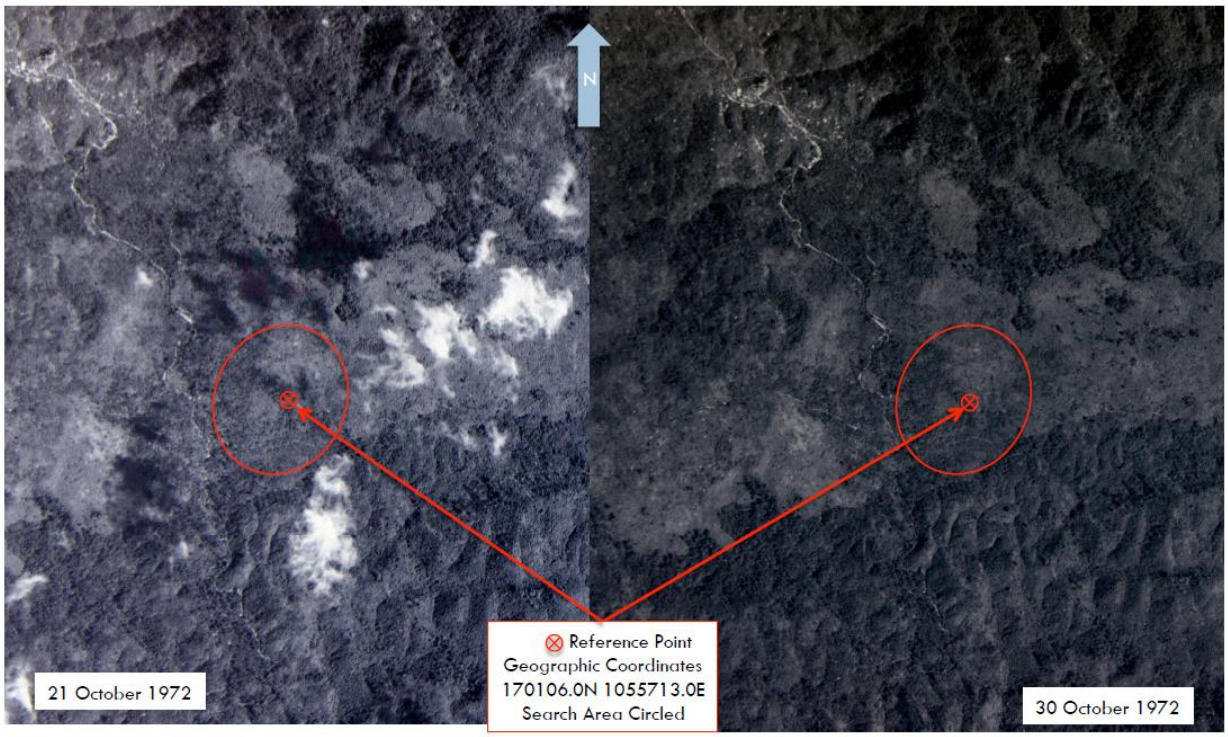


Figure 43: Possible crash site at the 3153 coordinates Sources: ARC Imagery Analysis, Google Earth, NARA, 1204-1/2, October 21/30 1972

Figure 43 shows declassified satellite imagery from late October 1972 (approximately one year after Owl 08 went missing).

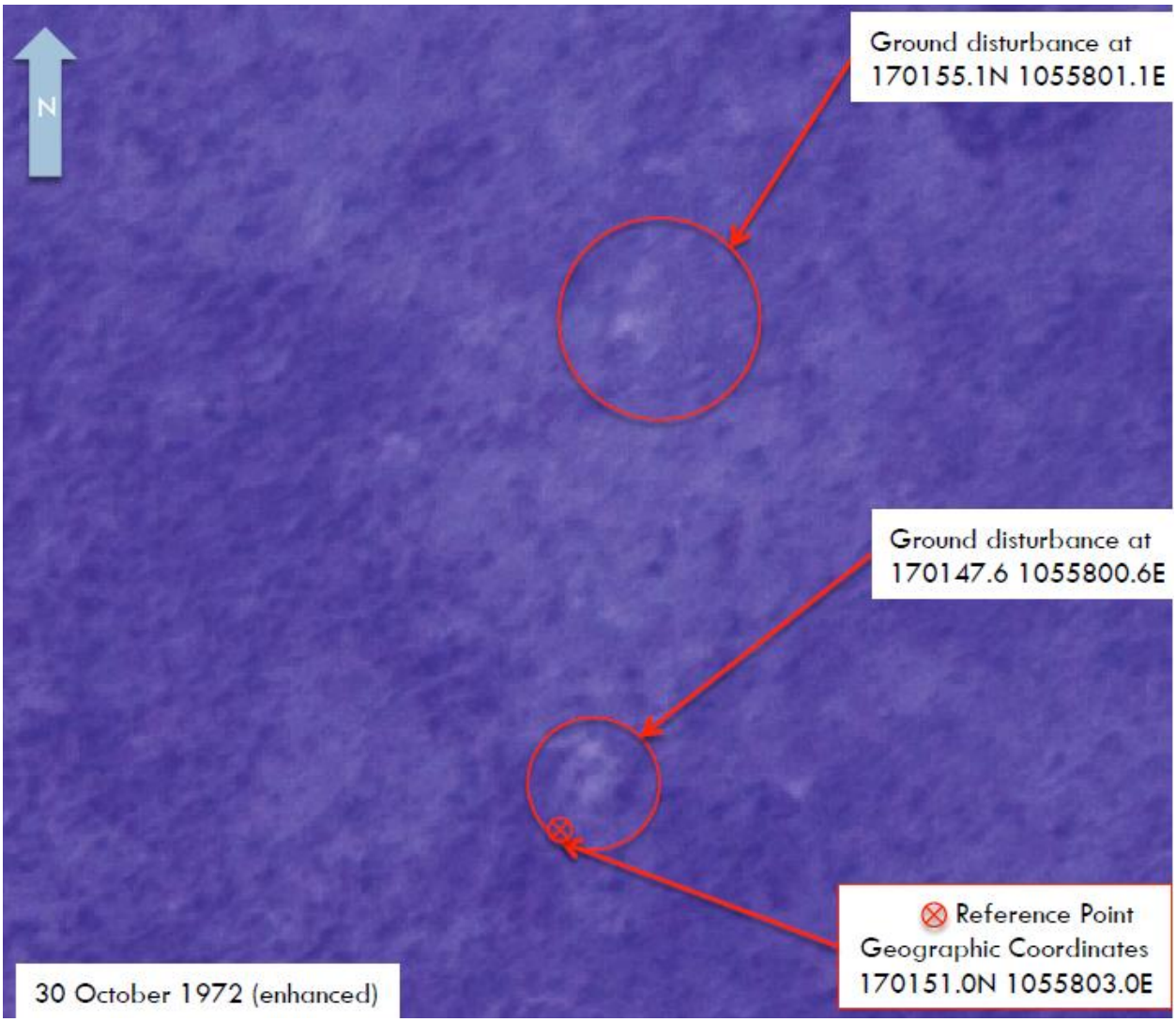


Figure 44: Enhancement of possible crash site at 3153 (bottom) and AAA site (top) ARC Imagery Analysis, Google Earth, NARA, 1204-1/2, October 21/30 1972

That said, the DPAA imagery graphic suggests that LA-00527 – the location where F-4 aircraft components were discovered in 2013 and 2019 but not correlated with any particular loss – aligns to a fresh crater seen on the 1966 image. The round crater size and shape suggest a bomb/ordnance detonation, not an aircraft crash crater. Many bomb craters were observed on the images from 1966, 1967, and October 30, 1972 (declassified satellite imagery), and can be seen on modern satellite images in the area around LA-00527. While some are nearly perfect circles, many are not.

In 2021, DPAA provided the families with an assessment of imagery associated with the 3153 location. According to the REFNO 1781 Family Conference Report ("Scrub Sheet") dated April 12, 2021, "[Analysts] uncovered imagery [from a reconnaissance aircraft] of the crash site dated 21 December 1966 and 28 January 1967. The December imagery shows a fresh crater at the UNC 3153 location… These images predate the REFNO 1781 loss by five years *and conclusively demonstrate the uncorrelated incident 3153 site is not the REFNO 1781 crash site*." [emphasis added] This reads like DPAA was saying fresh crater = 3153 crash site. However, that conclusion is not supported by imagery analysis. That is,

the DPAA excavation report CIL 2019-225-R (LA-00527/REFNO 3153) shows (diagrams) from four-to-seven various-sized craters from 5 to 75 meters away from the LA-00527 excavation site. The crater size diameters varied in the diagrams. It is possible one of these craters was from the fresh-1966 bomb/ordinance detonation.

In conclusion, the referenced aerial and satellite imagery do not show an aircraft crash crater or associated debris at the LA-00527 excavation site. The net effect is imagery cannot determine the crash date of the F-4 wreckage found at LA-00527.

However, assuming this imagery assessment is correct, based on the forensic evidence found at 3153, the uncorrelated aircraft must be an F-4C or F-4D lost sometime between April 1 (earliest Hose Tag assembly date) and December 21, 1966 (imagery taken date). According to Hobson, 56 J79-15-powered aircraft were lost due to all causes during this period (see Appendix D – J79-15 Powered Aircraft Lost April 1 to December 21, 1966 for a complete list). Using an analytics "funnel", the breakdown of the 56 aircraft is shown below. 49 were F-4Cs and 7 were RF-4Cs (which can be categorically ruled out). No F-4Ds were lost during this period. Of the 49 F-4Cs, 30 were lost over North Vietnam, 14 over South Vietnam, 3 over Thailand, and only 2 over Laos.

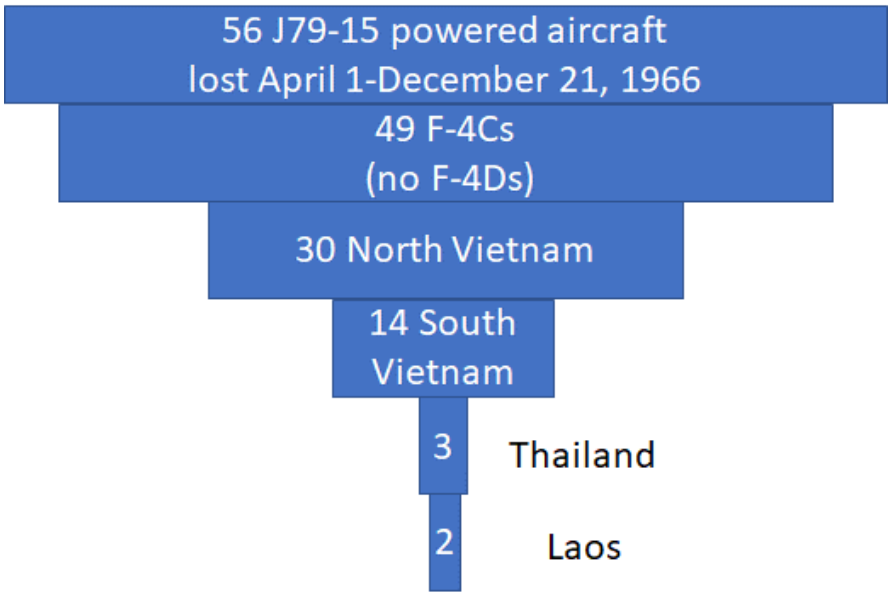


Figure 45: Disposition of 56 J79-15 powered aircraft April 1 to December 21, 1966 Source: Hobson

This means 3153 would have to be one of these two Laos F-4C losses. However, looking at the table below, both were OPLOSSES (both men ejected and were rescued), which is incompatible with the Life Support found at 3153. This means either DPAA's imagery assessment is incorrect or 3153 is an MIA loss other than 1781. If the latter is true, it's not clear to which REFNO it could be associated.

Model	Tail #	Loss Date	REFNO	Location relative to 3153
F-4C	63-7531	4/21/1966	OPLOSS	72 miles southeast
F-4C	63-7518	10/20/1966	OPLOSS	9 miles north

Table 8: J79-15 powered aircraft lost over Laos April 1 to December 21, 1966 Source: Hobson

Zooming out to take a larger view, the image below shows 3153 at the center and the locations of all 21 F-4 MIA losses within 50 miles known to the Team. The "*known to the Team*" caveat is important because we don't have a complete picture of all losses. The following pages have a lot of detail so please keep the following in mind:

1. DPAA has repatriated remains or exclusively-correlated several F-4 losses in this part of Laos and should be recognized for these successes. This has reduced the realm of possibilities for 3153.

2. The Team believes we have ruled out every one of these F-4s as being correlated to 3153. This is because they have been resolved, exclusively-correlated, have last-known positions too far away, and/or have an engine subtype that doesn't match 3153. Please pay particular attention to the last-known positions of the five off-the-scope REFNOs (no known crash sites) highlighted in beige, which will be discussed in detail, since they are the most-likely candidates for 3153.

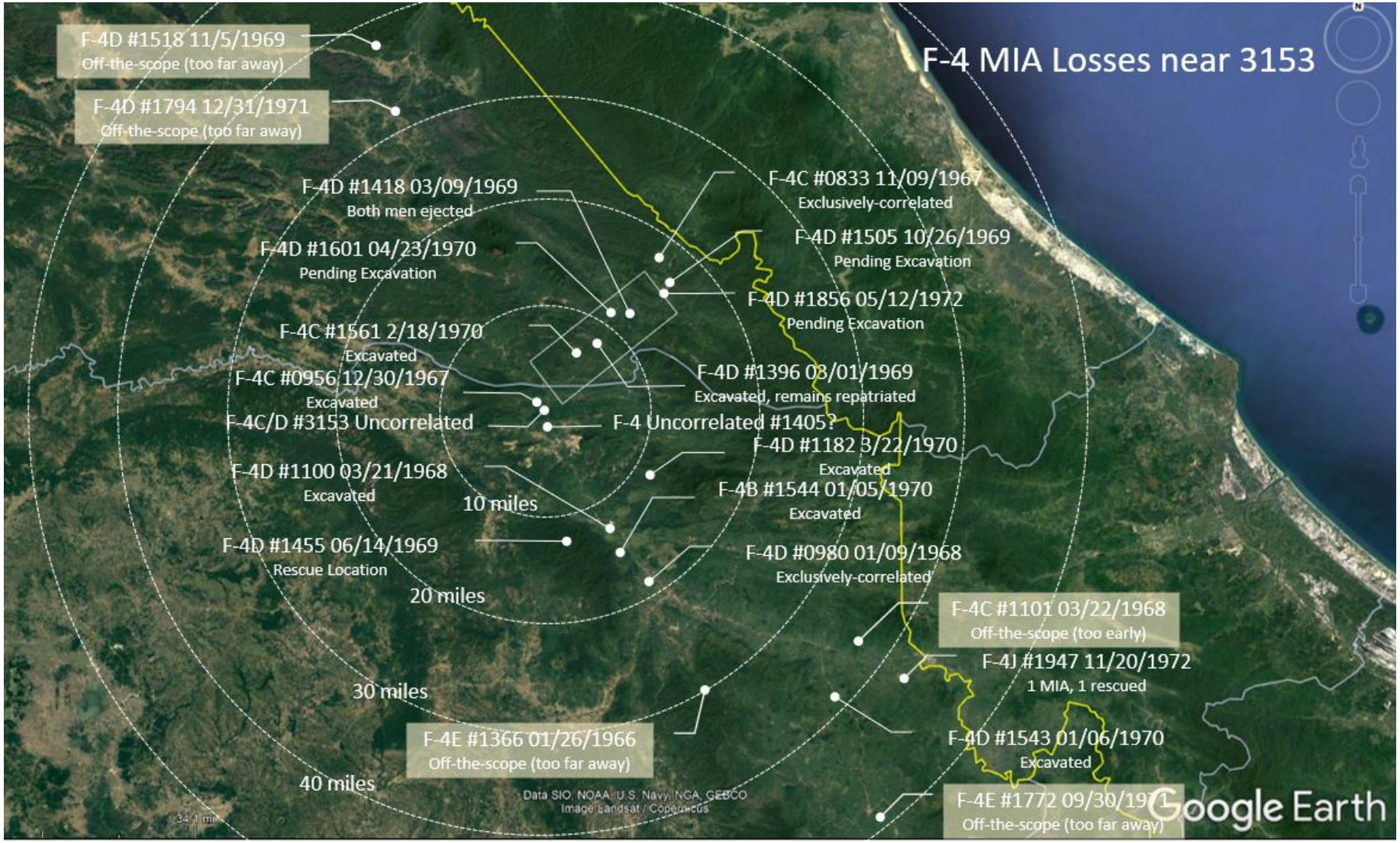


Figure 46: F-4 MIA Losses known within 50 miles of REFNO 3153 Multiple Sources

The following table lists all 21 F-4 MIA losses the Team is aware of within 50 miles of REFNO 3153 plus what we believe is the wreckage of REFNO 1405, ordered by date ascending.

Aircraft Serial #	REFNO	Loss Date and Location relative to 3153	Notes
F-4C 64-0571	0833	11/9/1967 038°/16 miles	This uncorrelated F-4 crash site is 16 miles northeast of 3153 and was pending excavation as of 2017 (we don't know its current status). Armstrong remains MIA and Sijan died in captivity. His remains were repatriated in 1974.
F-4C 63-7658	0956	12/30/1967 002°/1 mile	The exclusively-correlated site of Swords/Wortham is 1 mile north of 3153 has been excavated multiple times. While at least one crewman was determined to be in the aircraft at impact, no remains were identified and the case is in No Further Pursuit status.
F-4D 66-8729	0980	1/9/1968 151°/19 miles	Multiple eyewitnesses saw Green/Irsch impact the ground 19 miles southeast of 3153. As of 2017, this site has been exclusively-correlated.
F-4D 66-8767	1100	3/21/968 153°/15 miles	This uncorrelated F-4 crash site was excavated during 4 JFAs but it's not clear if it's been exclusively-correlated or not. However, there were multiple friendly eyewitnesses (including a FAC who stayed on-station for 2 hours) that saw Hesford/Stowers crash 15 miles southeast of 3153.
F-4C 64-0830	1101	3/22/1968 128°/37 miles	Guy (Returned POW)/Lyon (MIA) were seen to crash 37 miles southeast of 3153 (Record Loss Location).
F-4D 66-8695	1182	3/22/1968 130°/12 miles	Davies/McCubbon were seen to have hit the ground on a night mission by their wingman. This site is pending excavation.
F-4E 67-0286	1366	1/26/1969 150°/29 miles	Utley/Singleton were seen to have crashed 29 miles south southeast of 3153 (Record Loss Location). No crash site has been identified. However, since this was an F-4E aircraft, its engine subtype (J79-17) is not compatible with what was found at 3153.
F-4D 66-8814	1396	3/1/1969 040°/7 miles	Keller's & Meroney's remains were repatriated in 2012 and buried in Arlington National Cemetery.

Aircraft Serial #	REFNO	Loss Date and Location relative to 3153	Notes
F-4D 65-0722	1405	3/10/1969 156°/5 miles	Luna/Rutyna were shot down and both made it safely to the ground and were in radio contact with SAR Forces. While Rutyna was rescued, Luna remains MIA. Multiple JFAs have sought to locate Luna's burial site but nothing has been found to-date. This Record Loss Location is 5 miles south southeast of 3153.
F-4 Uncorrelated	1405?	Date? 155°/0.5 mile	This uncorrelated F-4 site (48Q XD 03338268) is ½ mile south southeast of 3153 and was found on 1/17/1996 during the 96-12L JFA. Based on its proximity and direction from the REFNO 1405 ejection point, it's likely REFNO 1405's crash site. However, since both men ejected, their aircraft's crash site would technically be an OPLOSS (no Life Support) and not an MIA site. Please see the subsection "Why We Think the Uncorrelated F-4 found during the 96-12L JFA is REFNO 1405" that follows.
F-4D 66-8809	1418	3/29/1969 045°/10 miles	Both Popendorf & Hess ejected but Hess remains MIA (although DPAA believes they found the crash site at 48Q XD 0870 9760). Regardless, they ejected 10 miles north-east of 3153 and the aircraft was heading northwest (further away). Likewise, there should be no Life Support.
F-4D 66-7574	1455	6/14/1969 172°/14 miles	Grace/Karas were rescued but tragically, Grace fell to his death from the helicopter and his body has never been recovered (although in 1997 a JTF-FA Team recovered one of the canopies from this aircraft). That said, it's not clear if the Record Loss Location coordinates (16 43' N 106 00' E) are where the aircraft crashed or the crew was picked up. Regardless, at 14 miles south of 3153, it's too far away to be 3153 and there should be no Life Support.
F-4D 65-0751	1505	10/25/1969 045°/15 miles	While this is the Record Loss Location and the Team does not know the case's current status (surveyed, exclusively-correlated, excavated), there were multiple friendly eye-witnesses that saw Warren/Bynum impact the ground 15 miles northeast of 3153.
F-4D 66-7748	1518	11/5/1969 333°/36 miles	Lefever/Echanis were working a night FAC mission near the Mu Gia Pass with several Navy aircraft who saw an explosion below them. It's not clear what the status of this case is but with a last-known position 36 miles northwest of 3153, it's too far away to be 3153.

Aircraft Serial #	REFNO	Loss Date and Location relative to 3153	Notes
F-4D 66-8784	1543	1/2/1970 135°/38 miles	West/Lindstrom were seen to have been by AAA and crash without an attempt to eject. This site has been excavated.
F-4B 152283	1544	1/5/1970 156°/16 miles	This uncorrelated F-4 crash site was excavated during 6 JFAs but it's not clear if it's been exclusively-correlated. However, multiple friendly eyewitnesses saw Robinson/ Burnes impact the ground 16 miles south southeast of 3153. Likewise, as an F-4B aircraft, its engine subtype (J79-8) is not compatible with what was found at 3153.
F-4C 63-7671	1561	2/18/1970 027°/5 miles	Daffron/Morley were hit by AAA on a night mission. Their crash site was excavated in 1993 and 1995 and their remains were identified in 1999.
F-4D 66-7639	1601	4/23/1970 032°/9.5 miles	Multiple friendly eyewitnesses saw Lucki/Gomez impact the ground 10 miles northeast of 3153. This site is pending excavation.
F-4E 68-0316	1772	9/30/1971 140°/51 miles	Donovan/Bond's last-known position was 50 miles south-east of 3153. Additionally, since it's an F-4E its engine sub-type (J79-17) is incompatible with 3153.
F-4D 66-7573	1794	12/31/1971 332°/31 miles	In 2015 a Team member interviewed a pilot in who saw the Duggan/Sutter aircraft heading north about 10 miles south of Mu Gia Pass. This puts their last-known position about 30 miles northwest of 3153 and *heading further away*. Like-wise, multiple US eyewitnesses later saw burning wreckage on the ground, which was consistent with a Vietnamese claim that an F-4 was shot down by a Surface-to-Air Missile (SAM) on the that date near Mu Gia.
F-4D 66-8799	1856	5/12/1972 035°/19 miles	This site was exclusively-correlated to Bogard/Ostermeyer in May 2000. It was last surveyed on August 10-11, 2019 during JFA 19-4VN (136TH JFA) in preparation for excavation (this site has been on the Master Excavation List (MEL) since 2006).
F-4J 153849	1947	11/20/1972 128°/42 miles	Anderson (rescued) and Breuer (MIA) were shot down by AAA. It is unknown if Breuer ejected or not.

Table 9: F-4 Losses within 50 miles of REFNO 3153 ordered by Date

Why We Think the Uncorrelated F-4 found during the 96-12L JFA is REFNO 1405

The image below shows Owl 08's target area boundary and 3153 at the center. You can see Owl 08's projected flightpaths, one back to the tanker and one to Ubon. You can also see two impact points for REFNO 0956 (the aircraft broke in two upon impact, leaving two crash sites). It also shows DPAA estimated 3153's heading as "westerly". A phone interview with the surviving REFNO 1405 pilot identified his approximate ejection point and heading and you can see the Uncorrelated F-4 site is consistent with that trajectory. While strong, this is still circumstantial.

Figure 47: UNC 3153 relative to REFNO 1405

Remaining Off-the-Scope Losses in Laos

According to the 2021 REFNO 1781 "Scrub Sheet", "There are still 11 off-the-scope losses believed to have crashed in Laos. Of the 11, 6 of them are F-4s, which includes REFNO 1781, and possibly crashed in Khammouane, Salavan or Savannakhet province." *As best the Team can tell* – and this is an important caveat because we do not have visibility into all losses – the table below lists these 6 off-the-scope F-4 losses. Note the last-known position of another off-the-scope loss, REFNO 1259 (8/23/1968), was near the Laotian border with Thailand, but since it was an RF-4C, it can't be a potential match for 3153.

#	Model	REFNO	Tail #	Loss Date	Relevance to 3153
1	F-4C	1101	64-0830	3/22/1968	Too far away (shot down 37 miles southeast of 3153).
2	F-4E	1366	67-0286	1/26/1969	Too far away (shot down 29 miles southeast of 3153) and incompatible engine subtype.

#	Model	REFNO	Tail #	Loss Date	Relevance to 3153
3	F-4D	1518	66-7748	11/5/1969	Too far away (last-known to be 36 miles north-west of 3153).
4	F-4E	1772	68-0316	9/30/1971	Too far away (last-known to be 50 miles south-east of 3153) and incompatible engine subtype.
5	F-4D	1781	66-7752	11/26/1971	A possible match.
6	F-4D	1794	66-7573	12/31/1971	Too far away (last-known to be 32 miles north-west and heading further away).

Table 10: Six F-4 off-the-scope losses in Laos the Team is aware of (by date ascending)

Of the six, the Team thinks five can be ruled out for being too far away (REFNOs 1101, 1518, and 1794) or wrong engine subtype/too far away (REFNOs 1366, 1772). Assuming the Team is correct about these six off-the-scope REFNOs, by process-of-elimination this leaves only REFNO 1781 as a possible match for 3153. However, the REFNO 1781 2021 Scrub Sheet clearly states, "There are still multiple uncorrelated F-4 crash sites in the loss area that analysts have yet to associate with known incidents." This means one of these sites may be a better match for where Owl 08 crashed.

Conclusions and Next Steps

Given all the information analyzed over the past 16 years, the Research Team has reasonably concluded the following based on the logic tree below.

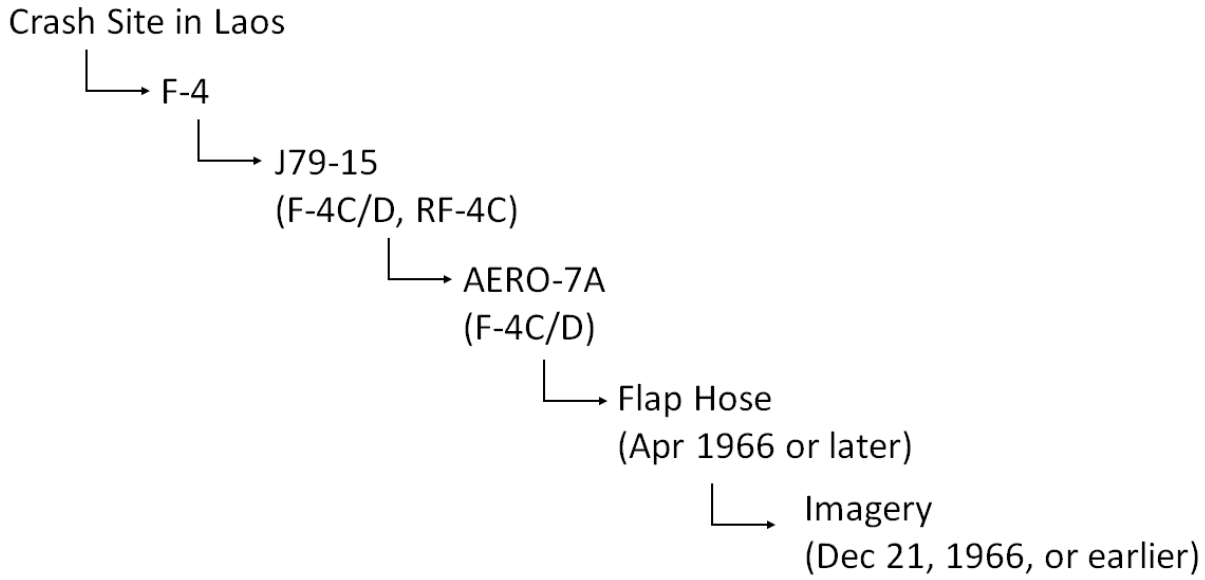


Figure 48: Logic tree of forensic evidence related to REFNO 3153

1. Whatever happened to Jim Steadman and Bob Beutel in early morning of November 26, 1971 was sudden and catastrophic. This was based on the lack of a radio distress call and no ejection beepers. (Circumstantial Information) However, a mid-air collision has been definitively ruled out since no other aircraft (friendly or Vietnamese) were lost that night in Southeast Asia. (Forensic Factual Information) Likewise, based on ground-based sensor data and their mission profile, they likely crashed sometime after 3:28 AM and before about 3:50 AM. (Circumstantial Information)

2. The evidence found at 3153 is believed to be from an MIA Loss of an F-4C or F-4D (and not an RF-4C) aircraft sometime on/after April 1, 1966, the Hose Tag assembly date. (Forensic Factual Information)

3. The Team's assessment of aircraft reconnaissance imagery from late 1966/early 1967 is that is does not conclusively show an aircraft crashed there. As such, we disagree with DPAA's assessment on technical grounds. (Scientific Information)

4. We also disagree with DPAA's imagery assessment that 3153 must be an unknown F-4 MIA loss prior to December 21, 1966 (date imagery of 3153 was taken showing a fresh crater) based on the evidence analyzed in item 2 above. That is, only two J79-15 powered F-4s were lost between April 1, 1966 (earliest date based on the Hose Tag) and December 21, 1966 (latest date based on aircraft imagery) in Laos and both were OPLOSSES (no Life Support would be present). Since these losses occurred 72 miles southeast and 9 miles north of 3153 respectively, they can be ruled out based on distance. (Circumstantial Information)

5. Assuming the Team has correctly identified all six off-the-scope F-4 losses in Laos (of which REFNO 1781 is one), we believe that five – REFNOs 1101, 1518, 1366, 1772, and 1794 – can be ruled out based on distance from 3153 and/or incompatible engine subtype.

6. Taking the totality of information we have analyzed, we find multiple lines of evidence pointing to 3153 being the most-likely location where Jim Steadman and Bob Beutel crashed. Assuming this is correct, given an extensive SAR searched this location would mean the aircraft likely broke up in-flight, leaving very little wreckage. (Circumstantial Information)

7. However, since the Team lacks the complete list of off-the-scope losses and visibility into all uncorrelated (3000-series) crash sites in Laos, this precludes us from definitively claiming that 3153 is 1781. That is, there may be a better candidate for 1781 than 3153 that we are not aware of.

We believe that a combined analysis effort between DPAA and the Team will lead to either an exclusive correlation of 3153 to a REFNO (whether it's 1781 or not) and/or identifying a better candidate site for 1781 based on the uncorrelated F-4 crash sites in Laos. Both represent win-win scenarios. In order to move forward, the following next steps are recommended.

1. DPAA needs to provide to the Steadman and Beutel Families the list of the 11 off-the-scope losses in Laos as well as the coordinates for the "multiple uncorrelated F-4 crash sites in the loss area that analysts have yet to associate with known incidents."

2. DPAA needs to provide the Steadman and Beutel Families "Message DPAA HICKAM AFB HI 142003Z JAN 20, Subject: Life Support Report Concerning Uncorrelated Incident 3153 (Site LA-00527) Obtained during JFA 20-1LA (156th JFA)".

3. DPAA needs to provide the Steadman and Beutel Families the 2019 REFNO 3153 excavation photos previously requested as listed in Appendix H – UNC 3153 Excavation Images Needed.

4. DPAA needs to provide the Steadman and Beutel Families what the follow-up was on the person who claimed in 2019 that he witnessed the losses of both REFNO 0572 and 3153.

In closing, The Research Team is grateful to the many people both inside and outside DOD who contributed to the efforts to bring two of our missing Vietnam War heroes home.


Until they *all* come home…

Appendix A – Search-And-Rescue Logs Transcriptions

This section contains transcriptions of the hand-written SAR Logs regarding the loss of Owl 08 on November 26, 1971 (all entries not related to Owl 08 were omitted for clarity). The logs cover the period November 25 through December 8, 1971, the last date with an entry related to Owl 08. Note that all dates and times are Zulu (Greenwich Mean Time, GMT) unless otherwise noted. Keep in mind that since Thailand is 7 hours ahead of Zulu/GMT, Owl 08 was first reported as missing at 2130 (9:30 PM) on November 25 (Zulu), which equates to 4:30 AM Local Time on November 26. There are two sets of logs, both with entries regarding the missing crew, one is from "Jack" (rescue center in Thailand) and the other is from "Joker" (rescue center in South Vietnam). Additionally, undecipherable handwriting was transcribed as either [unreadable] or [?] and all transcriber comments are shown as [ ] Here are the names/acronyms found in this document.

Term	Definition
ABCCC	Airborne Command Control and Communication aircraft (EC-130).
Atlanta	Callsign of RF-4 reconnaissance aircraft.
Blue Chip	Callsign of the 7th Air Force Headquarters in Saigon.
Covey	Callsign Slow-mover Forward Air Controller of O-2 or OV-10 flying out of Danang.
FAC	Forward Air Controller
Falcon	Callsign of RF-4 reconnaissance aircraft.
Fast Mover	F-4 aircraft used in a Forward Air Control role.
Fistful	Callsign of the 8th Fighter Wing Command Post at Ubon Airbase in Thailand.
Headshed	Callsign of Task Force Alpha Command Post at Nakom Phanom Airbase.
Hillsboro	Callsign of daytime EC-130 ABCCC from the 7 ACCS out of Udorn.
Igloo White	A highly-classified, covert electronic warfare operation conducted from January 1968 to February 1973 using sensors to detect truck and troop movements and assist in the direction of strike aircraft to their targets on the Ho Chi Minh Trail.
Jack	Callsign of the Rescue Coordination Center at Nakom Phanom Airbase, Thailand.
Joker	Callsign of the Joint Rescue Coordination Center (JRCC) at Tan Son Nhut Airbase in Saigon; and referred to by the initials 'JR' in this document.
King	Callsign of HC-130 rescue aircraft (command & control and helicopter tanker).
Lion	Callsign of Detachment 3, 621 TCS Air Traffic Control radar site at Ubon Airbase.
Moonbeam	Callsign of nighttime EC-130 Airborne Command Post (7 ACCS out of Udorn).
Nail	Callsign of O-2 or OV-10 slow-mover Forward Air Control aircraft out of NKP.
Queen	Callsign of the Rescue Coordination Center at Danang Airbase in South Vietnam.
Raven	Callsign of O-1 Forward Air Control aircraft.
RCC	Rescue Coordination Center.
Slow-Mover	Term used to identify jet vs. propellor aircraft (i.e., O-1, O-2, OV-10, A-1 (in strike role) and T-28).
Task Force Alpha	Oversaw the "Igloo White" sensor program at Nakom Phanom Airbase in Thailand.
TACAN	Acronym for Tactical Air Navigation, a UHF radio beacon providing bearing and distance information from a ground station or ship to an aircraft.
TUOC	Tactical Unit Operations Center.

Table 11: SAR Log Term Definitions

The following image shows the SAR sector responsibilities in Southeast Asia.

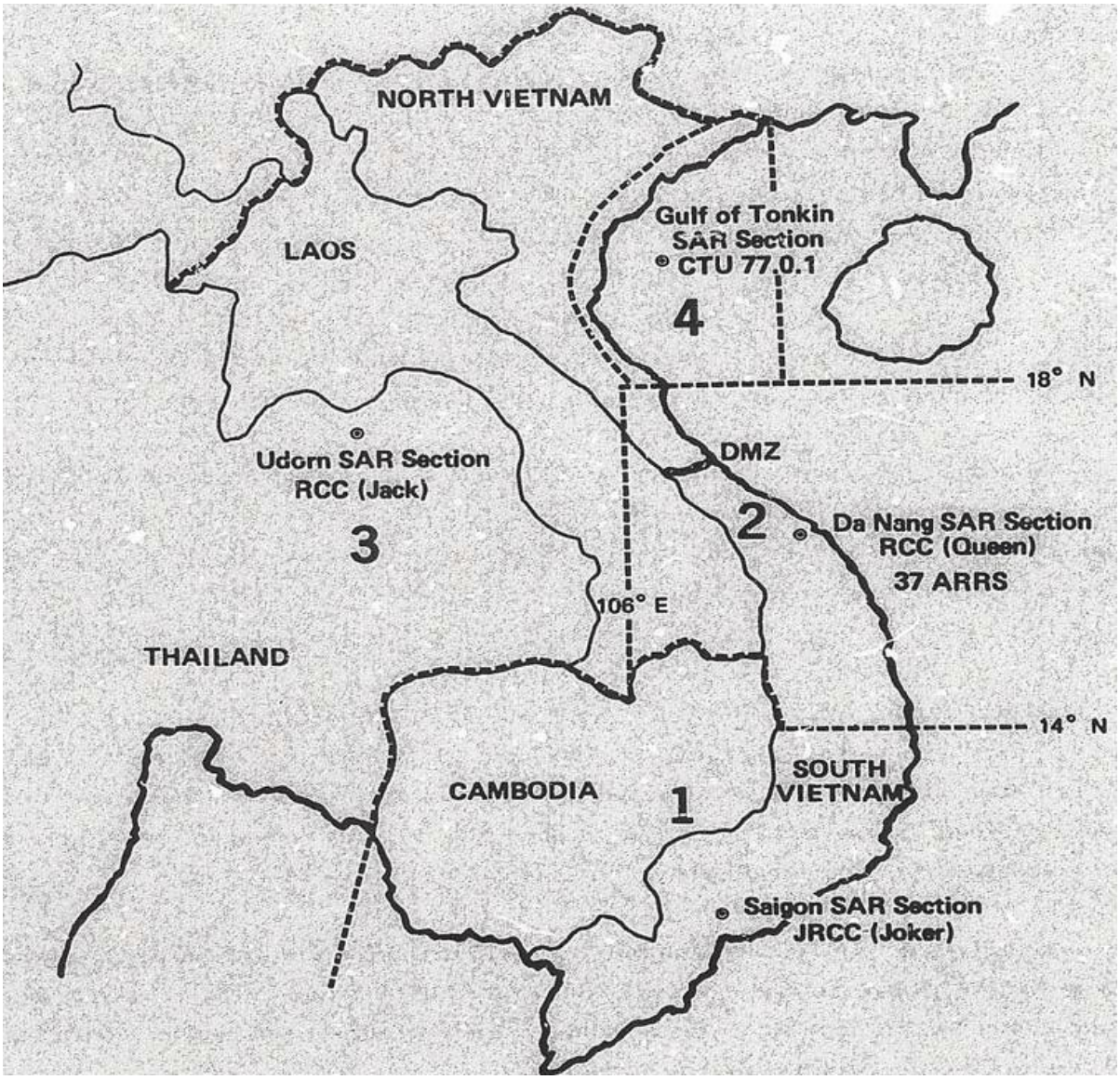


Figure 49: Rescue Coordination Center Locations and Areas of Responsibility Source: Wormley

Additionally, the table below contains navigational reference data relative to Nakom Phanom (note: magnetic variation is 0) and Owl 08's Target Area. The TACAN format position is magnetic bearing/distance/channel; for example, 090/50/89 is 90 degrees (east) for 50 miles from Channel 89.

Checkpoint	Latitude/Longitude	TACAN	MGRS	Elevation (MSL)
NKP	17 23' 02" N 104 38' 35" E	CH 89	48Q VE 6121	587
D22	17 12' 00" N 106 09' 00" E	105/79/89	48Q XE 2201	1,411
D52	17 08' 13" N 106 03' 44" E	100/82/89	48Q XD 1395	1,076
D68	17 03' 22" N 105 57' 31" E	097/89/89	48Q XE 2201	1,397

Table 12: Navigational Reference Data

---------- 25-Nov-71 ----------

2125 Owl 08 (Mission B-3-042) off tanker 1955Z with Lion Tactical [till] 2000Z. No word. Dry tanks at 2130Z. Fistful says missing - was to work road from Delta 68 to Delta 22. Delta 52 is midpoint.

2300 Owl 08 in progress.

2345 Owl 08 in progress.

2400 Owl 08 in progress.

---------- 26-Nov-71 ----------

0001 Owl 08 in progress.

0015 Owl 08 - last radar plot (from Lion) 005/65/93 [65 miles north of Ubon] (per Lion). Last voice contact 2 minutes off tanker going tactical at 2000Z. Off tanker at 340/50/93 [50 miles northwest of Ubon]. Joker/RF [don't know who this is] briefed.

0033 Owl 08 - reconnaissance requested for route search of Owl 08 route of flight including working area. To Blue Chip through JR. 432nd [432nd Reconnaissance Wing at Udorn] TUOC briefed.

0040 Owl 08 - King 21 reports Nail 06 in area at this time. Says weather is pretty good, bases 3-4,000 feet.

0057 Owl 08 - requested weather reconnaissance of target area from Joker/GN [don't know who this is].

0111 Owl 08 - requested from Fistful a crew who is familiar with the area and patterns of Owl 08. Passed to Joker/DW [don't know who this is] to coordinate with Blue Chip.

0114 Owl 08 - Joker says Blue Chip will approve use of a crew to search Owl 08 working area.

0120 Owl 08 - Weather in area of 60 [unreadable - "mile"?] radius of 17.00N 106.05E low broken deck bases from 4-7,000 feet. 7/8 cloud coverage. Rain in east portion of area. Moderate turbulence below 10,000.

0137 Owl 08 - King 21 advises Atlanta [RF-4 recon aircraft] in target area at this time.

0158 Owl 08 - King 21 reports Nail 28, 10, 06, 53, 40, 47, 30 and 03 plus Gunfighter 24 [F-4] and Atlanta in area at this time.

0211 Owl 08 - Raven 31 coming into search area. Bingo 0410Z [time at which aircraft would have to return to home station due to fuel state]

0214 Owl 08 - Nail 28 finish area - 100% coverage 100% effective [this is likely referring to visual coverage]

0219 Owl 08 - Victor/DB [unsure who they are] briefed on mission for Owl 08.

0300 Owl 08 - Blue Chip advises negative reconnaissance or fast mover FACs due to weather in area.

0310 Owl 08 - King 21 requests status of L-11 [It is unclear who or what "L-11" is.]

0315 L-11 friendly per Blue Chip [It is unclear if this is related to Owl 08 or not.]

0338 King 21 requests contact intelligence to see if any significance of initials or letters P, L.P./B. D. T. (these were sighted on ground). Passed to intelligence. [It is unclear if this is related to Owl 08 or not.]

0745 Owl 08 in progress

1000 Owl 08 - King 21 returning to base at this time. King 24 taking mission at this time.

1023 Owl 08 - Fast mover weather reconnaissance at first light for 27-Nov-71. Will have 2 fast mover and slow mover FACs per Blue Chip/Zimmerman. [unsure who "Zimmerman" is]

1040 Owl 08 - Advised Blue Chip/Zimmerman to have fast mover FACs on call. 3 slow mover FACs available at sunrise. [Sunrise was 2307Z or 6:07 AM local time on November 26, 1971]

1042 Owl 08 - Nail 42 reports some ground fire.

1050 Owl 08 - SAR forces returned to base at this time due to darkness. [1050Z is 1750 or 5:50 PM local time; sunset was 1027Z or 5:27 PM Local Time on November 26, 1971]

1235 Owl 08 - Head Shed confirms last contact 25/2000Z and Head Shed was controlling agency. Lt Col Brannon ABCCC debriefed controller on Moonbeam and he confirmed last contact was 2003Z and he had coordinated this with Col Thompson notified Head Shed. Moonbeam only momentary handoff due to control by Head Shed. Nothing further would be gained from tapes. [audio tapes of communication with Owl 08]

2345 Owl 08 - request fast mover FAC for weather reconnaissance of the area.

2350 Owl 08 in progress.

---------- **27-Nov-71** ----------

0001 Owl 08 in progress.

0027 Owl 08 - King 23 actual time of arrival 0025Z. [unsure if this is the time King 21 arrived over the search area or returned home]

0139 Owl 08 - requested through JRCC a reconnaissance flight between 16-53N 105-45E and 17-15N 106-10E with coverage 5 nautical miles either side of line.

0200 Owl 08 - requested from Blue Chip through JRCC for callsigns of fast mover and slow mover resources available for search. Weather is fair in west sector and improving in east.

0204 Owl 08 - King 27 to go to Hillsboro and see if he has any resources available to search.

0440 D.O. Fistful [Deputy Commander for Operations (DO) at Ubon Airbase] reports Palmer Flight observed 3 flares at their 9:30 - 10:00 position. Palmer Flight was on a heading of 115 degrees at a location of 115/70/89 [115 degrees for 70 nautical miles off the Nakom Phanom TACAN - Channel 89]. The time was 25/2045Z. Passed to Joker to check with Blue Chip of any other aircraft who might have

been in area. Palmer Flight normally flies same type of mission [as Owl 08]. (Palmer Flight) says normal procedure is to launch only two flares at a time.

0503 Owl 08 - King 27 advises weather is deteriorating in the prime search area.

0820 Falcon 15 will take pictures [from] Delta Point 22 [Eastern boundary of Owl 08's Target Area] to Delta 68 [Western boundary of Owl 08's Target Area].

1028 Fistfull/Major Sinnet [sic] passed 4 locations of sensors activated by an aircraft. Reconnaissance will be done on these 4 points when weather permits. To Blue Chip through JRCC. [Major Gilbert J. Sinnott III (also referred to by incorrect spellings of 'Sinnet' and 'Sinnot' in this document), was the Duty Officer when Owl 08 went missing. One of the authors had a phone conversation with him circa 2012 in which he said he did not recall this specific loss but if Task Force Alpha provided only 4 sensor activations that date, they were the only ones that were detected (i.e., there weren't any others that were not reported).]

1030 Major Sinnet [sic], Task Force Alpha at Secure phone 7712 called and passed following coordinates of Sensor Activations by aircraft that could possibly tie into Owl 08. #1: 25/2009Z/Propeller aircraft/XD 18749667 #2 - 25/2010Z/Jet aircraft/XD 06629154; #3 - 2015Z/Unknown Type/XD 05638723; #4 - 2028Z/Type Unknown/XD 12269473.

1103 Owl 08 - request for one Fast Mover and 3 slow mover Forward Air Controllers to cycle through the Target Area all day. The Fast Mover can be used to cover the four points [Igloo White sensor activations] listed in the 1030Z entry.

1320 King 23 crew [?] Ubon TUOC Maj. Sinnot [sic] - Question What altitude did Owl 08 do work at? answer: 5,550 to 6,000 feet. [This is probably above ground level (AGL), not above mean sea level (MSL)] Also could go as low as 2,500 feet [This is probably above ground level (AGL), not above mean sea level (MSL)] on a VR [Visual Reconnaissance] run. He would begin VR run 40 miles out from target. Should have been off target enroute to tanker at 2024Z. [This may have been Owl 08's original time off target but since they were delayed in their initial air refueling, they did not arrive over target until approximately 2010 per standard calculations, which is very close to the #2 sensor activation time and location listed in the 1030 entry.]

2345 Owl 08 - 3 Coveys will concentrate in Area 19. [See Joker SAR Log November 26, 1971 0145 entry]

---------- **28-Nov-71** ----------

0001 Owl 08 in progress.

0125 Owl 08 in progress.

0143 Owl 08 in progress.

0555 Owl 08 - Weather in prime area - thin overcast bases 6,000 feet, tops of clouds 8,000 feet. 8/8 coverage [total overcast] another thin overcast deck bases unknown. 8/8 coverage.

0622 Owl 08 - Covey 241 reports something shining at location 067/85.5/99. [about 4 miles southeast of the center of Owl 08's Target Area] Request photo reconnaissance on position. Passed to Joker for reconnaissance.

0628 Owl 08 - Atlanta 09 will come in to take pictures in about 5 minutes.

0643 Owl 08 - Covey 241 reports the object is near or on top of a ridge. He is marking the position with smoke to show Atlanta 09 the spot to photograph.

0650 Owl 08 - Atlanta 09 took photo and a got a visual sighting on object. Covey 241/240 going to take close look at object.

0701 Position of object is XD 106900 (from King 24).

0725 Owl 08 - Nail 28 returned to base Nail 20 now controlling on-scene FAC.

0745 Owl 08 in progress.

0940 King 24 lost radar. Request to possibly return to base now so can go Channel 71 or can stay on orbit till frag [assigned] time.

0943 Joker concurs King 24 will stay on orbit till Bingo. Will return to base Channel 70 to fix radar.

1100 Owl 08 - Photo interpreter called what appears to be a parachute of some kind. Very small chute at location XD 155885.

[It is difficult to quantify what a "very small chute" could mean so here is a list of the sizes of various parachutes in use in Laos at this time for comparison:

- F-4 Phantoms used Martin-Baker ejection seats that had a 22-inch diameter drogue chute that pulled out a 60-inch diameter stabilizer drogue chute that kept the seat from tumbling after ejection.
- F-4 Pilots' parachutes were 28 feet in diameter; most other aircraft used similar diameters.
- F-4s had a 16-foot diameter drag chute mounted in the tail and was used on landing; most other aircraft with drag chutes used similar diameters.
- Mk-24 Illumination Flares had 16-foot diameter chutes.
- LUU-2 Illumination Flares had 18-foot diameter chutes (Owl 08 was carrying LUU-2s the night she was lost but such flares were ubiquitous in that area as they had been dropped by different types of aircraft for several years).

That said, the reference to a "very small chute" could mean one of the parachutes from an ejection seat itself.]

1420 Request suspension of Owl 08 mission due to weather and negative results to 8th Fighter Wing. DO [Deputy Commander for Operations] 8th Fighter Wing request additional day search with suspension tomorrow if negative results. Also requested 3 slow mover and 1 fast mover FAC on call. Blue Chip approved.

1500 King 23 will cover mission for Owl 08. [Entry goes on to list details on the unrelated loss of a CH-47 helicopter]

2130 King 21 briefed on 1500 entry - 432nd [432nd Reconnaissance Wing at Udorn Airbase, Thailand] reconnaissance technician called. Have roll of pictures shows possible chute in area. Did not say what kind.

---------- **29-Nov-71** ----------

0050 From King 23. Weather is 5/8 (7/8) [Cloud cover] 3,000-5,000 feet broken, 13,000 feet overcast, 7+ miles visibility. Have no slow movers at this time.

0745 Owl 08 in progress.

1000 Discussed Owl 08 mission with Fistful/DCO and with Joker. 8th Fighter Wing DCO request full seven days search. [This is evidence that the search for Owl 08 would go on as long as reasonable. While some SARs were shorter, there is some evidence that 7 days was normally the longest a SAR would continue without any contact with the missing man/men.]

1345 Owl 08 in progress.

1440 Joker confirmed 3 slow mover FACs tomorrow.

2325 From King 21 - Nail FAC in search says weather is 8/8 [8/8 = eight eighths or 100% cloud cover] no good coverage would be gained today. Low flying aircraft would be shot at just from engine sound. No effective search would be accomplished. Place King 21 on normal orbit checking weather periodically to search if weather improves. Joker weather [forecaster] does not look for improvement today.

---------- **30-Nov-71** ----------

0001 Owl 08 in progress.

0040 Owl 08 - Covey 242 is in area searching at this time.

0940 Owl 08 - Requested through Joker to Blue Chip to frag [assign] 3 slow mover FACs for 01-Dec plus 1 fast mover FAC on standby on call.

1151 Owl 08 in progress.

1348 Owl 08 in progress.

2330 Owl 08 in progress.

---------- **01-Dec-71** ----------

0001 Owl 08 in progress.

0045 Joker Covey FACs for Owl 08 will be Covey 223 TOT [Time-on-Target] 0001, Covey 289 TOT 0230, no callsign for third Covey, TOT 0500.

0142 Owl 08 - King 21 requested more Covey FACs as the weather is clearing. Passed to Joker.

0745 Owl 08 in progress.

1108 Owl 08 in progress.

1355 Owl 08 in progress.

2345 Owl 08 in progress.

---------- **02-Dec-71** ----------

0001 Owl 08 in progress.

0040 King 21 advises weather in area is overcast with rain and haze. Joker

0510 Owl 08 - Maj Sennit [sic]/8th Fighter Wing called wanting to know visual reconnaissance coverage of Ban Karai Pass.

1030 To confirm reconnaissance coverage of the Owl 08 mission, Major Pratt went to 432nd Reconnaissance Wing [at Udorn Airbase, Thailand] reconnaissance operations and obtained the following:

[November] 27th - 3 nautical miles either side of line between WD 030853 and WE 2048 [This is a 35-nautical mile line running southwest to northeast and that is approximately 60 nautical miles west of D52, the center of Owl 08's Target Area. It is not clear why an area so far from Owl 08's target area was reconnoitered.]

[November] 29th - followed road between XD 030853 and XE 225015 [This is a 16-nautical mile line that runs approximately straight through the center of Owl 08's Target Area] plus coverage of point WD 8070 plus coverage of a block bounded by XD 0052 - XD 0353 - WD 9365 - WD 9667 [This is a 2 by 8 nautical mile box running southeast to northwest that is approximately 21 nautical miles southwest of D52, the center of Owl 08's Target Area. It is not clear why an area so far from Owl 08's target area was reconnoitered.]

02-Dec - block [listed above] covered again twice by direction of 7th Air Force.

1108 Owl 08 in progress.

1115 From Major Sinnot [sic] at Channel 93 [Ubon Airbase]. They request one more day of Search on Owl 08, then if nothing yet suspend until we have clear weather, at which time they request a photo reconnaissance of the following.

a - along border perpendicular to aircraft path

b - 3 nautical miles either side of Ban Karai Pass

c - any significant high peaks in the general area

Passed to JR/via secure phone. He will tell Commander [Which one?] and advise us.

1330 Owl 08 in progress.

2347 Owl 08 in progress.

---------- **03-Dec-71** ----------

0045 Approval received from Joker to suspend today and follow program outlined in entry above (1115Z).

0415 King 21 reports weather in Owl 08 search area still very poor.

0545 Owl 08 area weather is "dogshit". Coveys on ground unable [to takeoff] at this time on weather hold.

0745 Owl 08 in progress.

1240 Owl 08 search mission suspending report sent out at this time.

[This is the official suspension of the SAR effort and was the last date with entries related to Owl 08.]

"Joker" Joint Rescue Coordination Center (JRCC) at Tan Son Nhut SAR Log Transcription

---------- **25-Nov-71** ----------

2130 From Jack (also Blue Chip) Owl 08 (F-4; Mission B-03-042) was off Cherry Air Refueling Track at 1955Z, went tactical at 2000Z heading for Delta 52 area. He did not return to Cherry track at scheduled time 2100Z for fuel. Probably working road between Delta 68 and 22. Delta 52 is approximately 1/2 way between)

D22 = XE 2201
D52 = XD 1395
D68 = XD 0286

2210 Owl - 08 crew and authentication

Capt. James E. Steadman

Authenticator Nr. 6767 [Unique number created by each pilot; think of it like a modern-day PIN]

1. What high school?	A. Cheyenne
2. Color of car?	A. Red
3. Where last assigned?	A. George AFB
4. What is daughter's name?	A. Bridgit

1/Lt Robert D. Beutel 325 40 1943 [Is this his Social Security Number?]

Authenticator Nr. 1946

1. Favorite Baseball Team?	A. Chicago Cubs
2. Little Sisters Nickname?	A. Babe
3. What kind of car do I drive?	A. Mustang
4. Name of my fraternity?	A. Phi Delta Beta

---------- **26-Nov-71** ----------

0001 From Lion: last coordinates on Owl 08: 008/65/93 [65 miles north of Ubon; this is the last position Lion tracked Owl 08]

0105 Owl 08 - On Jack's request, asked Blue Chip intelligence for photo and visual reconnaissance of route from VD 0999 to XE 2201 [The first point is near Nakom Phanom Airbase in Thailand and the second is the northeastern boundary of Owl 08's target area. Subsequent entries explain the area

in/around the target area was searched thoroughly; it's not clear why the path to NKP was requested but perhaps it was done in the belief that Owl 08 might have diverted here. In any event, it's not clear whether the route to NKP was searched or not.]

0145 Owl 08 - From Jack Search coordinates for Owl 08

Area 19	WD 9070
	XD 1090
Area 20	WD 9090
	XE 1010
Area 21	XD 1070
	XD 3090
Area 22	XD 1090
	XD 3010

---------- **27-Nov-71** ----------

0135 Owl 08 - From Jack request reconnaissance primary - 17-15N 106-10E secondary - 16-53N 105-45E. Primary interest 5 nautical miles either side of area - dependent on coverage.

0205 Owl 08 - request fast mover Col Scott Blue Chip for 0126 [unrelated] and 0135 entry.

0440 Owl 08 - From Jack - Palmer Flight saw 3 flares on 25 Nov 2045Z on [sic] his 9 to 9:30 position. He was heading 115/70/89. Blue Chip notified.

0800 Results on photo reconnaissance for Gunfighter 61 [An F-4 missing from Danang Airbase, South Vietnam] and Owl 08. Owl 08 [unreadable] was 40% coverage - no results.

1030 Owl 08 Mission: Fistful concurs that search well covered in all areas except near higher plateau areas near mountains to east. Would like to get a Blue Chip fragged fast mover in morning - if weather breaks - to check 4 positions suggested by Head Shed which coincide with planned flightpath of Owl 08. Positions sent kacked [encoded] by Jack. Decoded they are: #1 - XD 18739667 #2 - XD 06628154 #3 - XD 05638723 #4 - XD 12269473. Blue Chip given request. Blue Chip advises 1 fast and 3 slow movers fragged for 2300Z. Jack advised.

1530 Owl 08 in progress.

2000 Owl 08 in progress.

---------- **28-Nov-71** ----------

0120 Jack reports that he has 3 Covey aircraft searching for Owl 08 who have to bingo [will be reaching minimum fuel to return to base] in 45 minutes. He wants some replacements. Blue Chip advised and indicated that ABCC will try and direct something over to King.

0355 From Jack - received photo reconnaissance request, passed to Blue Chip Intelligence for action. Requested photo reconnaissance of (1) Point WD 8070 - (2) Point 2 XD 030853 along the road to point (3) XE 225015.

0630 Jack reports a Covey 241 has spotted a metal object at 067/85.5/99 and wants photo coverage of it. Atlanta 09 should be in the area in about 5 minutes. Blue Chip advised.

0700 Jack advises that the Atlanta aircraft got the pictures. Another FAC is going into the area to see what he thinks of the metal they have found.

0700 Owl 08 - From Jack - Bright shiny object in tree - at XD 106 900 - pictures taken - sited [sic] by Atlanta 09 and Covey 241.

1430 Owl 08 - Jack reports 8th Fighter Wing requests one more day of search, in same areas covered today. King Bird will cover from normal orbit. Jack requested 3 slow mover FACs and 1 fast mover FAC - on alert for use when weather breaks. Blue Chip approved request. Jack advised photo reconnaissance today was 100% coverage.

2215 Owl 08 in progress.

---------- **29-Nov-71** ----------

0001 Owl 08 in progress.

1010 Owl 08 - Jack requested to know how many slow mover aircraft for tomorrow search. Blue Chip says they can have 3 same as today same time same station.

2325 Jack reports weather in Owl 08 area solid undercast with bad guys firing up through it into engine noise, etc. Nail recommends no search in area until it gets better. King will remain on normal orbit until weather improves.

---------- **30-Nov-71** ----------

0625 Owl 08 in progress.

0945 Jack requests Blue Chip frag 3 FACs for tomorrow for the Owl 08 mission. They want one at a time. Also wanted fast mover FAC on call.

---------- **01-Dec-71** ----------

[No log entries related to Owl 08]

---------- **02-Dec-71** ----------

1110 Jack requests 3 FACs for Owl 08 for tomorrow LC Brihenger [?]/Blue Chip approved. Also 1 fast mover on call (Blue Chip says possibly).

---------- **03-Dec-71** ----------

[No log entries related to Owl 08]

---------- **04-Dec-71** ----------

[No log entries related to Owl 08]

---------- **05-Dec-71** ----------

[No log entries related to Owl 08]

---------- **06-Dec-71** ----------

[No log entries related to Owl 08]

---------- **07-Dec-71** ----------

[No log entries related to Owl 08]

---------- **08-Dec-71** ----------

0150 Jack request reconnaissance on Box area coordinates XE 0515, XE 4005, XD 3090. This reconnaissance should be requested when weather breaks for SAR on Owl 08.

[This is the last date with entries related to Owl 08. It's unclear why this reconnaissance request was made 5 days *after* the decision to suspend the search for Owl 08 was made. There is no corresponding record in the Jack SAR Log.]

Appendix B – Operational History of F-4D-31-MC-66-7752

F-4D 66-7752 was a Block 31 aircraft with a Construction Number (CN, the manufacturer's serial number) of 2393. It first flew on June 30, 1967. The operational history below shows the aircraft suffered major battle damage on 3/30/1969 that required it to be shipped back to the Ogden Air Logistics Center at Hill AFB, UT. This was a depot-level maintenance facility for F-4s and one of only a few places where major damage could be repaired. The aircraft was under repair at Ogden for 19 months (6/13/1969 to 1/11/1971) but no details are available as to what was repaired. It was then sent back to Southeast Asia. On 5/7/1971 the aircraft suffered major battle damage for a second time. However, this time the damage must have been less-severe since a team from Ogden went to Vietnam and it took only about 3 months to repair. Again, no details are available as to what was repaired.

Multiple major battle damage repairs begs the question, "Could this damage have played a factor in the aircraft's disappearance?" Even if we knew the details of what was repaired and assuming 3153 is where 66-7752 crashed, there is no way based on the little evidence DPAA found that could determine the cause of loss. A few other points need to be made. First, the comment in the last entry that the aircraft was "shot down by AAA over Laos" was just a guess since how could anyone have known? Likewise, the date Aircraft Terminated from the inventory is shown as 11/25/1971 (Zulu Date) rather than 11/26/1971 (date in the US). Finally, it's interesting to note that 66-7752 went right from the factory to war and it spent nearly its entire career fighting in Southeast Asia.

Date	Organization	Sub Org	Base	Comments
6/30/1967	MCDSL		St Louis	First Flight
8/4/1967	MCDSL		St Louis	PP - USAF Gained: The date that the aircraft completed its acceptance checks and was officially entered into the Air Force inventory.
8/7/1967	MCDSL		St Louis	Fly Away: The date McDonell Douglas was paid for the aircraft.
8/7/1967		OOAAR	Hill AFB	WM
9/28/1967	8 TFW	433 TFS	Ubon RTAFB	PL
10/2/1967	8 TFW	433 TFS	Ubon RTAFB	CC
10/31/1967	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 34 Sorties during the month
11/19/1967	8 TFW	433 TFS	Ubon RTAFB	MF - Abort
12/28/1967	8 TFW	433 TFS	Ubon RTAFB	MF - Abort
1/31/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 54.8 Hours During the month
2/29/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 65.9 Hours During the month
3/31/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 51.3 Hours During the month

Date	Organization	Sub Org	Base	Comments
4/3/1968		SMAAR	Ubon RTAFB	WM - T.O. 1-F4-663 (Egress Seat Rocket Assist): Depot Team installation of Mark 7 ejection seats with rocket assist.
4/12/1968	8 TFW	433 TFS	Ubon RTAFB	CC
4/30/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 14.4 Hours/10 Sorties During the month
5/20/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 37.3 Hours/22 Sorties During the month
5/20/1968		6400 TS	Clark AB	CC - Combat Sage: Air-to-Air missile test firings - All Southeast Asia-based aircraft went through this deployment to wring out any problems with the aircraft systems and to give aircrews a chance to live fire missiles.
6/4/1968	8 TFW	433 TFS	Ubon RTAFB	CC
6/30/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 63.0 Hours/37 Sorties During the month
7/31/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 60.8 Hours/38 Sorties during the month
8/31/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 57.6 Hours/36 Sorties during the month
9/30/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 69.8 Hours/41 Sorties during the month
10/31/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 60.4 Hours/34 Sorties during the month
11/30/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 71.1 Hours/33 Sorties during the month
12/31/1968	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 71.7 Hours/35 Sorties during the month
1/31/1969	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 52.9 Hours/29 Sorties during the month
2/28/1969	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 55.9 Hours/26 Sorties during the month
3/30/1969	8 TFW	433 TFS	Ubon RTAFB	MF - Flew 60.7 Hours/32 Sorties during the month
3/30/1969		SMAAR	Udorn RTAFB	WJ: Indicates that aircraft suffered major battle damage and had to make an emergency recovery at Udorn rather than home base (no details on this incident).
4/24/1969		SMAAR	Udorn RTAFB	VL: Awaiting battle damage repair
6/6/1969		OOAAR	Hill AFB	PL: Enroute to the depot.
6/13/1969		OOAAR	Hill AFB	VL: Inducted to the depot for repair.
1/11/1971	49 TFW		Holloman AFB	PL
1/14/1971	49 TFW		Holloman AFB	CC
3/31/1971	12 TFW	480 TFS	Phu Cat AB	PL - MF - MO462 - Possessed aircraft
4/2/1971	12 TFW	480 TFS	Phu Cat AB	CC
5/7/1971	12 TFW	480 TFS	Da Nang AB	PL: MF - MO464 - major Battle Damage over A Shau Valley, recovered at Da Nang

Date	Organization	Sub Org	Base	Comments
5/9/1971		OOAAR	Da Nang AB	WM: Depot Team repair
7/15/1971	366 TFW		Da Nang AB	WL: Still under repair (aircraft under repair away from home base were often temporarily attached to a local base unit).
8/2/1971	12 TFW	480 TFS	Phu Cat AB	PL
8/5/1971	12 TFW	480 TFS	Phu Cat AB	CC
10/23/1971	12 TFW	480 TFS	Phu Cat AB	PL
10/31/1971	8 TFW		Ubon RTAFB	PL
11/2/1971	8 TFW		Ubon RTAFB	CC
11/25/1971	8 TFW	497 TFS	Ubon RTAFB	OWL 08 - shot down by AAA over Laos - 2 MIA: CPT James E Steadman, 1LT Robert Donald Beutel
11/25/1971	8 TFW	497 TFS	Ubon RTAFB	TM

Table 13: Operational History of F-4D-31-MC-66-7752 Source: USAF

Aircraft Status Codes and Acronyms

Code/Acronym	Definition
CC	Combat Capable – Fully operational with the unit
MCDSL	McDonnell Douglas, St Louis (manufacturer of the F-4)
MF	Missions flow (summary of flight missions/hours)
OOAAR	Ogden Air Logistics Center (F-4 maintenance depot at Hill AFB, UT)
PL	Pipeline – Indicates initial assignment to a unit for ferry transfer to its new owner
PP	Production Pipeline
SMAAR	Sacramento Air Logistics Center (F-4 maintenance depot at McClellan AFB, CA)
TFS	Tactical Fighter Squadron
TFW	Tactical Fighter Wing
TM	Aircraft Terminated from the inventory
TS	Test Squadron
VL	Awaiting repair (aircraft in non-flyable condition)
WJ	Aircraft damaged to the point of being non-flyable
WL	Still under repair
WM	Schedule maintenance or modification

Appendix C – REFNO 1781 Ordnance Review

The purpose of this section is to provide details on the ordnance carried by the missing aircraft. As was stated in the Case Overview and Research Methodology section, the aircraft was configured with the following external stores and looked as shown below.

- 1 600-gallon centerline tank (about 4,000 pounds of fuel)
- 3 CBU-24 800-lb. cluster bombs with 665 BLU-26 or BLU-36 bomblets each
- 2 M36 690-lb. incendiary cluster bombs
- 2 SUU-42 flare dispensers with 16 LUU-2 illumination flares each (821 pounds total each)
- 2 AIM-7E Sparrow air-to-air missiles (435 pounds each)

Figure 50: F-4D 66-7752 "Owl 08" as seen on November 26, 1971 Source: Mads Bangsø

600-gallon Centerline Tank

F-4s rarely flew without external fuel tanks and Owl 08 was no exception. The centerline tank held 600 gallons or about 4,000 pounds of fuel.

M36 Incendiary Bomb

The M36 was a 690-pound incendiary bomb that contained 182 M126 incendiary (thermite) bomblets. It was developed during World War II and was one of the primary weapons used to firebomb Japan. It had a blunt nose because it was designed to be carried by bombers in internal bomb bays. Since they had to be carried externally on aircraft like F-4s and others without bomb bays, their blunt noses created a considerable amount of drag. However, they were an effective anti-truck weapon. (Parsch)

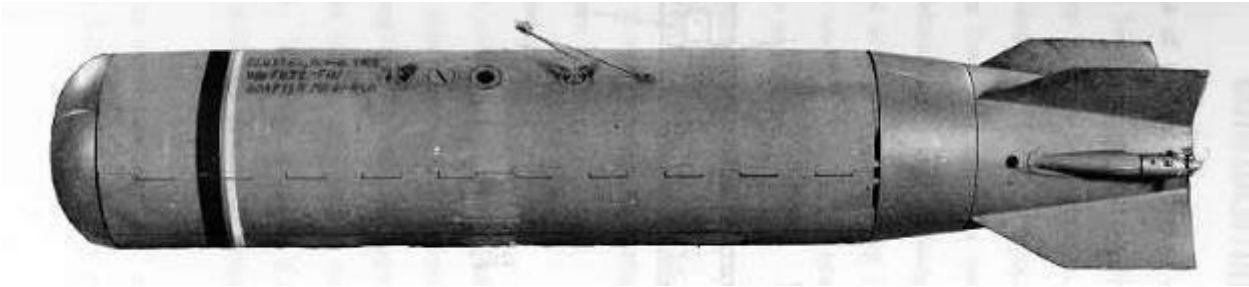


Figure 51: M36 Incendiary Bomb Layout Source: Bulletpicker

CBU-24 Cluster Bomb

The CBU-24 (pronounced "C-B-U twenty-four") was a cluster bomb used against personnel or lightly-armored vehicles or trucks. 670 BLU-26 submunitions (bomblets) were housed in a SUU-30 (pronounced "sue thirty") clamshell dispenser, of which there were two types: the older SUU-30B/B and the newer SUU-30H/B, both of which are shown below. It's not clear which type of dispenser Owl 08 was carrying.

Figure 52: SUU-30B/B Dispenser side view
Source: UXO

Figure 53: SUU-30H/B Dispenser side view
Source: UXO

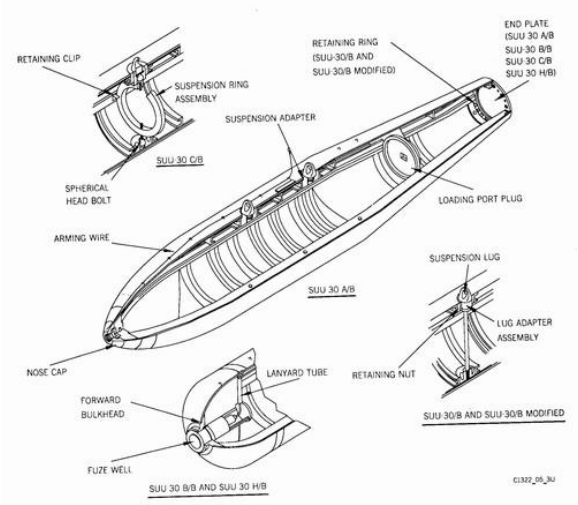


Figure 54: SUU-30B/B Schematic Source: Parch

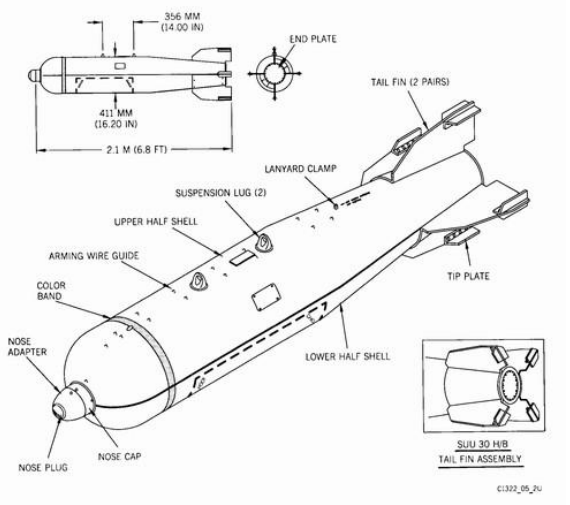


Figure 55: SUU-30H/B Schematic Source: Parch

BLU-26 Submunition

The BLU-26 (pronounced "B-L-U twenty-six") was a tennis ball-sized bomblet weighing about 1 pound with 85 grams of explosives. Once the dispenser was released from the aircraft and the clamshell opened, the flutes would cause the bomblets to spin, thereby arming them only after having separated safely from the aircraft.

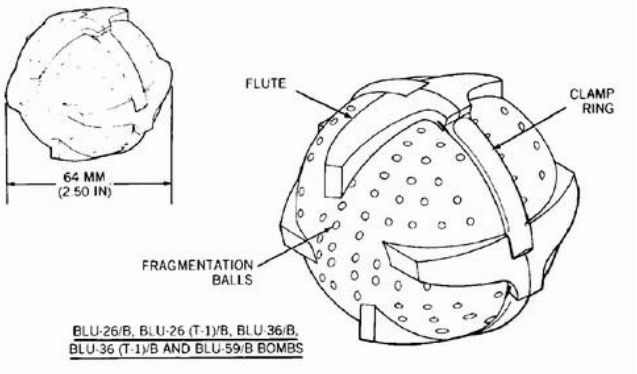


Figure 56: BLU-26 Bomblet schematic Source: Parsch

SUU-42 Dispenser and LUU-2 Illumination Flare

The LUU-2 (pronounced "loo-two") was a high-intensity flare used to illuminate targets for night operations. They were carried on SUU-42 (pronounced "sue forty-two") dispenser pods with a capacity of 16 flares each. The LUU-2 had a light output rating of 1.8 million candlepower and at 1,000 feet altitude illuminated a circle on the ground of 500 meters at 5 lux. The mechanism had a timer on it that deployed the parachute and ignited the flare candle. The candle burned magnesium and flares burned at uneven rates and therefore fluctuated in brightness.

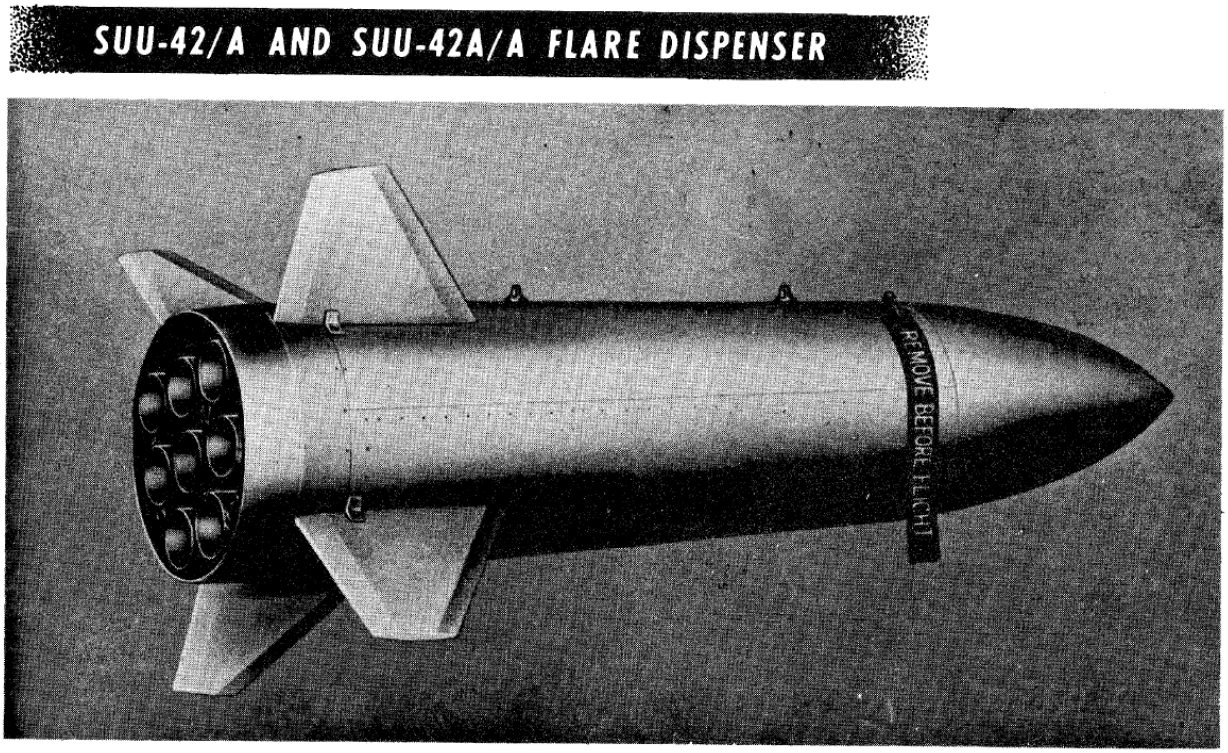


Figure 57: SUU-42 Dispenser Pod Source: T.O. 1A-7K-34-1-1

The LUU-2 had a burn time of approximately 5 minutes. The pyrotechnic candle consumed the flare housing, reducing flare weight which in turn slowed the rate of fall during the last 2 minutes of burn time. At candle burnout an explosive bolt was fired, releasing one parachute support cable which caused the parachute to collapse. While unburned flares falling from high altitude could be dangerous, burned flares were much less dangerous since they were designed to burn up during the fall (even the aluminum casing was burned). (Global Security)

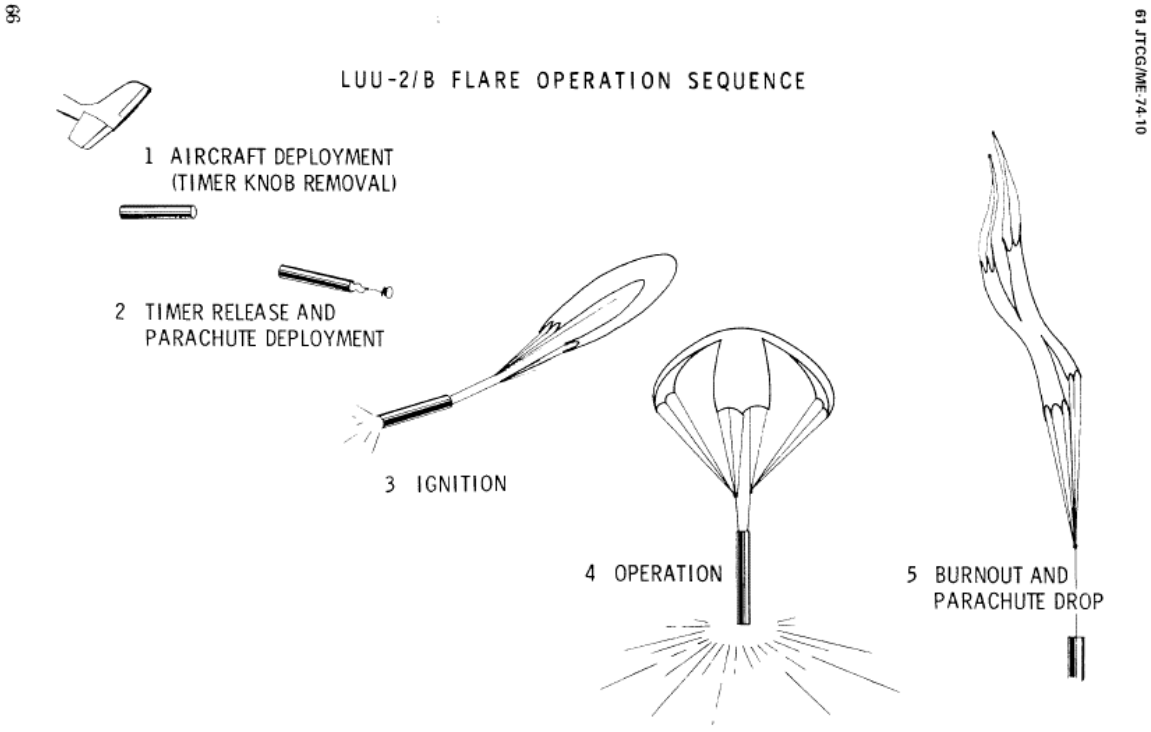


Figure 58: LUU-2/B Flare Operation Sequence Source: FLARE EFFECTIVENESS

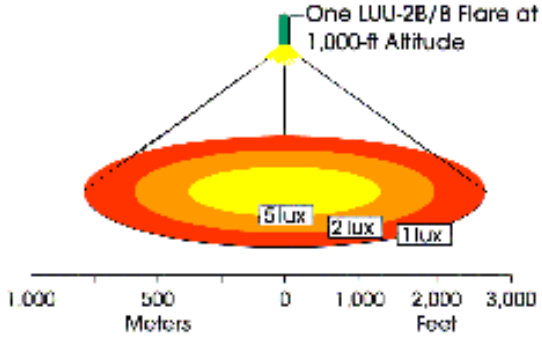
Specifications		Ground Illumination Pattern
Weight:	30 lb. (13.6 kg)	
Length:	36 in. (91.4 cm)	
Diameter:	4.87 in. (12.4 cm)	
Output:	1.6 – 1.8 million candlepower	
Burn Time:	240 - 300 sec	
Descent Rate:	8.3 ft/sec (2.5 m/sec)	5 lux 0.46 foot-candle 2 lux 0.186 foot-candle 1 lux 0.093 foot-candle

Figure 59: LUU-2 Specifications and Illumination Partner Source: Global Security

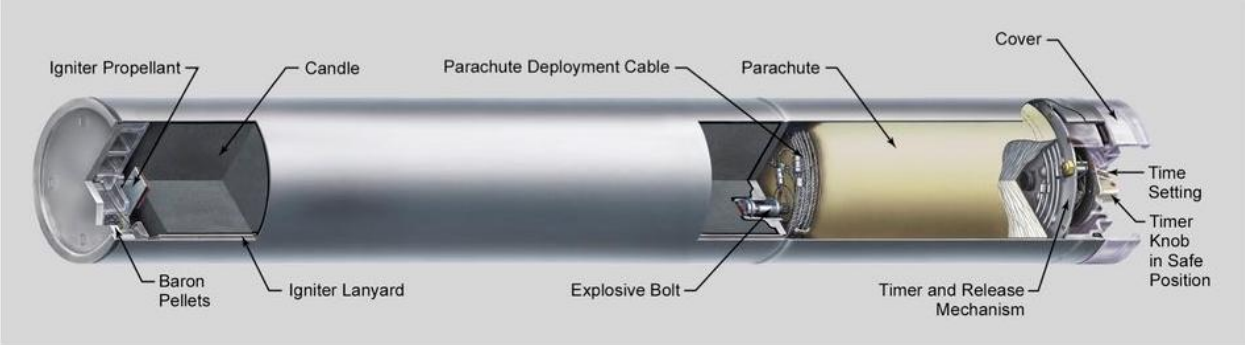


Figure 60: LUU-2 cutaway diagram Source: BT-11

AIM-7 Sparrow Radar-Guided Air-to-Air Missile

The AIM-7 "Sparrow" ("AIM" stands for Air Intercept Missile) was a medium-range, radar-guided, air-to-air missile designed by the US Navy in the 1950s and was the primary air-to-air weapon on USAF F-4s. The Sparrow was originally designed to shoot down large, unmaneuverable bomber aircraft. However, in combat in Southeast Asia the missile suffered from both reliability problems (due to a complicated design) and employment problems when used against small, agile targets. The AIM-7E was the Air Force's first attempt at a "dogfight" radar missile that had better performance against fighter-sized targets. Even so, in Southeast Asia the Sparrow had only about an 8% total kill ratio (only about 8 out of every 100 launches killed their intended target). For comparison, 20 years later during Desert Storm, vastly-improved Sparrows had only a 27% kill ratio. The AIM-7E had the following specifications. (War Thunder 2)

Length	144 in. (3.66 m)
Wingspan	40 in. (1.02 m)
Finspan	32 in. (0.81 m)
Diameter	8 in. (0.20 m)
Weight	435 lb. (197 kg)
Speed	Mach 4
Maximum Range	12 nm (20 km)
Propulsion	Rocketdyne MK 38/MK 52 solid rocket motor
Warhead	65 lb. (30 kg) MK 38 continuous rod

For many air-to-ground missions, F-4s carried two AIM-7s in the rear missile bays for self-defense. In the following image, AIM-7E missiles are being readied to load onto the F-4s in the background. You can see the missile second from the left has the serial number 'R 4532 b'. The bottom fins were installed when the missile was loaded on the aircraft using a hydraulic lift known as a "jammer".

Figure 61: AIM-7E Missiles awaiting loading aboard F-4s Source: War Thunder 2

Appendix D – J79-15 Powered Aircraft Lost April 1 to December 21, 1966

According to Hobson, the following 56 J79-15 powered aircraft were lost due to all causes between April 1 and December 21, 1966 (the interval between the Assembly Date of the Hose Tag found at 3153 and the date the imagery was taken showing a fresh crater at 3153). All 56 were either F-4C or RF-4C aircraft (the first F-4D wasn't lost until 6/30/1967). The two aircraft without known loss locations – REFNO 0475 (9/26/1966) and REFNO 0488 (10/7/1966) – were both RF-4Cs and can thus be ruled out as being 3153.

Date	REFNO	Aircraft	Tail #	Unit	Loss Country	Loss Notes
4/16/1966	0303	F-4C	63-7677	433 TFS, 8 TFW	NVN	35 NM west of DMZ
4/21/1966	OPLOSS	F-4C	63-7531	559 TFS, 12 TFW	Laos	Near Tang Hune Nord in southern Laos
4/25/1966	0317	RF-4C	64-1045	16 TRS, 460 TRW	NVN	20 miles west of Dong Hoi
5/4/1966	OPLOSS	F-4C	64-0688	557 TFS, 12 TFW	SVN	Near Cam Ranh Bay
5/13/1966	0338	F-4C	64-0760	8 TFW	NVN	15 miles west of Dong Hoi
5/17/1966	OPLOSS	F-4C	64-0717	433 TFS, 8 TFW	Thailand	9 miles from Ubon
5/26/1966	0346	F-4C	64-0722	391 TFS, 12 TFW	SVN	10 miles from Qui Nhon
6/1/1966	0351	F-4C	63-7664	555 TFS, 8 TFW	NVN	Overwater, near Hon Me
6/1/1966	0352	F-4C	63-7571	433 TFS, 8 TFW	NVN	12 miles northeast of Keep
6/2/1966	0353	F-4C	64-0744	558 TFS, 12 TFW	SVN	10 miles north of Dak To
6/7/1966	OPLOSS	F-4C	64-0671	389 TFS, 366 TFW	SVN	Crashed on takeoff
6/13/1966	0360	F-4C	63-7697	480 TFS, 35 TFW	NVN	10 miles north of Dong Hoi
7/10/1966	OPLOSS	F-4C	63-7546	480 TFS, 35 TFW	NVN	2 miles north of the DMZ
7/17/1966	OPLOSS	F-4C	63-7690	390 TFS, 35 TFW	NVN	Overwater
7/20/1966	OPLOSS	F-4C	63-7695	555 TFS, 8 TFW	NVN	Crash landed at Udorn
7/26/1966	OPLOSS	RF-4C	64-1040	16 TRS, 460 TRW	NVN	10 miles north of the DMZ
8/6/1966	OPLOSS	F-4C	63-7587	557 TFS, 12 TFW	SVN	Engine failure
8/8/1966	0423	F-4C	63-7560	555 TFS, 8 TFW	NVN	30 miles northwest of Keep
8/8/1966	0424	F-4C	64-0687	557 TFS, 12 TFW	SVN	Remains identified 2010
8/11/1966	OPLOSS	F-4C	63-7502	497 TFS, 8 TFW	NVN	Near Kep
8/19/1966	0435	RF-4C	64-1054	16 TRS, 460 TRW	NVN	30 miles north of Dong Hoi
8/27/1966	OPLOSS	F-4C	63-7525	497 TFS, 8 TFW	NVN	Overwater
8/29/1966	OPLOSS	F-4C	64-0798	390 TFS, 35 TFW	SVN	Takeoff accident
8/29/1966	0441	F-4C	63-7503	497 TFS, 8 TFW	NVN	20 miles northwest of Dong Hoi
9/3/1966	OPLOSS	F-4C	64-0771	557 TFS, 12 TFW	SVN	Crashed during instrument approach
9/4/1966	0447	F-4C	63-7561	555 TFS, 8 TFW	NVN	Near Thai Nguyen
9/10/1966	0454	F-4C	64-0832	433 TFS, 8 TFW	NVN	Near Kep
9/13/1966	OPLOSS	F-4C	63-7694	497 TFS, 8 TFW	Thailand	Crashed on takeoff
9/13/1966	OPLOSS	F-4C	63-7640	497 TFS, 8 TFW	Thailand	Crashed near Ubon
9/14/1966	OPLOSS	F-4C	64-0657	389 TFS, 366 TFW	SVN	Flight control failure
9/16/1966	OPLOSS	F-4C	63-7613	557 TFS, 12 TFW	NVN	Near DMZ
9/16/1966	0459	F-4C	63-7643	555 TFS, 8 TFW	NVN	15 miles southeast of Kep

Date	REFNO	Aircraft	Tail #	Unit	Loss Country	Loss Notes
9/17/1966	OPLOSS	F-4C	63-7509	558 TFS, 12 TFW	SVN	Mid-air collision with 64-0716
9/17/1966	OPLOSS	F-4C	64-0716	558 TFS, 12 TFW	SVN	Mid-air collision with 63-7509
9/19/1966	OPLOSS	F-4C	63-7687	555 TFS, 8 TFW	NVN	Near Kep
9/21/1966	OPLOSS	F-4C	63-7642	433 TFS, 8 TFW	NVN	15 miles south of Kep
9/26/1966	0475	RF-4C	65-0862	16 TRS, 460 TRW	NVN?	Believed lost to AAA near DMZ
9/29/1966	OPLOSS	F-4C	64-0736	497 TFS, 8 TFW	NVN	35 miles northwest of Dong Hoi
10/2/1966	OPLOSS	F-4C	64-0821	497 TFS, 8 TFW	NVN	20 miles northwest of Dong Hoi
10/5/1966	0482	F-4C	64-0702	433 TFS, 8 TFW	NVN	45 miles southwest of Yen Bai
10/6/1966	0486	F-4C	63-7486	497 TFS, 8 TFW	NVN	25 miles northwest of Dong Hoi
10/7/1966	0488	RF-4C	65-0885	12 TRS, 460 TRW	SVN	Believed lost to AAA
10/13/1966	0494	F-4C	64-0654	480 TFS, 366 TFW	NVN	1 MIA, 1 remains repatriated
10/20/1966	OPLOSS	F-4C	63-7518	433 TFS, 8 TFW	Laos	10 miles south of Ban Kang
11/11/1966	0516	F-4C	63-7616	559 TFS, 12 TFW	NVN	4 miles north of the DMZ
11/11/1966	0517	F-4C	64-0743	559 TFS, 12 TFW	NVN	4 miles north of the DMZ
11/22/1966	0527	F-4C	64-0755	480 TFS, 366 TFW	NVN	10 miles southwest of Thai Nguyen
12/2/1966	0531	RF-4C	65-0829	11 TRS, 432 TRW	NVN	40 miles southwest of Yen Bai
12/2/1966	0534	F-4C	64-0663	389 TFS, 366 TFW	NVN	40 miles northwest of Phuc Yen
12/2/1966	0535	F-4C	64-0753	480 TFS, 366 TFW	NVN	10 miles northeast of Phuc Yen
12/3/1966	0532	F-4C	63-7608	559 TFS, 12 TFW	NVN	15 miles southwest of Yen Bai
12/6/1966	OPLOSS	RF-4C	65-0819	11 TRS, 432 TRW	NVN	5 miles east of Dien Bien Phu
12/6/1966	OPLOSS	F-4C	63-7521	559 TFS, 12 TFW	SVN	Crashed in the weather
12/8/1966	OPLOSS	F-4C	63-7544	480 TFS, 366 TFW	SVN	Shot down on takeoff
12/11/1966	0546	F-4C	63-7533	480 TFS, 366 TFW	NVN	Overwater
12/20/1966	OPLOSS	F-4C	64-0698	497 TFS, 8 TFW	SVN	Overwater

Table 14: J79-15 powered aircraft lost in SEA between April 1 and December 21, 1966 Source: Hobson

Appendix E – Igloo White Sensor Technical Analysis

This appendix was included because several hundred hours were spent researching Igloo White sensor detection capabilities as they applied to aircraft. These details are included for completeness and to demonstrate the Team did its due diligence. Let's start with an overview of the three main components. (Jeppeson)

1. Sensors – there were four types: seismic (always-on and activated by ground vibrations), acoustic (selectively turned on either in response to a seismic sensor activation or at random intervals), combination seismic-acoustic, and ignition (used to detect spark plug activity).

2. Relay Aircraft – Lockheed EC-121 Constellation piston-engined aircraft were the primary airborne radio/data relays between the sensors and the ground-based processing station (see next item), providing near-24-hour coverage. Additionally, EC-121s carried several sensor operators who "could listen in and record whatever sound was being made around the sensor" so some analysis was done while airborne. (Westin)

3. Infiltration Surveillance Center (ISC) – located at Nakhon Phanom Royal Thai Air Force Base in northeast Thailand (known as Task Force Alpha), this center processed and analyzed sensor data to determine vehicle position, direction, and speed. Target information was then passed to operational units for engagement.

Additionally, "Signals were used by a Ground Surveillance Monitor (GSM), a highly trained officer familiar with the sensor field and the Laotian route structure that was responsible for monitoring a specified group of sensor strings." (Project Checo 1970-1971)

While the sensors were designed to detect vehicle movement (see table below of which the ACOUSID was the most-prevalent), acoustic sensors had a secondary capability to detect aircraft and under certain conditions, identify its engine type (jet, turboprop, or piston). Such identifications were done using LOFARGRAMS (Low Frequency Analysis and Ranging Record Gram), which were readouts of acoustical signatures. (Acoustical Techniques)

Sensor Type	Series	Trucks	Personnel
Seismic	ADSID Ill	100-150 meters	30-50 meters
Acoustic	COMMIKE III	300-1500 meters	30-100 meters
Seismic and Acoustic	ACOUSID III	100-300 meters	30-50 meters
Ignition	EDET III	100-200 meters	N/A

Table 15: Effective Detection Ranges Of Igloo White Sensors In Use For Commando Hunt VII (01-Nov-1971 to 29-Mar-1972)

Acoustic sensors differed from seismic/ignition types in that they sent signals only on command from radio operators in the ISC plot room. Two procedures were followed in "polling" (command to send audio) acoustic sensors. If a seismic/ignition sensor displayed an activation, the GSM immediately determined if there were active acoustic sensors in the string. If so, he directed the Radio Operator to poll the acoustic sensor in an attempt to determine the nature of the activity. By listening directly to the sounds and using a Spectrum Analyzer to supplement his knowledge and experience, the Radio Operator assessed the source of the sounds and entered this assessment into the computer by means of an IBM 2260 display console/keyboard. The computer simultaneously entered this assessment onto the 2250 display in front of the GSM. The Spectrum Analyzer was basically a cathode ray tube on which were displayed patterns generated by the acoustic signals. Since moving vehicles and aircraft had distinct patterns, the Radio Operator used the highly sensitive analyzer to detect the presence of trucks

when their engine sounds were either too faint for the human ear, or were covered by exploding ordnance or aircraft noise. (Project Checo 1970-1971)

Most of the relay operation was automatic, but the monitors could have transmitted data orally by secure voice circuits, should there have been any malfunction in the automatic relay equipment, or should there have been any other operational requirement to do so. Actually, it was possible to hear the sounds from the battlefield area, which were transmitted by the Acoubuoys. Each time an Acoubuoy was activated it would remain alive for eleven seconds, during which foreign voices, overflying aircraft (occasionally the EC-121 [airborne sensor relay aircraft] itself), automatic weapons fire, and bomb, or artillery bursts could be heard. Additionally, coded activations of the 3 seismic detectors were frequent. (Acoustical Techniques)

The Problem of the Prop Aircraft

The 03:09 local time activation by a "prop" aircraft is problematic as the only known propeller-driven aircraft in that part of Laos was an AC-119 gunship, Callsign "Stinger 09". However, this aircraft's time-over-target (TOT) was not till 03:40 and its target area was 15.5 miles/29 km. southeast of the center of the Owl 08's target area. Likewise, we know for certain the Airborne Command Post (callsign "Moonbeam") did not advise Owl 08 of any other aircraft in its target area; had they known about another aircraft operating in the same area, they would have informed both sets of crews (the F-4 and the gunship). This leaves two, other possibilities: a friendly propeller-driven aircraft transiting the area coincidental to Owl 08's mission (or lost) or a Vietnamese propeller-driven aircraft conducting its own mission at the same time.

The following table shows for each combination of sensor activations the distance, time, and average true airspeed if it was the same aircraft flying point-to-point (*this is a huge assumption*). The True Airspeeds of all the combinations are very low (< 100 kts.), which dramatically limits the types of aircraft it could be.

Sensor 1	Engine Type	Sensor 2	Engine Type	Distance (m)	Distance (NM)	Time (min)	TAS (kts)	TAS (m/s)
03:09	Prop	03:15	Unknown	16,150	8.7	6.00	87	45
03:09	Prop	03:28	Unknown	6,725	3.6	19.00	11	6
03:15	Unknown	03:28	Unknown	10,000	5.4	13.00	25	13

Table 16: Summary of Aircraft Detection Sensor Data

1. 03:09 "Prop" to 03:15 "Unknown". There are three possibilities.

a. A helicopter would be the most-obvious explanation for the 87-knot TAS figure. It's not clear, though, who would have been flying such an aircraft at night in an active target area under marginal weather conditions. It's possible a special operations mission was concurrent in Owl 08's target area but this would have represented a coordination failure. Alternately, the crew could have been lost. Regardless, we know that since no helicopters were lost that night, Owl 08 did not have a midair collision with a helicopter. However, a helicopter is the simplest explanation.

b. Air America, the covert CIA-run "airline" in Southeast Asia, operated a number of piston-engined aircraft that could cruise in the 90-kt. range (among them the Pilatus PC-6C and de Havilland Canada DHC-2). It's possible an Air America aircraft was transiting the target area that night coincidental to Owl 08's bombing mission. However, Air America did not normally operate in this part of Laos due to the heavy air defense threat. Regardless, we know that no Air America aircraft were lost that night so we know for certain Owl 08 did not have a midair collision with one of them.

c. The VPAF operated a Russian-built short takeoff and landing (STOL) aircraft called an Antonov AN-2 "Colt" that could fly as slow as 25 knots/13 m/s. According to USAF Gen. Momyer in "Airpower in Three Wars (World War II, Korea, Vietnam)", "[I]t is probable that some unidentified flights into the II Corp area of South Vietnam [southeast of Owl 08's target area] along the Laotian border were being made by Russian AN-2 Colts." However, the Colt had limited night/instrument flying capabilities and according to a 2001 article by the Aircraft Owners and Pilots Association, "Flying on instruments in the Colt would be a challenge." (AOPA) Therefore, it's possible but unlikely it was a Colt. Regardless, we know that no Vietnamese aircraft were lost that night so we know for certain Owl 08 did not have a midair collision with one of them.

2. 03:09 "Prop" to 03:28 "Unknown". With an average speed of only 11 kts. there is no possibility this could have been a fixed-wing aircraft flying point-to-point but if a helicopter were not flying directly, it could also explain the very low (11-knot) average TAS.

3. 03:15 "Unknown" to 03:28 "Unknown". With an average speed of only 25 kts. there is no possibility this could have been a fixed-wing aircraft flying point-to-point but if a helicopter were not flying directly, it could also explain the very low (25-knot) average TAS.

The only conclusion that can be drawn from the evidence is that a second, unidentified, and likely unidentifiable aircraft was operating in Owl 08's target area. However, determining the identify of this aircraft is not central to resolving this case.

Appendix F – UNC 3153 Excavation Images Needed

During the 20-1LA JFA that excavated the UNC 3153 location (Site LA-00527) between 10/21/2019 and 11/30/2019, a DPAA photographer took hundreds of images of the crash site and surrounding areas. The Steadman Family requested these images but inexplicably, in January 2021 instead of providing the requested images, DPAA sent images of the photographer's notebook (filename 20-1LA_3153_LA-00527_Photo Field Notebook_Redacted1.pdf). This notebook catalogued the date, location, and subject of the images (see sample page below). The Steadmans then requested the 154 images listed in the table that follows but these were never provided. Doing so is a recommended next step. The following context is needed for the photographer's notes and the items found were given the CIL accession number 2019-493 for analysis.

- The prefixes N (north) and E (east) indicate where in the excavation squares the objects were found.
- ME = Material evidence (any physical evidence not related to aircraft wreckage or Life Support equipment).
- ACW = Aircraft wreckage (self-explanatory).
- LSI = Life Support Indicated (any physical evidence related to equipment intended to support life; this includes obvious items ranging from oxygen hoses, ejection seats, and pilot's parachutes to less-obvious things like flight suit zippers and boots).
- Possible osseous = possible bony (and therefore possibly human) remains. Important note: subsequent analysis of all possible osseous objects by the CIL determined they were not human.

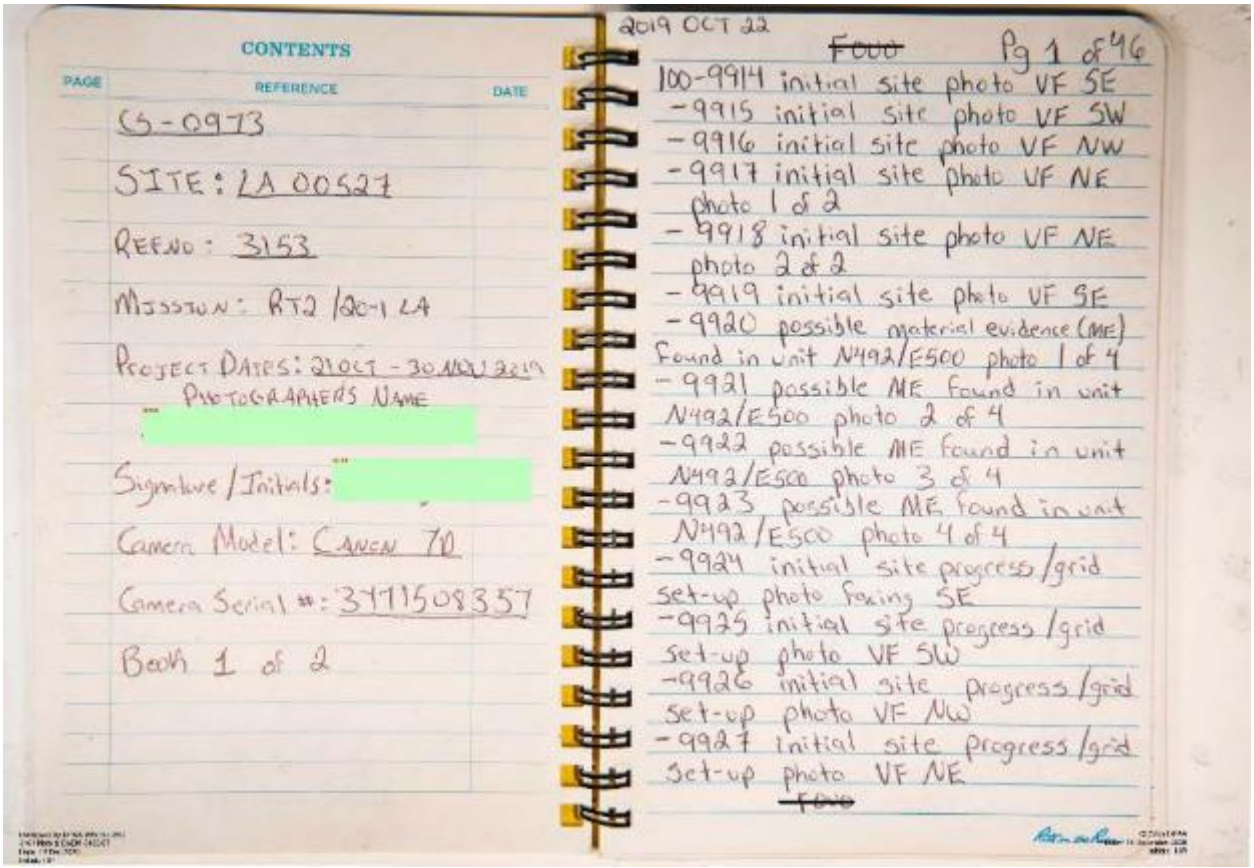


Figure 62: REFNO 3153 Photographer's Excavation Images Notebook sample Source: DPAA

Table 17: 20-1LA JFA REFNO 3153 Excavation Photos Requested (N = 154) Source: DPAA

PDF Page #	Notebook Page #	Notebook Date	Image #	Image Description
1	1	2019-Oct-22	100-9920	possible material evidence (ME) found in unit N492/E500 photo 1 of 4
1	1	2019-Oct-22	100-9921	possible ME found in unit N492/E500 photo 2 of 4
1	1	2019-Oct-22	100-9922	possible ME found in unit N492/E500 photo 3 of 4
1	1	2019-Oct-22	100-9923	possible ME found in unit N492/E500 photo 4 of 4
2	2	2019-Oct-23	100-9939	possible ACW found in unit N492/E500 photo 1 of 3
2	3	2019-Oct-23	100-9940	possible ACW found in unit N492/E500 photo 2 of 3
2	3	2019-Oct-23	100-9941	possible ACW found in unit N492/E500 photo 3 of 3
3	4	2019-Oct-24	100-9953	possible ACW found in unit N492/E500
3	4	2019-Oct-24	100-9954	possible ACW found in unit N492/E500
3	5	2019-Oct-25	100-9957	possible ACW found in unit N488/E500
3	5	2019-Oct-25	100-9958	a closeup of possible ACW found in unit N488/E500
4	6	2019-Oct-26	100-9974	possible ACW found in unit N484/E500 (level 1)
4	7	2019-Oct-27	100-9980	possible ACW found in unit N484/E500 (level 2)
4	7	2019-Oct-27	100-9981	possible ACW found in unit N484/E500
5	8	2019-Oct-27	100-9994	possible ACW found in level 1 of unit N488/E496
5	9	2019-Oct-28	100-9997	possible ACW found in unit N492/E504
5	9	2019-Oct-28	100-9998	possible ACW found in unit N492/E504
5	9	2019-Oct-28	101-0004	possible ACW found in level 2 of unit N488/E496
5	9	2019-Oct-28	101-0005	possible ACW found in overall unit N488/E496
6	10	2019-Oct-28	101-0008	possible ACW found in level 2 of unit N492/E504
6	10	2019-Oct-28	101-0009	possible ACW found in overall unit N492/E504
6	10	2019-Oct-28	101-0012	possible ACW found unit N492/E504
6	11	2019-Oct-29	101-0013	possible material evidence found in unit N492/E504 (4 photos)
6	11	2019-Oct-29	101-0014	possible material evidence found in unit N492/E504 (4 photos)
6	11	2019-Oct-29	101-0015	possible material evidence found in unit N492/E504 (4 photos)
6	11	2019-Oct-29	101-0016	possible material evidence found in unit N492/E504 (4 photos)
6	11	2019-Oct-29	101-0028	possible ACW found unit N480/E496
7	12	2019-Oct-29	101-0030	possible ACW found in unit N488/E504 photo 1 of 2
7	12	2019-Oct-29	101-0031	possible ACW found in unit N488/E504 photo 2 of 2
7	13	2019-Oct-30	101-0035	possible ACW found in unit N480/E508
7	13	2019-Oct-30	101-0036	photos of possible door hinge found in unit N480/E508
7	13	2019-Oct-30	101-0037	photos of possible door hinge found in unit N480/E508
7	13	2019-Oct-30	101-0044	possible ACW found in unit N516/E512
8	14	2019-Nov-1	101-0048	photos of possible osseous found in unit N516/E508
8	14	2019-Nov-1	101-0049	photos of possible osseous found in unit N516/E508

PDF Page #	Notebook Page #	Notebook Date	Image #	Image Description
8	14	2019-Nov-1	101-0050	photos of possible osseous found in unit N516/E508
8	14	2019-Nov-1	101-0051	photos of possible osseous found in unit N516/E508
8	14	2019-Nov-1	101-0052	possible ACW found in unit N516/E508
8	14	2019-Nov-1	101-0053	possible ACW found in unit N516/E508
8	14	2019-Nov-1	101-0057	possible ACW found in unit N480/E512
8	14	2019-Nov-1	101-0058	possible ACW found in unit N480/E512
8	14	2019-Nov-1	101-0059	possible ACW found in unit N464/E512
8	14	2019-Nov-1	101-0060	possible ACW found in unit N464/E512
8	14	2019-Nov-1	101-0061	possible ACW found in unit N476/E512
8	14	2019-Nov-1	101-0062	possible ACW found in unit N476/E512
8	15	2019-Nov-3	101-0078	photo of melted plastic possible ACW found in unit N464/E512
9	16	2019-Nov-3	101-0079	photos of possible ACW found in unit N464/E512
9	16	2019-Nov-3	101-0080	photos of possible ACW found in unit N464/E512
9	16	2019-Nov-3	101-0081	possible ACW found in unit N476/E512
9	17	2019-Nov-4	101-0083	photos of possible ACW found in unit N468/E508
9	17	2019-Nov-4	101-0084	photos of possible ACW found in unit N468/E508
9	17	2019-Nov-4	101-0085	photos of possible ACW found in unit N468/E508
10	18	2019-Nov-4	101-0100	possible ACW found in unit N476/E516
10	18	2019-Nov-4	101-0104	possible ACW found in unit N472/E504
10	19	2019-Nov-5	101-0109	possible ACW found in unit N476/E504
10	19	2019-Nov-5	101-0110	possible ACW found in unit N476/E504
10	19	2019-Nov-5	101-0115	possible ACW found in unit N480/E516
11	20	2019-Nov-6	101-0130	photos of possible ACW found in unit N472/E508
11	20	2019-Nov-6	101-0131	photos of possible ACW found in unit N472/E508
11	20	2019-Nov-6	101-0132	photos of possible ACW found in unit N472/E508
11	20	2019-Nov-6	101-0133	possible ACW found in unit N476/E516
11	21	2019-Nov-7	101-0147	possible ACW found in unit N476/E508
11	21	2019-Nov-7	101-0148	possible ACW found in unit N476/E508
11	21	2019-Nov-7	101-0149	possible ACW found in unit N484/E508
12	22	2019-Nov-8	101-0159	possible ACW found in unit N480/E504
12	22	2019-Nov-8	101-0160	possible ACW found in unit N480/E504
12	23	2019-Nov-9	101-0168	possible ACW found in unit N484/E512
12	23	2019-Nov-9	101-0171	possible ACW found in unit N484/E512
13	24	2019-Nov-10	101-0181	possible ACW found in unit N488/E512
13	24	2019-Nov-10	101-0182	possible ACW found in unit N488/E512
13	24	2019-Nov-10	101-0184	possible ACW found in unit N476/E520
13	25	2019-Nov-11	101-0190	possible ACW found in unit N484/E516
13	25	2019-Nov-11	101-0194	possible ACW found in unit N488/E508
14	26	2019-Nov-11	101-0198	possible ACW found in unit N488/E516
14	27	2019-Nov-12	101-0204	possible ACW found in unit N476/E500
15	28	2019-Nov-13	101-0212	possible ACW found in unit N492/E516

PDF Page #	Notebook Page #	Notebook Date	Image #	Image Description
15	28	2019-Nov-13	101-0213	possible ACW found in unit N480/E500
15	29	2019-Nov-14	101-0216	possible ACW found in unit N492/E520
15	29	2019-Nov-14	101-0220	possible ACW found in unit N472/E500
15	29	2019-Nov-14	101-0223	possible ACW found in unit N492/E524
16	30	2019-Nov-17	101-0228	possible ACW found in unit N484/E520
16	31	2019-Nov-18	101-0239	possible ACW found in unit N496/E524
16	31	2019-Nov-18	101-0240	photos of specific position ACW found on site
16	31	2019-Nov-18	101-0241	photos of specific position ACW found on site
16	31	2019-Nov-18	101-0245	photos of possible ACW found in East/Southeast 1x1 crater
16	31	2019-Nov-18	101-0246	photos of possible ACW found in East/Southeast 1x1 crater
16	31	2019-Nov-18	101-0247	photos of possible ACW found in unit N488/E520
16	31	2019-Nov-18	101-0248	photos of possible ACW found in unit N488/E520
17	32	2019-Nov-20	101-0261	possible ACW found in unit N500/E524
17	32	2019-Nov-20	101-0269	possible ACW found in unit N488/E524
17	32	2019-Nov-20	101-0272	possible ACW found in unit N496/E528
18	34	2019-Nov-21	101-0277	possible ACW found in unit N480/E524
18	34	2019-Nov-21	101-0278	possible ACW found in unit N480/E524
18	35	2019-Nov-22	101-0287	possible ACW found in unit N500/E496
18	35	2019-Nov-22	101-0288	possible ACW found in unit N500/E496
18	35	2019-Nov-22	101-0289	possible ACW found in unit N492/E528
19	36	2019-Nov-24	101-0295	possible ACW found in unit N496/E496
19	36	2019-Nov-24	101-0300	possible ACW found in unit N504/E524
19	37	2019-Nov-25	101-0309	possible ACW found in unit N496/E496
19	37	2019-Nov-25	101-0310	possible ACW found in unit N496/E496
19	37	2019-Nov-25	101-0316	possible ACW found in unit N490-492/E492-494
20	38	2019-Nov-25	101-0324	possible ACW found in unit N504/E528
20	38	2019-Nov-25	101-0327	possible ACW found in unit N482-484/E494-494
20	39	2019-Nov-26	101-0333	possible ACW found in unit N504/E536-538
20	39	2019-Nov-26	101-0338	possible ACW found in unit N480-482/E536-538
20	39	2019-Nov-26	101-0339	possible ACW found in unit N508-510/E536-538
21	40	2019-Nov-26	101-0348	photos of possible osseous found in unit N510-516/E532-534
21	40	2019-Nov-26	101-0349	photos of possible osseous found in unit N510-516/E532-534
21	40	2019-Nov-26	101-0350	photos of possible osseous found in unit N510-516/E532-534
21	40	2019-Nov-26	101-0351	photos of possible osseous found in unit N510-516/E532-534
21	40	2019-Nov-26	101-0352	photos of possible osseous found in unit N510-516/E532-534
21	40	2019-Nov-26	101-0353	possible ACW found in unit N478-480/E488-490

PDF Page #	Notebook Page #	Notebook Date	Image #	Image Description
21	40	2019-Nov-26	101-0354	possible ACW found in unit N494-496/E488-490
21	40	2019-Nov-26	101-0355	possible ACW found in unit N508-510/E536-538
21	41	2019-Nov-27	101-0358	possible ACW found in unit N510-516/E532-534
21	41	2019-Nov-27	101-0359	possible ACW found in unit N498-500/E484-486 (The incorrect label was in photo)
21	41	2019-Nov-27	101-0363	photos of possible osseous found in unit N508-512/E526-528
21	41	2019-Nov-27	101-0364	photos of possible osseous found in unit N508-512/E526-528
21	41	2019-Nov-27	101-0365	photos of possible osseous found in unit N508-512/E526-528
21	41	2019-Nov-27	101-0366	photos of possible osseous found in unit N508-512/E526-528
21	41	2019-Nov-27	101-0367	possible ACW found in unit N508-512/E526-528
21	41	2019-Nov-27	101-0372	photos of possible ACW found in unit N512-514/E528-532
21	41	2019-Nov-27	101-0373	photos of possible ACW found in unit N512-514/E528-532
22	42	2019-Nov-27	101-0377	possible ACW found in unit N508/E516
22	42	2019-Nov-27	101-0378	possible ACW found in unit N494-496/E492-494 (wrong site label in photo)
22	42	2019-Nov-27	101-0380	possible ACW found in unit N490-492/E488-490 (wrong site label in photo)
22	43	2019-Nov-28	101-0386	photos of LSI preparing ACW before disposal
22	43	2019-Nov-28	101-0387	photos of LSI preparing ACW before disposal
22	43	2019-Nov-28	101-0388	photo of all ACW found on site before being spray painted
22	43	2019-Nov-28	101-0389	photo of all ACW found on site being spray painted
22	43	2019-Nov-28	101-0390	photo of all ACW found on site being spray painted
22	43	2019-Nov-28	101-0391	photo of all ACW found on site after being spray painted
22	43	2019-Nov-28	101-0392	photo of all ACW found being disposed in hole
22	43	2019-Nov-28	101-0394	photos of possible LSI evidence found in unit N496/E544
22	43	2019-Nov-28	101-0395	photos of possible LSI evidence found in unit N496/E544
22	43	2019-Nov-28	101-0396	possible LSI evidence found in unit N496/E544
22	43	2019-Nov-28	101-0397	possible LSI evidence found in unit N496/E540
22	43	2019-Nov-28	101-0398	possible LSI evidence found in unit N488/E508
23	44	2019-Nov-28	101-0399	possible LSI evidence found in unit N480/E500
23	45	2019-Nov-30	101-0414	photos of possible osseous found in unit N516/E508
23	45	2019-Nov-30	101-0415	photos of possible osseous found in unit N516/E508
23	45	2019-Nov-30	101-0416	photos of possible osseous found in unit N516/E508
23	45	2019-Nov-30	101-0417	photos of possible osseous found in unit N492/E520

PDF Page #	Notebook Page #	Notebook Date	Image #	Image Description
23	45	2019-Nov-30	101-0418	photos of possible osseous found in unit N492/E520
23	45	2019-Nov-30	101-0419	photos of possible osseous found in unit N508/E528 The depth is incorrect in photo; 0-32 is the correct DEPTH
23	45	2019-Nov-30	101-0420	photos of possible osseous found in unit N508/E528 The depth is incorrect in photo; 0-32 is the correct DEPTH
23	45	2019-Nov-30	101-0421	photos of possible osseous found in unit N504/E532 The depth is incorrect in photo; 0-34 is the correct DEPTH
23	45	2019-Nov-30	101-0422	photos of possible osseous found in unit N504/E532 The depth is incorrect in photo; 0-34 is the correct DEPTH
23	45	2019-Nov-30	101-0423	photos of possible osseous found in unit N512-514/E532-534
23	45	2019-Nov-30	101-0424	photos of possible osseous found in unit N512-514/E532-534
24	46	2019-Nov-30	101-0425	photos of possible osseous found in unit N508-512/E526-528
24	46	2019-Nov-30	101-0426	photos of possible osseous found in unit N508-512/E526-528
24	46	2019-Nov-30	101-0427	photos of possible osseous found in unit N508-512/E526-528
24	46	2019-Nov-30	101-0428	photos of possible osseous found in unit N508-512/E526-528

Glossary

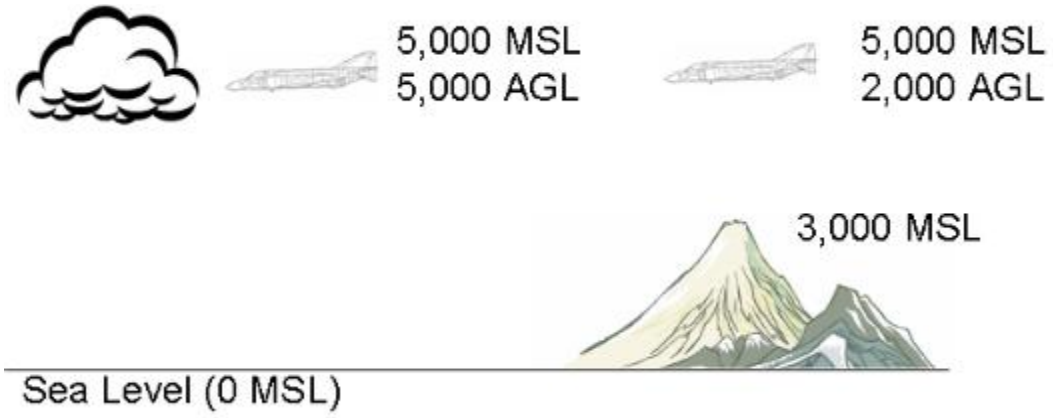
497 TFS — The 497th Tactical Fighter Squadron (TFS) – "Nite Owls" – was the Air Force's pioneer jet night flying unit and developed night tactics that later became Air Force standard. The unit was deactivated in 1974 when the 8th TFW moved to Kunsan Airbase in Korea. It was reactivated in 1978 at Taegu Airbase in Korea where it remained operational until it was deactivated again in 1989.

8 TFW — The 8th Tactical Fighter Wing (TFW) – "Wolfpack" – was based out of Ubon Royal Thai Air Base (RTAFB), Thailand and was the most successful USAF Fighter Wing during the Vietnam War. 8th Wing crews shot down more aircraft than any other and were the first to use laser-guided bombs in combat. In 1971, the 8 TFW consisted of four fighter squadrons: the 497th Tactical Fighter Squadron (TFS) "Nite Owls" (Tail code "FP"), 25th TFS "Dragons" (Tail code "FA"), 433rd TFS "Satan's Angels" (Tail code "FG"), and the 435th TFS "Screaming Eagles" (Tail code "FO"). In 1974, the 8th TFW moved to Kunsan AB, Korea, where it remains operational today.

AIM-7 — The AIM-7 Sparrow was a 435-pound, radar-guided, medium range, air-to-air missile carried exclusively by F-4 Phantoms during the Vietnam War. It gave the Phantom an all-weather engagement capability.

Altitude (AGL, MSL) — Altitude can be measured two ways – MSL (above Mean Sea Level) – the height of an aircraft or terrain above sea level – or AGL (above Ground Level) – the height of an aircraft above the ground directly below it. Here are a few examples:

The cloud and the F-4 on the left are both 5,000 feet MSL; since the elevation of the terrain underneath them is Sea Level (0 feet MSL), they are also 5,000 feet AGL. The mountain peak on the right has an elevation of 3,000 feet MSL. The F-4 above it is 5,000 feet MSL but only 2,000 feet AGL.



Callsign — A radio callsign serves as a unique way of identifying an aircraft during a mission. Nite Owl callsigns were normally "Owl" followed by a 2-digit number (Owl 01, Owl 02, etc.). In some squadrons, callsigns were assigned to a particular pilot who would use the same one regardless of the aircraft he flew.

CIL — The Central Identification Laboratory (pronounced "sill") is DPAA's forensic laboratory with responsibility for identification of human remains. It is accredited by the American Society of Crime Laboratory Directors' Laboratory Accreditation Board's International Standards Program. It is the only forensic skeletal identification laboratory accredited as such.

CBU — Cluster Bomb Unit (pronounced "C-B-U") is a type of munition that dispenses multiple submunitions or bomblets and is used to attack area targets.

Knot	Aircraft speed is measured in NM per hour or knots (1.15 statute miles per hour).
Nautical Mile (NM)	Distances in aviation are measured in nautical miles (NM), which are 6,076 feet or 1.15 statute miles. Unless specified otherwise, all references to "miles" in this document are nautical miles.
TFS	Tactical Fighter Squadron. In the Air Force organizational structure, a Squadron is the smallest formally organized flying unit and was usually commanded by a Lieutenant Colonel. F-4 squadrons normally had 24 aircraft assigned to them.
TFW	Tactical Fighter Wing. In the Air Force organizational structure, a Wing is a self-sustaining unit made up of one or more squadrons; it was usually commanded by a Colonel.
VPAF	The Vietnamese People's Air Force was the North Vietnamese Air Force's official name.
WRCS	The ASQ-91 Weapons Release Computer System or WRCS (pronounced "W-R-C-S") was an analog bombing computer first introduced in the F-4D model. In conjunction with the APQ-100 radar set, it gave the Phantom some all-weather bombing capability. 497 TFS crews used it to initiate flare releases and for certain bomb delivery profiles.

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