U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: INFORMATION

Date: March 5, 1987

Material relative to JAL, Nov. 17, 86,
sighting of unidentified air traffic

Reply to
Attn. of:

From:

PUBLIC AFFAIRS OFFICER, AAL-5

To:

ALL REGIONAL FACILITY MANAGERS
REGIONAL DIVISION MANAGERS AND STAFF OFFICERS

The attached selected information regarding the November 17, 1986, sighting of unidentified air traffic by the crew of JAL flight 1628, has been forwarded to you for you use. This is public information, no copyright, and you can share it with anyone else.

Thought you might like to read the data yourself.

Sincerely,

P. T. Steucke

Paul Steucke
Public Affairs Officer

March 5, 1987

Selected Material
Relative to the FAA Investigation of
Japan Air Lines flight 1628
Sighting of Unidentified Air Traffic
on November 17, 1986.

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Prepared by
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U.S. Department
of Transportation
**Federal Aviation
Administration**

News:

Office of Public Affairs
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FOR RELEASE ON
MARCH 5, 1987
#87-09

CONTACT: PAUL STEUCKE

FAA RELEASES DOCUMENTS ON REPORTED UFO SIGHTING LAST NOVEMBER

The Federal Aviation Administration today released documents relating to the reported sighting of an unidentified flying object (UFO) over Alaska by a Japan Air Lines flight crew on November 17, 1986, saying it was unable to confirm the event.

The material was issued by FAA's Regional Office in Anchorage, Alaska, and included transcripts of pilot-controller communications, interviews with controllers and the flight crew, radar plots and other data.

FAA's Regional Public Affairs Officer Paul Steucke pointed out that FAA normally does not investigate UFO sightings but pursued the JAL incident in its role as the operator of the air traffic control system. He said the agency's objective was to determine if there was an unreported aircraft in the vicinity of the JAL flight that could present a safety hazard.

As part of the inquiry, Steucke said, radar data of the JAL flight track was reviewed by FAA experts at the agency's Technical Center in Atlantic City, N.J., using identical equipment. They determined that a second radar target near the JAL flight at the time of the reported sighting was not another aircraft but rather a split radar return from the JAL Boeing 747.

Technically, this is known as an "uncorrelated primary and beacon target return." It means that the primary radar signal reflected off the aircraft's surface did not correlate exactly with the pulse emitted by the aircraft's radar beacon transponder. This phenomenon is not unusual and gives the impression of two separate radar targets.

Steucke also noted that FAA controllers who monitored the JAL aircraft said in their statements that they thought there might have been another aircraft because of the dual radar targets. However, a northbound United Air Lines jet that was diverted by controllers to intercept the JAL flight path did establish visual contact with that aircraft but the pilots saw nothing else.

The Nov. 17 UFO sighting was reported by JAL Captain Kenjyu Terauchi on a cargo flight over the polar cap from Iceland to Japan via Anchorage. Captain Terauchi said he had visual contact from approximately the U.S.-Canadian border to south of Fairbanks. On Jan. 11, 1987, Captain Terauchi also reported another sighting in the same general area as the first.

Steucke said FAA is satisfied that the safety of the air traffic control system was not compromised by the Nov. 17 incident and plans no further investigation of the circumstances.

# # #

AAL-5, FAA
February 4, 1987

SELECTED PORTIONS OF TRANSCRIPTION
CONCERNING THE INCIDENT INVOLVING JAPAN AIRLINES FLIGHT 1628
ON NOVEMBER 18, 1986, AT APPROXIMATELY 0218 UTC
(Universal Time Coordinated - November 17, 1986
Alaska Standard Time, 6:18 p.m.)

0219:15	JL1628	Anchorage Center, Japan Air sixteen twenty eight; ah do you have any traffic, ah seven o'clock above?
0219:32	R/D15	Japan Air sixteen twenty eight heavy; negative.
0219:36	JL1628	Ah, Japan Air sixteen twenty eight; roger and, ah we insight-ah-two traffic-ah, in front of us one mile, about.
0221:19	R/D15	Japan Air sixteen twenty eight heavy; Sir if your able to identify the type of aircraft, ah-and see if you can tell whether its military or civilian.
0221:35	JL1628	Ah, Japan Air sixteen twenty eight; we cannot identify ah, the type, ah but, ah we can see, ah navigation lights and ah, strobe lights.
0221:48	R/D15	Roger sir, say the color of the strobe and beacon lights?
0221:56	JL1628	The color is ah, - white and yellow, I think.
0223:37	R/D15	Ya, could you (ROCC) look ah, approximately forty miles south of Fort Yukon, there should be a code up there of one five-five-zero. Can you tell me you see a primary target about his position?
0225:02	R/D15	Japan Air sixteen twenty eight heavy; roger. Sir, I'm picking up a-ah, hit on the radar approximately five miles in trail of your six o'clock position, do you concur?
0225:12	JL1628	Ah negative, ah eleven o'clock, ah eight miles, ah same level over.
0225:43	ROCC	Okay, I've got your squawk. It looks like I am getting some surge, primary return, ah I don't know if it's erroneous or whatever but...

JL1628 = Japan Air Lines flight #1628
R15 = Controller position, Anchorage Air Route Traffic Control Center
D15 = Controller position, Anchorage Air Route Traffic Control Center
ROCC = (Military) Regional Operations Command Center

0225:50	R/D15	Negative, uhuh, it's not erroneous. I want you (ROCC) to keep a good track on there, and if you pick up a code, and verify that you do not have any aircraft operating in that area military.
0225:57	ROCC	That is affirm. We do not have anybody up there right now, ah. Can you give me the position of the primary your receiving?
0226:03	R/D15	Okay, I'm not. I'm ah, picking up a primary - approximately five zero miles, south, right up there - right in front of the ah, one five five zero code.
0226:18	ROCC	Okay, I've got him about his-ah, oh-it looks like about, ah-ten o'clock, at about that range, yes.
0226:25	R/D15	Alright keep an eye on that, and ah-see if-ah, any other military (unintelligible) in that area.
0227:53	ROCC	It is an unknown, okay, we've lost contact with it now.
0230:56	JL1628	It's ah, I think ah, very quite big ah, plane.
0231:48	R15	Are you (Fairbanks FAA tower) pickin up a primary target right with that aircraft?
0231:58	FBKS	Ah, no. It's (the JL1628) the only target I see there.
0232:04	R15	If you see a primary with it, keep your eye on it. And he should be at three five oh(zero)also.
0232:05	FBKS	Alright, very good, we're watching.
0232:07	JL1628	Japan Air sixteen twenty eight, ah request descent.
0232:20	JL1628	Japan Air sixteen twenty eight, request three one zero.
0232:25	R15	Japan Air sixteen twenty eight heavy, understand, requesting flight level three one zero.
0232:41	R15	Japan Air sixteen one er correction sixteen twenty eight heavy, descend at pilot discretion-maintain flight level three one zero.
0232:45	JL1628	Leaving three five zero to three one zero.
0232:58	R15	Japan Air sixteen twenty eight heavy, do you still have your traffic?
0233:00	JL1628	Still, ah, coming ah, ah, right formation, in ah formation.

0234:52	R15	Japan Air sixteen twenty eight heavy, understand your traffic is over Fairbanks at this time.
0234:56	JL1628	Affirmative - - ah request heading two one zero.
0235:02	R15	Japan Air sixteen twenty eight heavy, roger. Deviations approved as necessary for traffic.
0235:24	D15	Approach center (Fairbanks FAA tower) on the sixty one line.
0235:27	FBKS	Approach.
0235:30	D15	Look at your radar. We got a Japan Air one six two eight, ah-he's deviating. He's about ah-five miles north of Fairbanks V-O-R squawking one five five zero.
0235:39	D15	Do you have any traffic with him? He sees traffic, he was deviating.
0235:44	FBKS	Ah - ya, no we don't. I don't see anything there aside from his, ah-his target.
0236:12	JL1628	Ah-Anchorage Center; Japan Air one six two eight, request direct ah-Talkeetna.
0236:18	R15	Japan Air sixteen twenty eight heavy, cleared direct Talkeetna, and in-ah-advise me of your position of your traffic?
0236:24	JL1628	Ah, same po, same position.
0236:37	R15	Japan Air sixteen twenty eight heavy, ah-sir I'm gonna request you to make a right turn, three six zero degrees, three hundred and sixty degree turn, and advise me what your traffic does then.
0236:47	JL1628	Right turn, three sixty.
0237:23	ROCC	Okay. We have, no, we have confirmed, we have no military aircraft working up there.
0237:25	D15	Okay thank you very much.
0237:29	D15	You have no traffic at all?
0237:30	ROCC	That's correct, does he (JAL-1628) still have somebody visual?
0237:32	D15	He says he does.

FBKS = Fairbanks Airport FAA Approach Control (Tower)

0237:55	R15	Japan Air sixteen twenty eight heavy. Sir, does your traffic appear to be staying with you?
0238:00	JL1628	(unintelligible) just looking.
0239:01	R15	Japan Air sixteen twenty eight. Say again?
0239:04	JL1628	It ah-disappeared. Japan Air sixteen twenty eight.
0239:58	ROCC	Ya, this is one dash two again. On some other equipment here we have confirmed there is a flight size of two around your one five five zero. Squawk one primary return only.
0240:05	D15	Okay, where is is he following him?
0240:07	ROCC	It looks like he is, yes.
0240:10	R15	Japan Air sixteen twenty eight heavy; roger. At your discretion proceed direct Talkeetna, Jay one two five Anchorage. (J125 = air route)
0240:23	R15	Japan Air sixteen twenty eight; roger. Sir, the military radar advises they do have a primary target in trail of you at this time.
0240:24	D15	Okay do you have anybody you can scramble up there?
0240:30	ROCC	I'll tell you what, we're gonna talk to your liasion sir about that.
0240:35	R15	Japan Air sixteen twenty eight heavy. Military radar advises they are picking up intermittent primary target behind you in-trail, in-trail I say again.
0240:51	ROCC	Ah-I'm gonna talk to my other radar man here - has gotta, he's got some other equipment watching this aircraft.
0240:54	D15	Okay.
0240:13	R15	Roger sir. Would you (JAL 1628) like our military to scramble on the traffic?
0240:17	JL1628	Negative, negative.
0242:04	JL1628	Anchorage Center. Japan Air sixteen twenty eight. Confirm direct to Talkeetna, three one zero.
0242:09	R15	Japan Air sixteen twenty eight heavy; affirmative. Direct Talkeetna and descend at pilot's discretion, maintain flight level two five zero.

0242:24	ROCC	It looks like he, he-ah-offset left, and then possibly fell back in-trail. However, I can't see him now, I can't pick him out.
0242:29	D15	Okay thank you very much S-R.
0244:13	R15	Japan Air sixteen twenty eight heavy. Do you still have the traffic?
0244:17	JL1628	Ah-affirmative. Ah-nine o'clock, ah, ah.
0244:39	R15	United sixty nine, Anchorage request.
0244:41	UA69	Ah, go ahead, United sixty nine heavy.
0244:43	R15	United sixty nine heavy. Sir, I've got a Japan Air seven forty seven presently in your eleven o'clock position and one hundred and one, correction, one, one, zero miles, and he has traffic (unintelligible) I'll keep you advised, ah-when you're closer to him I want you to see if you see anything with him.
0245:04	UA69	Okay fine, ah-we'll look for ya.
0245:49	R15	United sixty nine heavy. In your eleven o'clock position, one, zero, zero miles, southbound, is a Japan Air, seven forty seven. He is at flight level three one zero. Says he has traffic at his nine o'clock position same altitude.
0246:06	UA69	We'll be looking, that's ah-ah, can't see anything yet.
0246:59	R15	Japan Air sixteen twenty eight; roger. I'm gonna have a United aircraft get close to you and take a look, ah-to see if he can identify your traffic.
0247:06	JL1628	Thank you.
0247:09	R15	United sixty nine heavy, turn ten degrees left, radar vectors, ah-to see traffic.
0248:31	R15	Japan Air sixteen twenty eight heavy. Say the position of your traffic.
0248:34	JL1628	Ah-now, ah-ah-moving to ah-around ten mile, now-ah-ah-position-ah-seven, ah-eight o'clock, ten mile.
0248:52	R15	Japan Air sixteen seventy eight heavy; roger.

UA69 = United Airlines flight #69

0249:52	R15	United sixty nine heavy; roger. The Japan Air says the traffic is in his seven to eight o'clock position and one zero miles in-trail.
0250:00	UA69	Okay, we're lookin.
0250:05	UA69	Why don't you get us a little closer?
0250:07	R15	United sixty nine heavy; roger. Another additional ten degrees left.
0250:14	UA69	Roger, United sixty nine.
0250:46	R15	United sixty nine, that's what he says. Japan Air sixteen twenty eight heavy, say the position of your traffic now.
0250:52	JL1628	Ah-now distinguishing but, ah-ah-your I guess, ah-twelve o'clock below-ah-you, over.
0251:32	UA69	Ah, Center from United ah sixty nine. Ah-the-ah-Japan Airliner is silhouetted against a-ah-light sky. I don't see anybody around him at all. I can see his contrail but I sure don't see any other airplanes. Do you see him?
0251:49	R15	United sixty nine heavy, ah-negative sir. We got just a very few primary hits on the ah-target and then ah-we really haven't got a good track on him ever.
0252:31	TOTEM	If you want we've got extra gas we could bop up another five or six thousand feet and turn around.
0252:36	R15	Totem (military C130 flight) seven one, ah roger sir. If you'd like ah-standby, ---- Totem seven one, turn ah-right, heading two five, correction turn right, heading two seven zero, radar vectors to intercept.
0253:10	R15	Japan Air sixteen twenty eight heavy, descend at pilot discretion, maintain flight level two five zero.
0253:13	JL1628	Japan Air sixteen twenty eight, ah-pilot's discretion, maintain ah-ah-two five zero, so-ah-ah-I cannot, I couldn't see ah-U-F-O, over.
0253:27	R15	Japan Air sixteen twenty eight heavy. Understand you do not see the traffic any longer.
0253:31	JL1628	Affirmative.
0254:04	TOTEM	Okay sir, we're searching this time, we think we have him.

TOTEM = Military C130 aircraft

0254:09	R15	Japan Air sixteen twenty eight heavy, flash your landing lights please.
0255:25	TOTEM	Ah, yes sir, we've got him insight.
0255:35	R15	Totem seven one, do you see any traffic in his vicinity?
0255:38	TOTEM	Not flashing any lights at this time sir.
0323:		JL1628 landed at Anchorage International Airport (approximate)

Paul Steucke
FAA Public Affairs
701 C Street, Box 14
Anch. AK 99513

March 5, 1987

UNCORRELATED RADAR SIGNALS

Radar data received by the FAA and used to track Japan Airlines flight 1628 on the night of the November 17, 1986, was retained by FAA. Review of this radar data by FAA experts using identical equipment at the FAA's research technical center in Atlantic City, New Jersey, revealed that the radar system was receiving what is called an "uncorrelated primary and beacon target".

This electronic phenomena is not unusual according to Steucke who said, "It is unfortunate that the uncorrelated target phenomena occurred just when a pilot was reporting seeing something outside his aircraft.

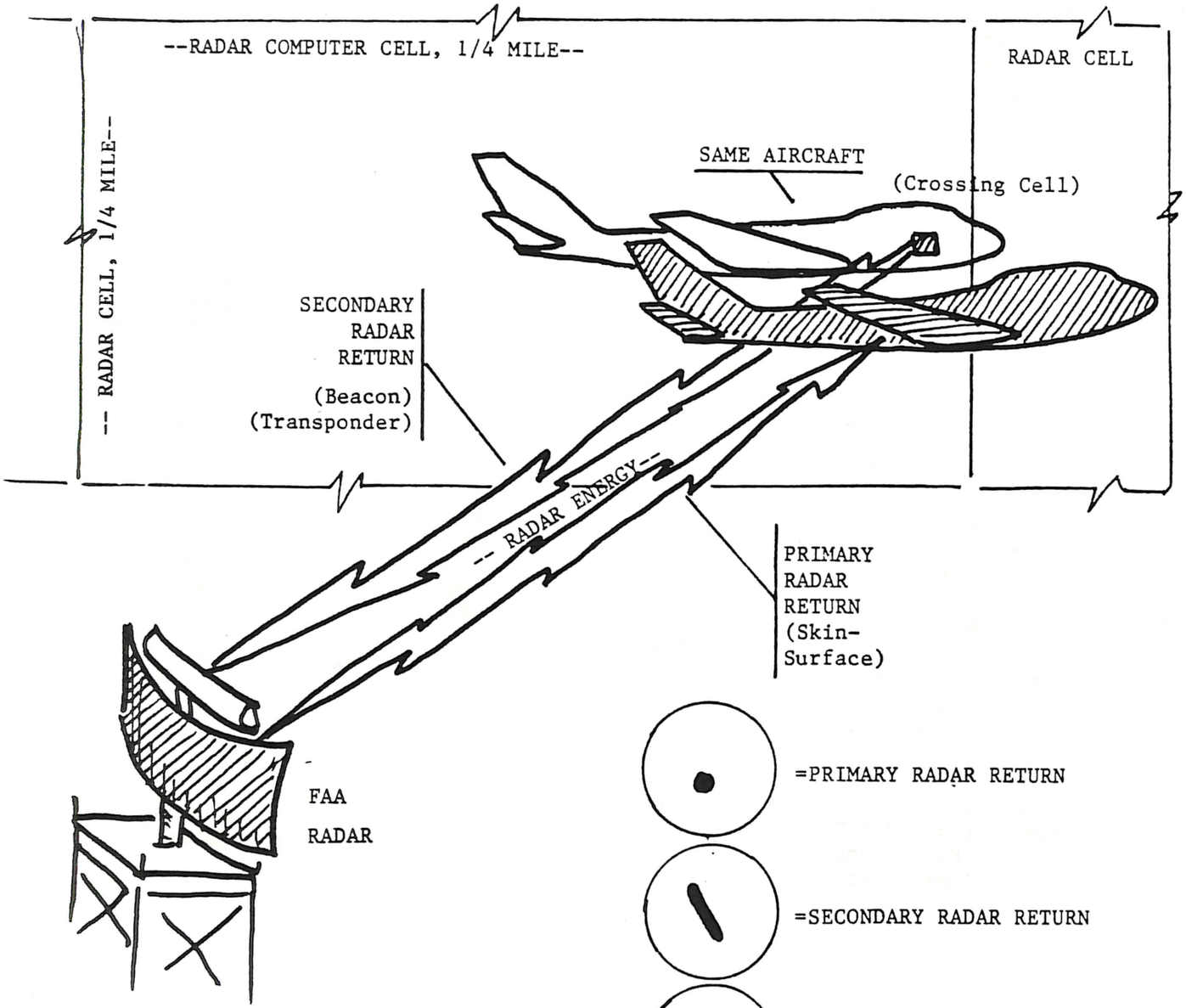
The controller's statements, released by the FAA, indicate that they thought there might be another aircraft or object in the area of the JAL flight. Steucke said, "The controllers were doing their job right because they have to work with what is right there in front of them on the screen, especially when you have a Captain that is reporting "other traffic" in his immediate area. The radar data they had was one target, moving slowly across the radar screen. They don't have the benefit of "monday morning quarterbacking" with multiple radar images as was the case in regenerating the radar data." Review of the radar data by FAA experts revealed the "uncorrelated target" phenomena.

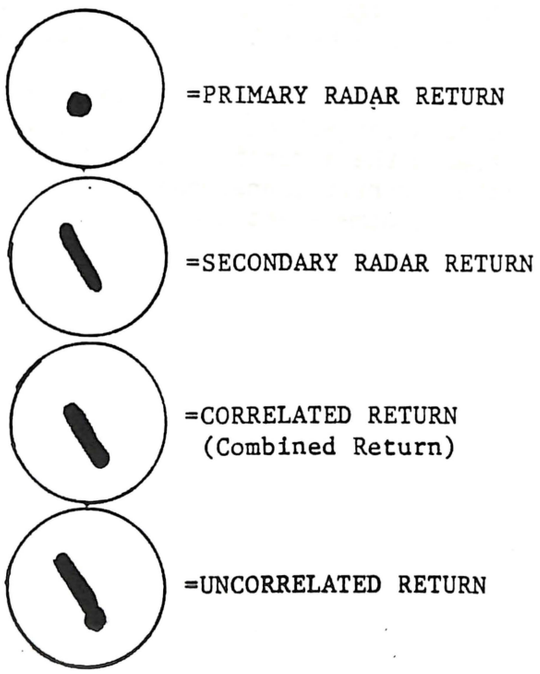
FAA electronic technicians explained that an "uncorrelated primary and beacon target" on the radar screen occurs when the radar energy that is sent up toward the aircraft, (primary signal) returns to the radar receiver along with the aircraft transponder (beacon) signal and the two do not match up as being at the same exact location.

# # #

UNCORRELATED RADAR SIGNALS

An "uncorrelated primary and beacon(secondary) return on a radar screen occurs when the radar energy that is sent up toward the aircraft (primary signal) returns off the surface of the aircraft at a slightly different moment than the beacon (secondary) transponder signal and the two do not match up as being at the same place or same computer radar cell.





Drawing by Paul Steucke
March 5, 1987

U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: INFORMATION: Description of Radar Split Image; AAL-5 Memo of 2/5/87

Date: FEB 27 1987

Reply to Attn of:

From: Manager, Airway Facilities Division, AAL-400

To: Public Affairs Officer, AAL-5

This letter transmits our analysis of the radar targets associated with JAL flight 1628, on November 17, 1986, and supplements discussions we have had regarding what has been referred to as "split images".

We concur with the interpretation provided to you by the Alaskan Region Air Traffic Division.

The attached Analysis of Uncorrelated Primary and Beacon Targets by Dennis Simantel covers the subject in more detail, and addresses the questions raised in your letter.

Paul, I appreciate the team approach you have taken to more fully understand a complex issue. The issue is an excellent example of how "interdependent" we are. If we can provide any more information, please do not hesitate to call.

Dave Morse

David F. Morse

Attachment

RECEIVED
27 FEB 87

ANALYSIS OF UNCORRELATED PRIMARY
AND BEACON TARGETS
(JAL-1628, 11/17/86 AKST)

Approximately 61 minutes of data was extracted from the EARTS CDR printouts relating to the November 18 incident involving JAL-1628 and the alleged UFO sighting.

Review of the data involving this incident did not show any abnormalities that could be associated with any type of target as indicated by the pilot of JAL-1628.

Radar returns from the aircraft and surrounding terrain vary with the different segments of the flight, but are considered normal for the area.

Returns relating to the incident can be categorized as three types: primary radar reinforced by a beacon reply (primary radar returns and beacon returns are both evident in the same 1/4 mile range cell), beacon only reply and beacon with an associated radar reply. Seventy-two percent of the replies were radar with beacon reinforcement (same range cell) which is normal for the Murphy dome radar system.

Approximately 25 percent were beacon only and of those that registered as beacon only, 90 percent of those had a primary only reply within 1/8 of a mile, either ahead or behind the beacon target (5 behind, 12 ahead).

These uncorrelated primary returns are not uncommon, due to the critical timing associated with the delay adjustments in the aircraft transponder for beacon systems and the target correlation circuitry within the radar equipment.

When an aircraft is being interrogated as it passes through the beginning of adjacent range cells the intricate timing between the two systems very often is off just enough to declare both a beacon and a radar target in different range cells, resulting in uncorrelated radar replies.

The data derived from the JAL-1628 flight is representative of the data from another aircraft in the same general area and is considered normal.

February 25, 1987

DS

Dennis R. Simantel
ZAN-AAL-ARTCC

CONCUR: David F. Morse, AAL-400

Paul Steucke
FAA, Public Affairs Officer
Alaskan Region
701 C Street, Box 14
Anchorage, Alaska 99513

March 5, 1987

LACK OF "SCIENTIFIC" INVESTIGATION

The Federal Aviation Administration has a number of employees who do scientific research with regard to aircraft, aviation, and related electronic equipment. The FAA does not have the resources or the Congressional mandate to investigate sightings of unidentified flying objects.

We have not tried to determine what the crew of Japan Airlines flight 1628 saw based on scientific analysis of the stars, planets, magnetic fields, angle of view, etc. We have received letters from several persons suggesting that we ask the crew and others a variety of detailed questions from a scientific viewpoint. This we have not done and do not intend to do. We reviewed the data that was created by our systems, the interviews that were done by FAA to determine the status of the crew and the aircraft, and have provided that information to the public.

The FAA has completed its investigation of JAL flight 1628, and does not intend to pursue it any further."

# # #

RECORD OF INTERVIEW WITH JAL CAPTAIN

Richard Gordon, Manager, FSDO-63
Kenju Terauchi, Captain, JAL
Frank Fujii, Interpretor, JAL
Sayoko Mimoto, FAA Airways Facilities
Mr. Shinbashi, Station Manager

On January 2, 1987, Inspector Richard O. Gordon, FSDO-63, and Japanese Interpertor Sayoko Mimoto, FAA Airways Facilities, interviewed JAL Captain Kenju Terauchi at JAL Operations, Anchorage, Alaska. The interview was conducted for the purpose of gathering first-hand witness testimony with regard to a sighting on November 17, 1986, by Captain Terauchi and his crew of an unidentified flying object. The following text is a record of the interview:

R. Gordon Think what I'm going to . . .

Garbled

R. Gordon I have a, oh, a few questions here, and I'll be glad to let you read them and it's just some clarification because I didn't do it, but one of the people that work for me, I'm the office manager over here at the FSDO, the Flight Standards Office. And Jack Wright, one of my people came over and met with the Captain the first night . . .

K. Terauchi Oh yeah.

R. Gordon Jack Wright gave you his card . . .

K. Terauchi Yeah.

R. Gordon Well then that's what Jack wrote down here. Well when they came I was out of town, I was in Washington DC, but when I came back, then I asked a couple questions and then the Administrator is asking some questions and I said, well we don't know we didn't ask that, so they gave me that list of questions right there, and we'll just address them along the way and then talk about them.

K. Terauchi Okay.

R. Gordon And it's almost reiterating what we've been through already on this thing.

K. Terauchi Sometimes, sometimes.

F. Fujii Reiterating questions, but, was this the first experience, Captain?

K. Terauchi No, third time.

R. Gordon This is the third time that ah that you've seen, where, in the same area or . . .

K. Terauchi No, no, no . . . um, ah I saw, um, mothership. Taipai, Kushung, Formosa, south of Formosa.

R. Gordon Around, near Formosa.

K. Terauchi Yeah ah no

F. Fujii This Tiapai mainland China

R. Gordon Uh uh

K. Terauchi And Taipai, Kushung is here, so ah this cargo flight ah I took off ah 2 am midnight, after midnight, after takeoff. When we start climb we saw left-hand side big mothership, but ah . . . it was so wierd, I ignored it (did not look).

F. Fujii Cause he wasn't feeling well . . .

R. Gordon No I can understand that, but that was the first time?

K. Terauchi Big Ship - yes and the second time ah, the, in my home I saw a sky clear daytime; ah, we can, we saw bright lights, I guess maybe ah 10,000 feet so ah . . . the light continued for about ten minutes.

F. Fujii The light continued for about ten minutes, so ah disappeared suddenly.

K. Terauchi It's ah I guess this one.

R. Gordon Okay now this one you saw off mainland China what timeframe did that happen, when did that happen?

F. Fujii What-time was it?

K. Terauchi 2 am

R. Gordon When last month

Interruption

R. Gordon Okay, excuse me one moment, but ah . . . Okay Frank I was trying to figure out that first sighting last year or this year

K. Terauchi Five years ago

R. Gordon Oh five years ago, just trying to get the timeframe that we sighted these things ah, the next one was that we wanted to talk about . . .

F. Fujii Was it the first experience for the crew members?

R. Gordon First time for the other crew members, okay that's fine.

K. Terauchi I think it was the first time.

F. Fujii Who was the first person who saw it?

K. Terauchi It was me. I saw it in - inside.

F. Fujii What did you notice at first?

K. Terauchi During first time we saw light, I think a navigation light.

R. Gordon Ah ha, but you saw it visually first you didn't pick it up on radar or anything you just saw some light out there, okay and that really coinsides with the air traffic statement, you called and said do you have any traffic in my area

K. Terauchi Yeah, yeah before, before, about six minutes before I saw this one so ah . . .

R. Gordon You were watching him for about five or six minutes before you called . . .

K. Terauchi Before I contact Anchorage Center

R. Gordon Ah ah, okay

F. Fujii Okay fourth question, what did you see exactly shape, light, and all, the shape, lighting, etc. . . .

R. Gordon Well if you can just explain these to me cause it looks like you've done alot of drawing here so it's not necessary for you to redraw all this stuff

K. Terauchi This light was amber and whitish, but, when it came to here it was only amber . . . white light. Why don't I understand. (Japanese) right

F. Fujii First of all it's like amber and whitish color, came closely it seems like all the output exhaust position of the jets, all these Challenger

R. Gordon Look like something like after burners . . . okay okay, like each one of these was an individual exhaust

? Yes

R. Gordon Okay

K. Terauchi & F. Fujii So this light is special like (Japanese) when ah Challenger, yes like Challenger took off amount of flame going on, we can't see Challenger by this flame

R. Gordon Okay, yes

K. Terauchi But this one is nozzle direction (Japanese)(garbled) we couldn't see this light this direction we could see big flame

R. Gordon Maybe we're saying then if you're looking at the back of it and then when it turns sideways this doesn't show. Okay I understand.

F. Fujii From the forward you could see the flame and the exhaust and flame were surrounding it.

R. Gordon Okay

F. Fujii So maybe ah, I - I think ah, um exhaust started (garbled)

R. Gordon Being okay these things here, maybe being each one of these things here, so these were maybe stacked, in otherwards if you were looking at the top view down, you would just see one if you come around here you would see all of those lights. Okay yeah

K. Terauchi So if they moved up or I guess this ah exhaust moved to ah, this way down so finally five years ago I saw the rocket.

R. Gordon Maybe that would account for that bright light he saw five years ago. In otherwords if these turned down you couldn't see them and then when it looked like it moved over here some over here turned up and then you could see them where it looked like it moved over there? So you're saying . . .

K. Terauchi Anyway ah (Japanese) right (Japanese) . . . Talk to me . . . Could not see but only here and here . . . and this, here, dark area, I saw sparks, like fire. When using gasoline or carbon fuel. You can see a great big flame, but I could not see (flame) at all in this angle, although there was a big blast.

F. Fujii Seems like it's really high technology because you can't see anything over here unless it's spinning rotation.

R. Gordon Yeah, okay, yeah, somebody said sometimes the sparks kick over into that and you could see the exhaust, now with ah that in mind this other picture you have here, where would this be on this thing captain?

F. Fujii What you're asking him where this (garbled) . . .

K. Terauchi Quite different, this is just small space ship, this one size of carrier, two times carrier so mothership, so ah after they flew with us three ah five minutes like home mission, then move to a mothership. So then I found mothership light, but this is not llght, all engine, because ah we have contact seven or eight mile here, so we saw this first lights, so um after light contact ah they move behind so we saw this pairs of light, so we saw this light same size, this one, same size.

R. Gordon Same distance apart . . . Now do you think that was just the mothership and then these little things were . . .

K. Terauchi But, yes, that right

R. Gordon I mean they were moving along, at that time where were these lights, captain?

F. Fujii (Japanese) disappear

R. Gordon Okay, okay

K. Terauchi Then we find this light, so I think this one is light, but I think now this is engine, so ah, same type of engine, the same logic . . . the same type of engine. This one and this one, the same logic, this point and this point are the same just bigger in size. This is the small one so it looked like this, but the bigger one, I could not see but only here, small size, big size, same technology. Yeah

R. Gordon Oh, oh

F. Fujii The mothership seems like it, he said that, this, this, same technology, type of engine

R. Gordon Well they're alot, much larger.

K. Terauchi Yes, much larger . . .

R. Gordon So this right here would be ah, sitting . . .

S. Mimoto No, this light is sitting here

K. Terauchi Yeah, yeah, yeah, yeah, yeah, yeah, yeah . . .

R. Gordon . . . Only much larger (garbled)

K. Terauchi Yeah much larger, much power. But, this color is white uh . . . it's ah um dark white pole . . . weak light . . . (unintelligible)

R. Gordon Maybe because it's so much bigger.

K. Terauchi Yeah

R. Gordon Now this distance, now you were speaking of these were fairly close uh?

K. Terauchi Hum uh, ah distances is ah, ah, not this, this one ah, 500, ah between 500 and 1,000 feet.

R. Gordon Okay, out from you, and then it took off and went out here and maybe this is, ah, you said five to seven miles or something on the radar.

K. Terauchi A no, seven, seven or eight miles.

R. Gordon Okay seven or eight miles, that's what they were saying on the radar.

K. Terauchi Yeah, this later, so we saw about seven or eight miles . . .

R. Gordon Okay

K. Terauchi And, 60 degrees left . . .

R. Gordon Okay

K. Terauchi So out in here small ship is disappear.

R. Gordon Okay, I understand, now lets (unintelligible) what else, see if I forget anything, visual was a first, what, you showed me exactly what you saw. Visually sighting, you saw it first uh?

K. Terauchi First

R. Gordon Okay

F. Fujii And (unintelligible) probably how long had you contacted the target.

R. Gordon No that's what we were saying, five to six minutes before you called ATC.

K. Terauchi Yeah, yeah, yeah, yeah, yeah, yeah, that's right.

R. Gordon Okay, did the other crew have trouble sighting the object?

F. Fujii Did the rest of the crew see the lights?

K. Terauchi (More Japanese) So I tried to fix it, but I ah, failed.

Laughter

K. Terauchi Just, shutter was open, did not close, so . . .

F. Fujii Yes every crew has seen it.

R. Gordon Okay all the crew members they did see it. Okay. Laughter . . . Yeah that's what I would do (more laughter)

F. Fujii What type of onboard radar?

R. Gordon Yeah, what type of radar was onboard, that ah ?

K. Terauchi It was the kind, ditigal, but I don not know.

R. Gordon Digital color?

K. Terauchi Yes colored, digital . . .

R. Gordon Okay, fine, yeah, that's all we need! I don't need to know numbers. Ah did the target appear on the radar as unusual or, or solid target or intermitt . . .

F. Fujii Was it clear?

K. Terauchi Clearly, clearly . . .

R. Gordon Very clearly

K. Terauchi But, ah, ah, strong, ah return signal is strong in case of a storm, show ah red, and next yellow.

R. Gordon Okay

? The, but weak is green . . .

R. Gordon Right.

K. Terauchi So ah is green light.

R. Gordon It showed green . . .

K. Terauchi Green

R. Gordon Okay, yeah, that's, that's where even some of the stuff could get through it, like when you take a picture of a cloud on the radar . . .

K. Terauchi Oh yeah . . .

R. Gordon If it's green, but if it's got heavy rain in it or thunderstorm in it then it shows red . . .

K. Terauchi Yes, yes

R. Gordon So it's light green, maybe the waves can go through this thing. Okay so it showed green on the radar, on the color radar.

F. Fujii When did you pick it up, the radar?

K. Terauchi Time? Time?

F. Fujii Time, is it by time, when?

R. Gordon Oh after, how long after you saw it with your eyes did you pick it up on the radar?

K. Terauchi Okay ah, um seven minutes, five minute, makes it twelve minutes, so, ah, fifteen minutes after contact.

R. Gordon Fifteen minutes after you visually contacted it, okay, okay.

K. Terauchi Yeah, fifteen minutes . . . when ah . . .

R. Gordon See, it just says did you paint anything that's did you see anything else on the radar, weather or anything else . . .

K. Terauchi No, no, nothing.

R. Gordon Just that target . . .

K. Terauchi Yeah, yes, yes.

R. Gordon Okay, okay . . . The only thing we saw on the radar then was that target

F. Fujii How about the aircraft, any turbulence?

K. Terauchi No, ah, no

R. Gordon No, no turbulence, no turbulence at all, okay. Autopilot stayed on all the time.

K. Terauchi Yeah . . .

R. Gordon Okay

K. Terauchi Working good

R. Gordon Good, (laughter)

F. Fujii Now how about communications, naviagion, or interferring of any sort . . .?

K. Terauchi This ah small aircraft near the here, so ah all the way VHF transmit on (unintelligible) with ah some we got a like some kind of . . . like ah, jamming.

R. Gordon Some kind of interference?

K. Terauchi Interference.

R. Gordon On the VHF?

K. Terauchi Yes then this one leave for mothership . . .

R. Gordon Ah ha

K. Terauchi Back to normal(?)

R. Gordon Okay, did you say it's like German talking uh?

K. Terauchi Yeah, yeah, yeah.

R. Gordon Okay

S. Mimoto Was it's sound like speaking in German, or just jamming noise?

K. Terauchi It was just noise, sounded zaa, zaa

R. Gordon Oh just noise . . . Okay, okay I misunderstood you, I'm glad you brought that out.

K. Terauchi Normally when you can hear clearly it is digital 5. 5, 4, 3, 2, 1 - but it was about 2.

F. Fujii You know five by five radio communication

R. Gordon Oh yeah uh hu, okay sure

F. Fujii It was like two . . .

R. Gordon Okay okay, like two

K. Terauchi Sometimes missing, sometimes missing.

R. Gordon Like, almost like, ah, background noise?

K. Terauchi Yes, yes.

R. Gordon Okay, and then when it, when the little small lights departed the noise went away, then back to real clear communications?

K. Terauchi Yes, that's right.

R. Gordon Okay, fine, ah, lets see, I'm going to come back to thirteen, because ah . . .

F. Fujii Okay

R. Gordon What was there any question?

F. Fujii Did you see any reflection on the glass (window)?

R. Gordon Inside the cockpit, was it dark, all the light off inside the cockpit?

K. Terauchi Oh ah, dark yeah, yeah, yeah.

K. Terauchi Therefore, there was not reflection of inside. No reflection from inside. So when I took the camera bag, finding the object, all the lights were turned off, made room dark - cargo room and passenger room, there was nothing to reflect.

F. Fujii We have ah, on a cargo plane we have a back lounge.

R. Gordon Yeah, I'm familiar with it, yeah I've been on there.

F. Fujii So he turned the light off on that, because they were trying to take a photo.

R. Gordon Okay, okay

F. Fujii So the (unintelligible) was dark.

R. Gordon Okay, that's good, I just wanted to make sure that everything in the cockpit you know, you see something and then you turn the light cause, me being a pilot, normally when I see something out there I'll turn the lights off and get everything dark inside.

K. Terauchi Yes that's right.

F. Fujii When you changed you aircraft position, did they make any special moves?

K. Terauchi No, they didn't. See here, I began to circle 360 degrees, they stayed at the same position with us.

F. Fujii Uh uh, same position

K. Terauchi Same position, same position, same position all the way (unintelligible)

R. Gordon Okay following you right around uh?

K. Terauchi Yes

R. Gordon And it was here, and then here, and here, and here, and then you rolled out and it was right there, okay.

K. Terauchi So ah, ah, I tried next, ah, descent, 3, 5, 0, 3, 1, 0.

R. Gordon Ah ah, okay, 3, 1, 0, when you descended to 3, 1, 0, still there uh?

K. Terauchi Yeah, same formation, uh formation descent . . . formation descent. It was impressive, the same formation, smooth!

R. Gordon Okay

K. Terauchi We, we used autopilot when descending, so (unintelligible).

R. Gordon Okay, yeah, yeah went right down with him, okay uh . . .

F. Fujii Can we go to the next one?

R. Gordon Sure, yeah, I was just was ah . . .

F. Fujii Size, estimate, ah, size

K. Terauchi (More Japanese) Two times, or ah, I guess ah . . .

F. Fujii (unintelligible) seven four seven

R. Gordon Okay

K. Terauchi So ah, size is ah, carrier . . .

R. Gordon Ah uh, in other words this being the jumbo jet was about as big as just the light . . .?

K. Terauchi See this is the jumbo jet. 1.5, two times this light.

R. Gordon Okay, okay, I have . . . so the side light on this thing was about, the jumbo is about two to two-and-a-half time the size of this light, so when you stack 'em up, you . . .

K. Terauchi Yeah, yeah, yeah . . .

R. Gordon . . . were saying about two times as big as an aircraft carrier.

K. Terauchi Yeah, yeah, yeah.

R. Gordon Okay

K. Terauchi It felt like this big - (he made a circle by using his fingers); seven to eight miles away and it was this big. Normally, an air carrier is seven - eight miles away, it looks like this.

F. Fujii Seven or eight miles away, usually the aircrafts are like this . . .

R. Gordon Ah uh, okay

F. Fujii About this big so . . .

R. Gordon Okay

F. Fujii . . . with his estimate.

R. Gordon So he's kinda comparing it to another jumbo jet?

F. Fujii Yeah, yeah . . .

R. Gordon Okay

S. Mimoto (More Japanese) Tremendous

R. Gordon Oh yeah (laughter), boy, okay

F. Fujii Go for this size here, this one.

R. Gordon Yeah, let's see what would you estimate the size of the small ships to be?

K. Terauchi Ah . . . (unintelligible), up here equal to (unintelligible) we saw, ah, second (unintelligible), square, but I saw this on here, ah here, for so I guess this one is maybe separate, separate, then move to here. So ah, ah, (Japanese).

R. Gordon Right, yeah, ah uh.

S. Mimoto if this one was two stacked together, how large was one?

K. Terauchi This here ah fuselage, fuselage of DC-8, DC-8 fuselage.

R. Gordon DC-8, okay . . . yeah ah uh, in other words this part right here would be like fuselage of a DC-8.

K. Terauchi Oh yes . . .

R. Gordon Like this . . .

K. Terauchi Yeah, yeah, yeah . . .

R. Gordon Okay

K. Terauchi Maybe, maybe about like this

R. Gordon Uh ah, yeah I understand, okay, I got it. That's good.

F. Fujii Any other lighted or unlight objects, any other lights?

K. Terauchi Yeah, we saw ah, some unusual light from ah, top of mothership.

R. Gordon Uh ah

K. Terauchi Ah, it was not regular, but - not regularly, but white - silverish lights, not in equal span of time, but occasionally flashed, irregularly lighted at all times.

S. Mimoto Occasional flash

K. Terauchi Flash, flash

R. Gordon And since I've got this on tape, if you will help me later, you know when we write this down, because I can't remember all this stuff. Thank you.

K. Terauchi (Japanese) First time we cannot see ah, this (unintelligible) so ah, ah, we saw this light, this light, and . . .

R. Gordon Ah uh, okay, thank you very much.

F. Fujii (Japanese) No ah magnetic

K. Terauchi No ah no . . .

R. Gordon No gages, or the instruments or the RMI on everything stayed okay, no magnetic disturbances? Okay. Ah, did the intensity of the objects lights change? I think he just explained that didn't he on that ah . . .

S. Mimoto (unintelligible) you mean intensity of light?

R. Gordon No on this object here, did the, did the intensity of these lights change, and I think he just explained that, ah . . .

F. Fujii You mean by distance, right?

R. Gordon No the intensity, the brightness of the, ah . . .

S. Mimoto (unintelligible)

F. Fujii Did the intensity of lights change?

K. Terauchi No, it did not change.

R. Gordon They didn't change, huh?

K. Terauchi Steady, steady.

R. Gordon Okay, the intensity was steady?

K. Terauchi Yes

K. Terauchi Visibility ah, more clear, all the way clear, clear sky.

R. Gordon Okay . . .

K. Terauchi Clear sky

R. Gordon How about visibilty? What would you estimate, you know when you're coming down from up there where we enter over Alaska where you come off the sea and hit Alaska, you come up a ways and then you can see Fairbanks out here, no problems seeing Fairbanks?

K. Terauchi When flying over Fort Yukon . . .

R. Gordon Fort Yukon, yeah.

K. Terauchi We can see ah Fairbanks and Eilsen Air Base.

R. Gordon Okay, yes, good, that's real clear, that's that's fine.

Shinbashi It was near full moon wasn't it?

K. Terauchi But we came this way. Full moon (unintelligible) Greenland, after we, we cross ah Greenland we saw moon right side (unintelligible) . . . but moon move to ah behind us so when crossing the Canadian, Canadian, ah, FLR (unintelligible) so maybe ah moon, ah stay near the horizon, so we couldn't use the moon light.

R. Gordon Ah uh, I understand.

K. Terauchi (Japanese)

R. Gordon So the moon was very low?

K. Terauchi Very low, very low, okay.

R. Gordon That's good, I appreciate you bringing that up, I didn't think about the moon, but that's good.

K. Terauchi Full moon, full moon, was very low, full moon.

R. Gordon Well that's good, I'm glad you folks did that, uh . . .

K. Terauchi So ah,

R. Gordon There's one last question . . .

? Yes

R. Gordon This, and it's just threw it in here, is there anything else that I didn't ask you that you could help us sort this thing out?

K. Terauchi Ah, yes, they

R. Gordon Frank, see how that tapes doing. We still got plenty?

F. Fujii Yes, ah uh.

R. Gordon That's good, because the mike is right there that's super.

K. Terauchi See it is recoil blasting, just a little bit high here, it is blasting jets, then if it was at the same altitude as we were, I assume they are using an atomic energy, there will be some radiation left on our aircraft. Also the other is, that air turbulance be created. So they did not want to leave any evidence of their existance. Also the reason, why they were there (position) is that they wanted to leave no evidence. See it is round, the air current goes this way (he is drawing a picture), see if they were at the same altitude, they would create air turbulance, but they never positioned when the air turbulance would disturb us.

R. Gordon Those are the small one now?

K. Terauchi Yeah. . .

R. Gordon The little one huh?

K. Terauchi (Japanese) . . .

F. Fujii That flight level right there does not leave any evidence, also if it on the same level, it would give this aircraft a little turbulence cause of this air.

R. Gordon You got no turbulence?

K. Terauchi No turbulence.

R. Gordon So it's just suspended there, really.

K. Terauchi (Japanese) Right

F. Fujii (unintelligible) leave the evidence . . .

R. Gordon Yeah, well that's what I'm saying, it's so moving, it's either so areodynamic that it's not causing, so you're saying when he was right in front of you there was not turbulence and if you had been that close to another object that large you should have got some buffetting?

K. Terauchi Yeah

R. Gordon Okay, I understand

K. Terauchi The turbulance would assure their existance, therefore, they positioned themselves to here from the beginning.

R. Gordon Yes

K. Terauchi Certainly, ah approaching Fort Yukon, west side, this side east side, so ah (unintelligible)(Japanese) big mothership (Japanese), horizon, sunset, we caught up the sunset, two - three millimeters strip of it. Then there was the mothership. They never came to this side. Because of the sunset (if they came to the other side) they would be seen, their shape by us. They positioned themselves at the darkest side, difficult place for us to see. But see, our aircraft was in front of the sunset and visible for any movement we make. They took the trouble to position themselves to be in the darkest place. I think they did not want to be seen.

F. Fujii He thinks that they don't want, of course they don't want the ship to see it, so they go to the place where it's dark . . .

R. Gordon Yeah

F. Fujii . . . and because there's a sunset over here, and about one

K. Terauchi (Japanese) 0.1 ah, inch

F. Fujii About 0.1 . . .

R. Gordon Just right on the horizon, the sun was setting?

F. Fujii Yeah, yes. So they don't want to go toward the ship side, they stayed away from it.

R. Gordon Toward the dark side.

F. Fujii Yes

R. Gordon So that would have put them to the east like on the Canadian side you're coming down on your side (unintelligible) captain's side?

K. Terauchi Yes

R. Gordon Okay I understand.

K. Terauchi I think, perhaps, they have regulations like they must not be seen by humans. But it was a surprise to see the sudden appearance in front of us. If the machine was set automatically for the distance of eight miles away from us, the machine will not come closer than eight miles (but they jumped in front of us), so I felt there was a living creature in it. It jumped in front of us, very unusual. They took such unexpected action. Try the other one(?)

F. Fujii Seems like they're trying to stay away, I guess there's some kind of regulation for them to not be seen by . . .

R. Gordon Ah uh, I understand. I have one more question that came up that I was thinking; now when he departed, departed east? Is that what someone told me; which direction did, when he departed, went away?

F. Fujii Which direction did it take off to?

K. Terauchi I don't know. Probably to the east.

F. Fujii He thinks it's east, he's not really sure. He was looking at it and it just dissappeared, so . . .

R. Gordon Okay, appeared that it went east, but it went so fast?

K. Terauchi So fast.

R. Gordon Okay

F. Fujii He was watching it and it just disappeared . . .

R. Gordon Okay, fine. Well I can't think of anything else I need to ask you, ah, I really appreciate you taking time to talk to us, because it's very, very interesting and we need to see if we can figure out what is there, you know.

K. Terauchi So ah, one things, they ah, completely they're controled of inertial and gravity. Yeah, so their technology was unthinkable. Unimaginable high technology.

F. Fujii High tech.

R. Gordon Oh yeah, it just sounds like it. All I can say is let's hope they're on our side . . . (laughter)

Shinbashi This kind of information (unintelligible) before?

R. Gordon No I can't, I haven't so that's why we're trying to get as much information as we have; we're going to send it back to Washington DC, and have them try to marry it up with anything like this before and then maybe we can say, oh, it happened here, or it happened here . . .

K. Terauchi Oh yeah

R. Gordon . . . other sightings, we have a lot of stuff where pilots have had other sightings.

K. Terauchi Oh yes

R. Gordon So we don't know if these lights and all these pictures you drew; maybe they'll be the same and it happened in Arizona or New York or wherever, so we got a place in Washington DC, we'll put them all together and say is any two of them alike. But, but as we go through this thing I would be glad to keep you folks informed and, of what we find out, or if we find out anything, but I'll be glad to tell you and see how we're doing. Could I get those drawings, if you don't mind ah? I think that's all we need.

K. Terauchi (unintelligible)

R. Gordon Yes, yes, you could probably explain that with the thing you have drawn here. Now these are the same drawings?

K. Terauchi Oh no, no, no

R. Gordon Yeah

K. Terauchi This one, this one, are the same.

R. Gordon Same

K. Terauchi So I like (unintelligible) .

R. Gordon I get a copy of that Frank? Could we take a picture of that, I would certainly appreciate it. Yes. Alright. I think that's all, can you think of anything we need.

K. Terauchi (unintelligible)

R. Gordon Yes, please if I could have one. Oh one thing, this track

K. Terauchi Oh yeah. This one is ah (unintelligible) so after this one is ah (unintelligible) this point ah . . .

R. Gordon Okay, right about the . . .

K. Terauchi This point, so we contact Anchorage Center here, so ah two or three minutes, proceed right direct to Talkeetna, so we flew this distance . . .

R. Gordon Okay from that point direct to Talkeetna and ah, and then some so you went about there you saw this thing.

K. Terauchi Yes, yes, I saw from here . . . so ah . . .

R. Gordon Okay, and then maybe five minutes later along here saying Anchorage do you have anything out there?

K. Terauchi Oh yeah, yeah, yeah

R. Gordon Okay I have it. To just about Talkeetna?

K. Terauchi No no, disappear 75 miles north of Talkeetna . . .

R. Gordon Okay 75 miles north of Talkeetna . . .

K. Terauchi Yeah, yeah

R. Gordon . . . it went away.

S. Mimoto The small one, not the mothership, were there many light?

K. Terauchi Oh yes, there were numerous lights. The exhausts on the engine were lined up all the way, but when they were blasting recoil jets were so strong I could not see it because it was so bright. Once the recoil blast stopped, the speed was absolutely steady, not faster or slower, and I could see them very clearly.

S. Mimoto Just one group?

K. Terauchi See there were two, appeared in front of us. Right here and right here . . . both exactly the same.

S. Mimoto Only two?

K. Terauchi All I saw was two.

R. Gordon Yeah, I got that out of that other one that there was two and then it went back to the mothership.

K. Terauchi Yeah

S. Mimoto I thought maybe there was more then two.

R. Gordon Oh I see, I'm glad you asked that. There were only two?

S. Mimoto Only two.

R. Gordon But one was larger then the other like there was two of 'em were stuck together, right?

S. Mimoto Then both are the same size, possible got (stuck) together later?

K. Terauchi Yes, possibly. The one I saw first, it was this long. See if they were stacked together at the beginning, one must have returned to the mothership soon after the separtation.

S. Mimoto This (unintelligible)

R. Gordon Oh you saw that, and then they separated like they were together and then they came apart.

K. Terauchi (Japanese)

R. Gordon Ah uh, okay. Same thing, and make sure that I'm right here, that ah, ah airplane, first sighting, and say this is over here, then it would have . . .

S. Mimoto (unintelligible)

R. Gordon Okay, fine just so we know if someone asks us that question we can answer. Very good. Well I have a lot better understanding of what transpired then what we got out of a bunch of people when we talked, and I want to thank you folks for your time. I really appreciate it.

Richard D. Gordon
MGR AL-FSDO-63

Sayoko Mimoto

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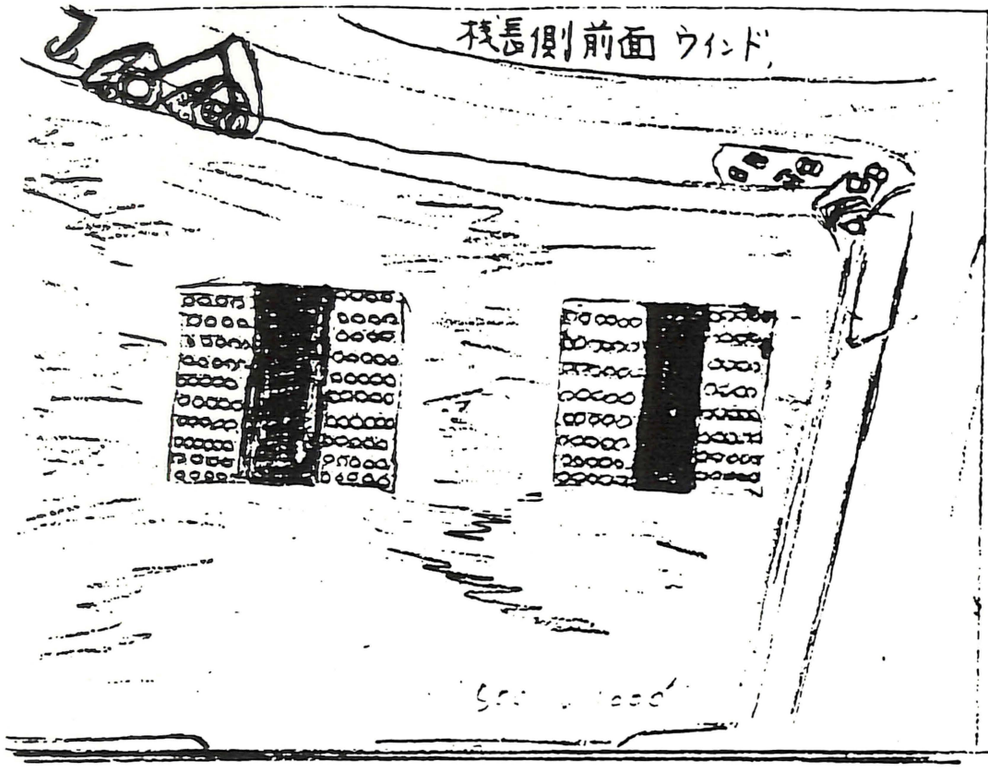
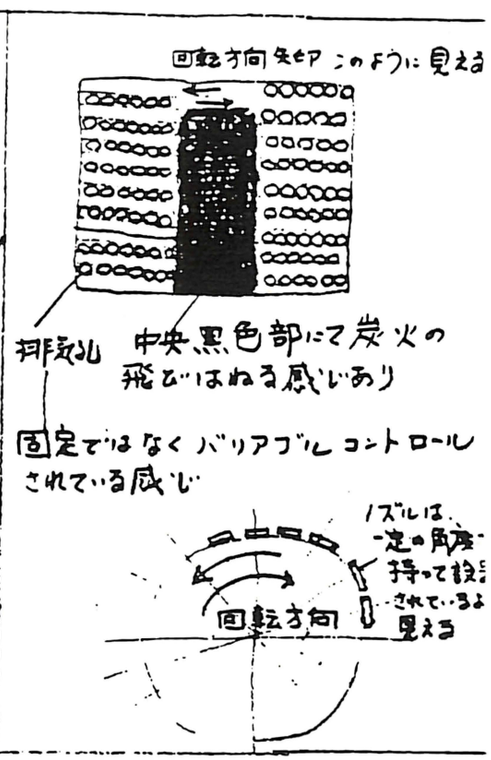
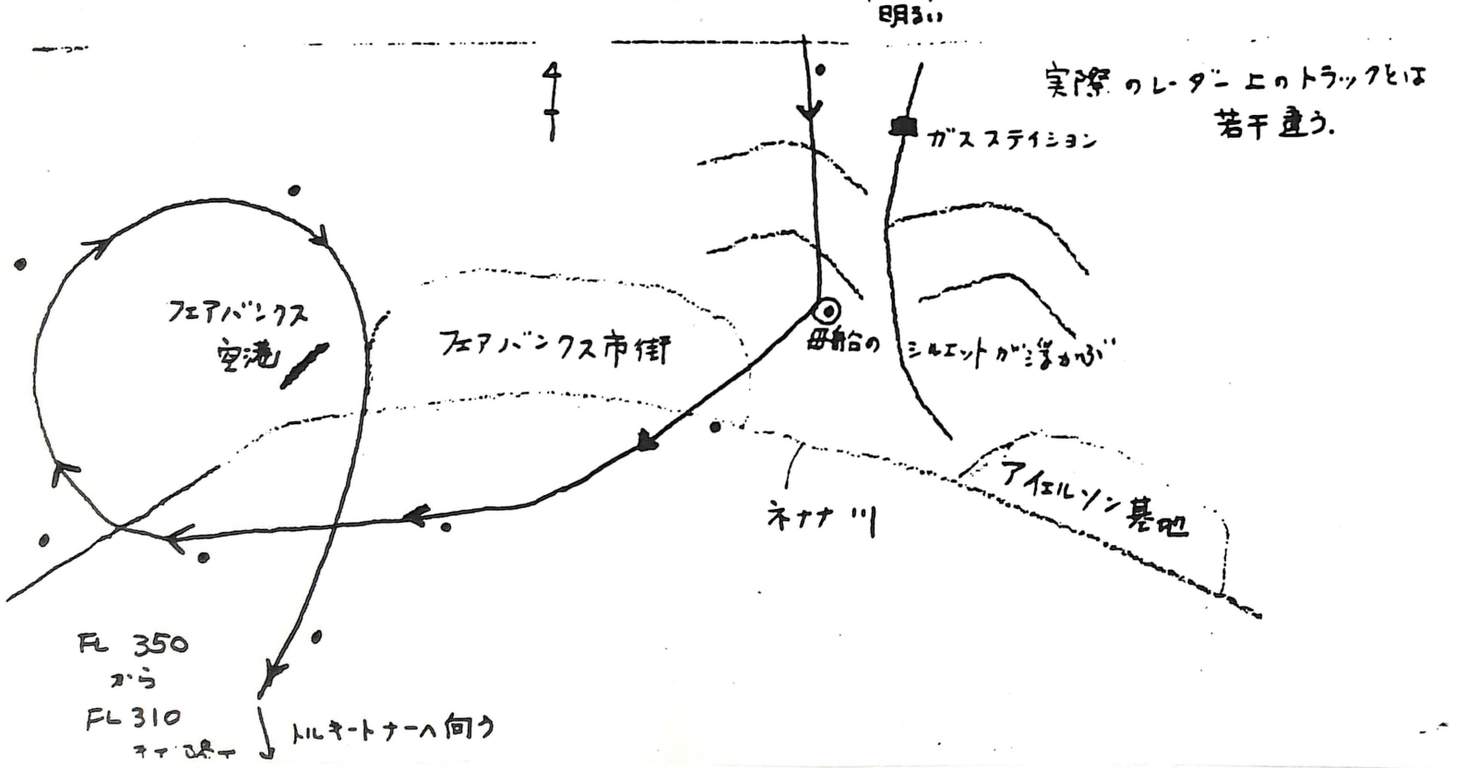




光について. 噴射方向の光は見えるが, ノズルが横を向くと全々見えなくなる
ジェットエンジンのアフターバーナ使用中は 明るく, まわりがぼんやり
見えるようになるが, 全く本体は光によっては浮かび上がらなかった.
正面を向いている 排気孔は, 常時 アンバー色の光(明るい) をはなっていた.



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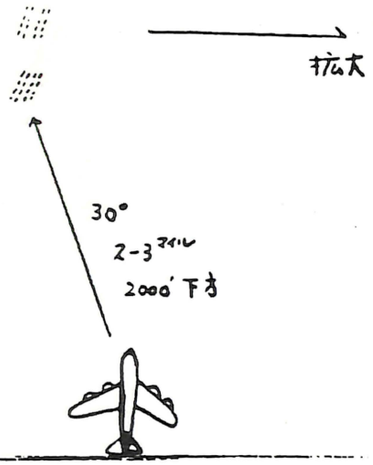
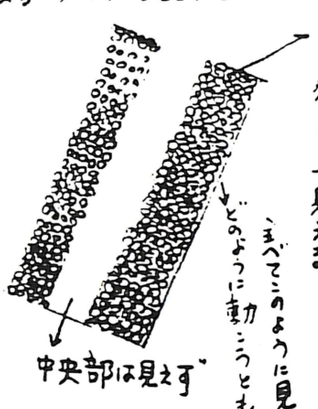
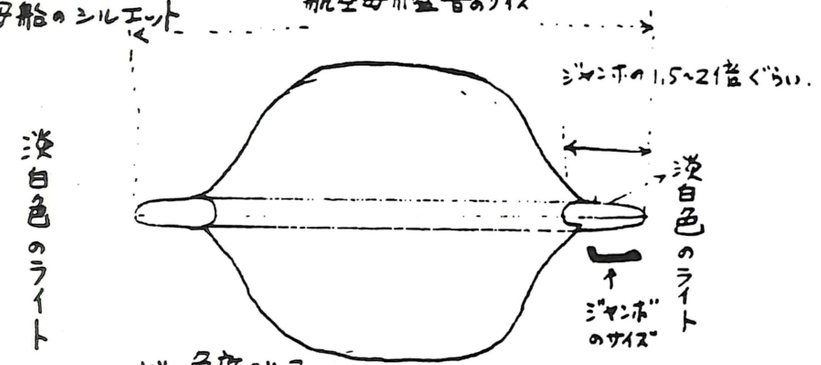
最初に灯火を発見



ヘアークリップのような
長方形のスタイルをしている

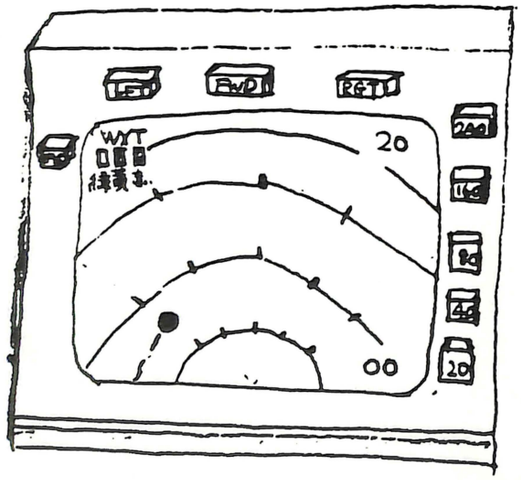


沖の灯火により浮び上った
母船のシルエット



どの角度より見ても我々に見える ライトの
間隔は同じであった. どの角度からも
左右のライトは見えた.

デジタル WX レーダーで補足した時の図



レンジ 20 マイル
テルト 0°

7~8 マイルに
ターゲット
緑色の円

PILOTS

TRANSLATED BY
S. MIMOTO
OF FAA AK REGION

Meeting the Future by Kenju Terauchi

Page 1.

Once upon a time if a hunter saw a t.v., how did he describe it to other people? My experience was similar to this. The north of Alaska in mid-November you cannot even see the sun; the darkness continues until the middle of March. Flight JL 1628, B747 jumbo cargo encountered two spaceships and a Mother ship about 50 minutes above Alaska. There was no danger but it created many questions that a human being cannot answer.

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So I am writing that experience down here. In mid-October, I was excited to hear the special flight. This special flight was to import special French wine from Iceland to Anchorage for approximately a 6 hour and 20 minute flight. It is an extremely short flight compared to most flights. It takes about two-thirds normal flight hours. There are only two landings at Kefurabik (sp.?) International Airport.

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This particular flight was planned to stop at Iceland and increase cargo items rather than flying direct from Paris to Anchorage. However, since being wintertime if the condition of the runway was poor, we may have to reduce the cargo, therefore, everyone was paying special attention to the amount of cargo. The temperature of Kefurabik Airport in November is approximately maximum of 3 degrees C. and the lowest was minus 3 degree C.

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Six of us Japan Airline employees arrived at Kefurabik Airport at midnight and three people welcomed us as usual. We headed on to a new hotel. The bed was extremely small. I understood why the down blanket was only 135 centimeters. We stayed only about 17 hours. The weather became good and the runway was not frozen and we left the Kefurabik at 2042.

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Co-employees are married, have children and are young. I am pleased that nothing happened. The ending of this encounter was very well. We worried because we do not know the purpose of the spaceship, but there is no immediate danger. What do you think about our experience? I hope we humans will meet them in the near future and confirm my experience.

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We took a flight course Southeast of Greenland direct to Chule(sp?) where a U.S. military base is by crossing the great icy highland midwest of Greenland.

The flight above Greenland, under a nearly full moon which was raising on the right front side of our aircraft helped visibility for the night flight. The flight was smooth despite the unstable air current that shook the plane for about two hours, but was still a rather stressless flight as compared to a passenger flight.

We aimed towards Single Point, on the north coast of Canada, by passing through the Canadian north polar regions and down southwest along an Arctic flight course. It was 4:25 p.m. Alaska time when we reported our location to Edmonton Center from above Single Point, Canada (68 degrees 55 minutes the North Latitude, 137 degrees 15 minutes West Longitude). It had become pitch-dark perhaps because the moon was directly behind us near the horizon. We received an order from Edmonton Center that we should contact the

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Anchorage Center when we reach above Pottat(sp?) where Alaska Territorial Air begins. Pottat locates approximately 480 miles, approximately 890 kilometers, North-northeast of Anchorage, 67 degrees 56 minutes North Latitude, 141 degrees West Longitude.

We began the communication with the Anchorage Center about 5:05 p.m. The flight course we had acknowledged was Jet 529, direct to Ft. Yukon and Jet 125 via Nenana, Talkeetna, Chaiger (sp?), and to Anchorage. The Anchorage Center ordered us to fly direct to Talkeetna, provided us transponder codes and placed us on a radar scope at the same time. The strange phenomenon happened immediately after we began left rotation, following the order of taking the direct flight course.

There was an unidentifiable light ahead of the rotation. We set the course toward Talkeetna and began level flight. Then we saw lights that looked like aircraft lights, 30 degrees left front, 2,000 feet (600 meters) below us, moving exactly in the same direction and with the same speed as we were. We were at the altitude of 35,000 feet (10,600 meters), flying speed was 900 kilometer per hour to 910 kilometer per hour.

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We ignored the lights, thinking probably they were special missioned aircrafts or two fighters because we did not notice the lights while communication (with the Anchorage Center?) or on prior visual inspection. However, the position of the lights had not changed even after a few minutes and that called our attention. The First Officer, Tameto(?), called the Anchorage Center and asked to report to us if there were any aircraft other than ours in the area. The Anchorage Center told us that there were no other aircraft in the North area. We immediately reported back that we were seeing aircraft lights. They again reported that there was no military aircraft and the ground radar did not show any aircraft but us. They also asked us several times if there were clouds near our altitudes. We saw thin and spotty clouds near the mountain below us, no clouds in mid-to-upper air, and the air current was steady and conditions were quite pleasant. Perhaps the controllers were concerned that an increased use of improved lazer beams using clouds was creating moving images.

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We kept observing the lights below us in left front, thinking it was ridiculous to have lazer beam testing at the end of a tundra area. Then the two lights began to move in a manner different from ordinary aircraft maneuvers, like two bear cubs playing with each other. We continued the flight South along a straight course since the distance from the lights was far enough from us and their movement was not extreme and we felt no immediate danger. I thought perhaps it is one of those things called UFO and taking a photo might help to identify the object later. I asked to bring forward my camera bag that was placed in the rear of the cockpit and began to take a picture. The area in which the plane was flying was unchanged but the lights were still moving strangely. I had ASA 100 film in my camera, mainly to take scenery and had auto-focus on, aimed at the object but the lens kept adjusting and never could set a focus. I changed auto-focus to manual-focus and pressed the shutter but this time the shutter would not close. Then our aircraft started to vibrate and I gave up taking a photo. I placed my camera back in the camera bag and concentrated on observing the lights.

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It was about seven or so minutes since we began paying attention to the lights, most unexpectedly two spaceships stopped in front of our face, shooting off lights. The inside cockpit shined brightly and I felt warm in the face. Perhaps firing of jets was the result to kill inertia of their quick high speed maneuver, but the ships appeared as if they were stopped in one place in front of us. Then three to seven seconds later a fire like from jet engines stopped and became a small circle of lights as they began to fly in level flight at the same speed as we were, showing numerous numbers of exhaust pipes. However, the center area of the ship where below an engine might be was invisible. The middle of the body of the ship sparked an occasionally stream of lights, like a charcoal fire, from right to left and from left to right. Its shape was a square, flying 500 feet to 1000 feet in front of us, very slightly higher in altitude than us, its size was about the same size as the body of a DC-8 jet, and with numerous exhaust pipes. The firing of the exhaust jets varied, perhaps to maintain balance, some became stronger than others and some became weaker than others, but seemed controlled automatically.

We did not feel threatened or in danger because the spaceship

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moved so suddenly. We probably would have felt more in danger and would have been prepared to escape if the spaceships were shaking unsteadily or were unable to stop themselves. It is impossible for any man-made machine to make a sudden appearance in front of a jumbo jet that is flying 910 kilometers per hour and to move along in a formation paralleling our aircraft. The ships moved in formation for about three to five minutes, then two ships moved forward in a line, again slightly higher in altitude as we were, 40 degrees to our left. We did not report this action to the Anchorage Center. Honestly, we were simply breathtaken. The VHF communication, both in transmitting and receiving were extremely difficult for ten or fifteen minutes while the little ships came close to us and often interfered with communication from the Anchorage Center; however, communication conditions became just as good as soon as the ships left us. There were no abnormalities in the equipment or the aircraft. I have no idea why they came so close to us.

Then again, there was a pale white flat light on the direction where the ships flew away, moving in a line along with us, in the same direction and same speed and in the same altitude as we were.

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Again, we began communicating with the Anchorage Center. We said that we could see a light in the 10 o'clock position at the same altitude and wondered if they could see anything in their radar. The Anchorage Center replied that they see nothing in their radar. I thought it would be impossible to find anything on an aircraft radar if a large ground radar did not show anything but I judged the distance of the object visually and it was not very far. I set the digital weather radar distance in 20 miles, radar angle to horizon. There it was, on the screen, a large, green, and a round object had appeared in seven or eight miles (13 kilometers to 15 kilometers) away, where the direction of the object was. We reported to the Anchorage Center that our aircraft radar caught the object within seven or eight miles in 10 o'clock position. We asked if they could catch it on the ground radar but did not seem they could at all. Normally it appears in red when an aircraft radar catches another aircraft. I wonder if the metal used in the spaceship is different from ours. While we were communicating with the Anchorage Center, the two pale white lights gradually moved to the left side and to left diagonally back 30 degrees as if they understood our conversation and then when they were beside our aircraft they totally disappeared from our radar.

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When they were in front of us, the ships were positioned slightly higher in altitude than we were, but now they placed themselves slightly below the horizon where it was most difficult for us to see. The distance between us was still about seven miles to eight miles visually. When we started to see Ft. Yukon diagonally below us at the right, the sun was setting down in the Southwest, painting the sky in a slightly red stripe, approximately two to three millimeters and gave a bit of light but the east side was still pitch dark. Far in front of us there were lights increasing from the U.S. Military Eielson Air Force Base and Fairbanks. The lights were still following us at exactly the same distance; however, it was too dark to identify by only the lights whether or not they were the same two spaceships that appeared in front of us a few minutes ago. It seemed that we were flying in the lighter side and gave them the advantage of being on the dark side. We had no fears so far but began to worry since we had no idea for their purpose. When the lights from the Eielson Air Force Base and Fairbanks became clear and bright, two very bright lights appeared suddenly from the North from a belt of lights, perhaps four or five mountains away.

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The extremely bright lights reflected on snow on the side of the mountains and seemed even brighter. We wondered if they were searching something on the ground surface or to (attract?)lead something. The flight above Alaska territory is generally in the daytime and it is confusing to identify the kind of lights. It cannot be a base for the spaceship. Is it a movie? There was something. Oh, yes, it is the Alaska pipeline. The lights must be a pump station for the pipeline. I got it.

We arrived at the sky above the Eielson Air Force Base and Fairbanks. It was a clear night. The lights were extremely bright to eyes that were used to the dark. How bright it was! We were just above the bright city lights and we checked the pale white light behind us. Alas! there was a silhouette of a gigantic spaceship. We must run away quickly! "Anchorage Center. This is JL 1628, requesting a change of course to right 45 degrees" It felt like a long time before we received permission. When we checked our rear there was still the ship following us: "This is JL 1628. Again requesting for change the course 45 degrees to the right." We had to get away from that object. "JL 1628. This is the Anchorage Center. We advise you, continue and take 360 degree turn." "JL 1628, thank you. we will continue 360 degree turn."

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I knew that in the past there was a U.S. military fighter called the mustang that had flown up high for a confirmation and a tragedy had happened to it. Even the F-15 with the newest technology had no guarantee of safety against the creature with an unknown degree of scientific technology. We flew toward Talkeetna at an altitude of 3,100 feet. The spaceship was still following us, not leaving us at all.

About the same time a United Airline passenger aircraft which left Anchorage to Fairbanks flew into the same air zone and began communicating with the Anchorage Center. We heard them transmitting that there was an object near JL 1628 and requesting for confirmation. We heard that the Anchorage Center was saying to the United Airline aircraft that JL 1628 was at an altitude of 3,100 feet, therefore, United Airline should maintain an altitude of 3,300 feet. It sounded as if Anchorage Center had the United Airline aircraft fly above the spaceship. We were flying the East side of Mt. McKinley. The United Airline aircraft came close to us. The United Airline aircraft requested us to flash landing lights for visual confirmation and we both confirmed our positions visually. The United Airline aircraft was coming close to us. We knew that they were watching us. When the United plane came by our side, the spaceship disappeared suddenly and there was nothing but the light of moon.

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The strange encounter ended at 75 miles North of Talkeetna, 150 miles (Approximately 276 kilometers) away from Anchorage. It comprised approximately 50 minutes of flight time. (line 5)

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RECORD OF INTERVIEW WITH JAL FIRST OFFICER

On January 5, 1987, Inspector Peter E. Beckner, AAL-207, and Japanese Interpertor Sayoko Mimoto, FAA Airways Facilities, interviewed JAL First Officer Takanori Tamefuji at the Federal Building, Anchorage, Alaska. The interview was conducted for the purpose of gathering first-hand witness testimony with regard to a sighting on November 17, 1986, by First Officer Tamefuji of an unidentified flying object. The following is a record of the interview:

P. Beckner — Conducted at this time in the Flight Standards Division Office, this is Pete Beckner with AAL-207, and we're here with First Officer, Mr. Tamefuji.

? — (unintelligible)

P. Beckner — Did I say that correctly?

T. Tamefuji — Tam - a - fuji.

P. Beckner — Okay, thank you, and Sayoko Mimoto from A A - ah, Airways Facilities in AL-400. To begin the questioning, I'd like to first of all ask you, um, is this the first time anything of this nature is, have you seen this sort of thing?

T. Tamefuji — This, this is, is my first time.

P. Beckner — First time, okay. What, if you will, if you could describe for me, what exactly did you see? And I'll provide the paper for you so, here, just kind of let me know, if you would, just describe what you saw. Was there more than just one thing that you saw? And ah, if you would just kinda put it down for ah, for me on paper if that's okay.

T. Tamefuji — First off . . . Captain Terauchi, what ah, Captain Terauchi saw was ah, I couldn't see.

P. Beckner — Okay

T. Tamefuji — And ah, first part of the incident . . .

P. Beckner — Incident?

T. Tamefuji — Yeah.

P. Beckner — That's fine.

T. Tamefuji — Ahhh . . . about ten minutes I could see, but after that time, hummmm . . . I couldn't see because of my seat is co-pilot right-hand side . . .

P. Beckner — Right.

T. Tamefuji . . . and ah, the object was in left-hand side . . .

P. Beckner Okay.

T. Tamefuji . . . and very dark vision, so . . .

P. Beckner Okay.

T. Tamefuji . . . so I couldn't see, but ah at first ah, humm, (unintelligible) what can I write . . .

P. Beckner Just kinda picture in your mind what you saw . . .

T. Tamefuji Humm. . .

P. Beckner . . . and then put that on paper, and I'm going to shut the door here.

T. Tamefuji Humm, it was ah, left right clock head-on traffic . . .

P.Beckner Okay.

T. Tamefuji I just to see and ah, humm, left right?

P. Beckner Yes

T. Tamefuji Ah, in night flight head-on traffic we can see just ah, light . . .

P. Beckner Lights, okay.

T. Tamefuji . . . we cannot see the total shape . . .

P. Beckner Shape

T. Tamefuji . . . shape

P. Beckner Okay

T. Tamefuji . . . so (unintelligible) I thought it was ah, head-on traffic . . .

P. Beckner Okay

T. Tamefuji Mmmm, so I couldn't, can't write ah, exactly . . .

P. Beckner Would you say it was just . . . ?

T. Tamefuji Just light . . .

P. Beckner Okay it was more than, s--was there more than like what would you say there was six lights . . .?

T. Tamefuji No! No!

P. Beckner . . . would you say there was a multitude of lights?

T. Tamefuji Ah, (unintelligible) just I want to describe just ah, light, only light. . .

P. Beckner Okay

T. Tamefuji Yeah, so if ah, there was something flying, but ah, I couldn't see at that time.

P. Beckner Okay, ah was there, was there clear night?

T. Tamefuji Yes . . .

P. Beckner Okay

T. Tamefuji . . . clear.

P. Beckner And you could distinguish this lights as being different from the star . . .?

T. Tamefuji NNNooo . . .

P. Beckner . . . from the stars?

T. Tamefuji Different is fine.

P. Beckner Okay (unintelligible) Alright ah um. How was it first detected? Was it - someone saw it visually, or did you see it on radar? Who, well, how was it first found?

T. Tamefuji What's found, humm?

P. Beckner Er, first sighted?

T.Tamefuji Ah, as you know, all the crew ah . . .

P. Beckner Right

T. Tamefuji . . . must watch outside?

P. Beckner Right

T. Tamefuji So ah, I must watch instrument and ah, outside so, and ah, as normal flight so I have traffic inside, also Captain traffic, inside, but ah, I'm not sure but a engineer landing calculate so he was just sit down back desk calculate . . .

P. Beckner (unintelligible)

T. Tamefuji departing direction

P. Beckner Right

T. Tamefuji . . . so maybe he couldn't see at that time, but the Captain and me (unintelligible) have ah, had traffic inside . . .

P. Beckner Visually saw . . .

T. Tamefuji Yes

P. Beckner Okay

T. Tamefuji (unintelligible) I saw there was two small aircraft.

P. Beckner Okay

T. Tamefuji And two small aircraft(unintelligible)

P. Beckner That's what you saw?

T. Tamefuji Yes

P. Beckner Okay

T. Tamefuji And ah, and ah, I ask Captain ah, we should ask ATC so ah, I Air Traffic . . .

P. Beckner Okay

T. Tamefuji . . . So as I thought, ah, very same similiar altitude and Captain said, ah, hum, I don't remember exactly but ah, ah, he said - ah, but a little bit high or same level, but I though little bit lower, you can know . . .

P. Beckner Right

T. Tamefuji . . . it is very difficult to (unintelligible) head-on traffic . . .

P. Beckner Right

T. Tamefuji . . . so ah . . .

P. Beckner It was actually at your twelve o'clock . . .

T. Tamefuji No

P. Beckner . . . then . . .

T. Tamefuji Slightly . . .

P. Beckner . . . or slightly . . .

T. Tamefuji . . . left-hand and ah, ten or eleven . . .

P. Beckner Ten or eleven?

T. Tamefuji Right

P. Beckner Okay

T. Tamefuji And I thought that it was low . . .

P. Beckner Okay

T. Tamefuji And, (unintelligible) I thought ah, traffic way, I image aircraft ah, lighting, navigation lights . . .

P. Beckner Right

T. Tamefuji . . . and landing lights . . .

P. Beckner Okay

T. Tamefuji (unintelligible) - light

P. Beckner Right

T. Tamefuji . . . but ah, it is my (unintelligible) for now I thought it was an aircraft so . . .

S. Mimoto I thought it was an aircraft.

P. Beckner Okay

S. Mimoto Ah . . .

P. Beckner Did you in your mind try to make it . . .

T. Tamefuji Yes

P. Beckner . . . look like an aircraft?

T. Tamefuji Yeah

P. Beckner I can do the same thing, . . .

T. Tamefuji Yes

P. Beckner . . . so ah . . . I understand.

T. Tamefuji And, but ah, very strange ah, I ah, it was too many lights . . .

P. Beckner Too many?

T. Tamefuji Yes

P. Beckner Okay

T. Tamefuji But so it was so luminous, I don't mean luminous ah, it was too much forever.

P. Beckner Right, okay. How 'bout the colors of the lights? Is that also . . .

T. Tamefuji Humm, might Captain, maybe for different thing and Mr. Fukuda, maybe different thing, but ah, ah I say it was the aircraft so I thought but actually I think . . .

P. Beckner Okay

T. Tamefuji . . . I think ah, salmon, just like Christmas assorted . . .

P. Beckner Okay, okay assorted.

T. Tamefuji . . . and ah, I remember, red or orange, hum, and a white landing light, just like landing light. And weak green, ah, blinking . . .

S. Mimoto Flashing . . .

P. Beckne Flashing . . .

S. Mimoto . . . blinking, blinking

P. Beckner Blinking

S. Mimoto (unintelligible) yes

P. Beckner Okay

T. Tamefuji How should I say - looks just like this, (hand-signs were made by Mr. Tamefuji) moving like in one . . .

S. Mimoto Oh, swinging

P. Beckner Swinging?

T. Tamefuji (Japanese)

P. Beckner Movement

T. Tamefuji Yes, and ah, ah if there was, there are ah, how should I say, very good formation flight . . .

P. Beckner Close formation flight?

T. Tamefuji Yes close.

P. Beckner Okay . . . Does - I - I did not meet the Captain so I don't know, but does he wear glasses?

T. Tamefuji Humm, no

P. Beckner No, do you wear glasses, sir?

T. Tamefuji Humm, . . .

P. Beckner For flying.

T. Tamefuji Oh, I use, but ah, at that time I don't wear, but ah, I how should I say . . . but I do use it . . .

S. Mimoto He usually wears glasses but at that time he was not wearing glasses . . .

T. Tamefuji No, I don not mean it. I normally do not wear glasses.

P. Beckner Okay

T. Tamefuji The licensing requires me to wear glasses.

S. Mimoto Oh, I'm sorry, he didn't mean that.

T. Tamefuji I need no glasses in daily life.

S. Mimoto Oh, in daily life he does not wear glasses.

P. Beckner Okay

T. Tamefuji But, ah, ah, result of the physical exam, I am required to - to wear glasses . . .

S. Mimoto Oh, okay . . .

P. Beckner (unintelligible)

S. Mimoto The physical requires him to wear glasses.

P. Beckner Okay, how 'bout - how 'bout the flight engineer, does he . . .

T. Tamefuji Hummm . . .

P. Beckner . . . do you remember if he wore . . .

T. Tamefuji I don't remember.

P. Beckner Okay

T. Tamefuji But ah, I have numerous visions . . .

S. Mimoto (unintelligible)

P. Beckner Okay

T. Tamefuji . . . and I use ah, humm . . . how should I say?

S. Mimoto I will not - I do not need to wear glasses in daily life.

P. Beckner Okay, okay. Now - the time of the incident, when - when you guys first saw the objects, ah what were the lighting conditions outside? Was it dark . . .

T. Tamefuji Hum

P. Beckner . . . or was it dusk? Or was the sun still up er, how would you describe . . .?

T. Tamefuji Just after sunset . . .

P. Beckner Just after sunset.

T. Tamefuji (unintelligible)

P. Beckner Right

T. Tamefuji . . . dark, dark red.

P. Beckner Dark red, okay.

T. Tamefuji But almost dark I must say night . . .

P. Beckner Okay, you could see the stars real clearly?

T. Tamefuji Yes, yes.

P. Beckner Okay. Okay, was the - what you saw - was it real obvious to you?

T. Tamefuji Yes

P. Beckner Okay. Ah, at what point did you see it on the radar?

T. Tamefuji Humm, what point mean?

P. Beckner What - you saw the lights, and then how much later before you saw something on the radar? On your - your radar in the aircraft, or did you see it on the radar?

T. Tamefuji I just don't understand.

S. Mimoto When did you see the object on the radar?

T. Tamefuji Oh, and, hum ah, I can't tell you exactly . . .

P. Beckner Well ah . . .

T. Tamefuji . . . but ah, at first we have in flight . . .

? Hum huh.

T. Tamefuji . . . at ATC, air traffic, and no traffic, so - we are suprised . . .

P. Beckner Yeah . . .

T. Tamefuji . . . and ah, Captain operates the radar . . .

P. Beckner Radar, okay yeah . . .

T. Tamefuji . . . and so Captain ah, try to search object by the radar . . .

P. Beckner Okay

T. Tamefuji . . . we fix - ah, give to ten minutes (unintelligible).

P. Beckner Okay, and then what did you see on the rad - were you able to see the radar from where you were sitting?

T. Tamefuji ?

P. Beckner Okay, what did you see on the radar as far as . . .

T. Tamefuji Humm, just like ah - ah, traffic, other traffic, but ah, I thought a little bit large . . .

P. Becker Um hum

T. Tamefuji . . . echos

P. Beckner Large echos, okay. Was it ah, what - I understand you have color radar in - in the . . .

T. Tamefuji Yes

P. Beckner . . . aircraft. What color was the . . .?

T. Tamefuji Humm I thought ah, green.

P. Beckner Green?

T. Tamefuji Yes

P. Beckner Okay. And about what range did - did you - did you guys . . .?

T. Tamefuji Humm, twenty miles . . .

P. Beckner Twenty?

T. Tamefuji . . . and ah, seven to eight miles to object.

P. Beckner Okay, from you, from you. Did it pretty much maintain that position for most of the flight?

T. Tamefuji Humm, ah . . .

P. Beckner Or did it move around a whole lot, or did it . . .

T. Tamefuji No, no (unintelligible) oblong?

P. Beckner Right

T. Tamefuji . . . so ah, hummm, don't - it didn't move just like this, just like this . . .

P. Beckner Okay

T. Tamefuji . . . just like a other traffic stay on, but ah, I can't say, it was moving or not moving.

P. Beckner Okay, it sort of seemed to stay in formation with you, would that be . . .

T. Tamefuji Hummmm . . .

P. Beckner . . . seven to eight mile formation?

T. Tamefuji Hummm, formation means same position?

P. Beckner Right - same general direction in this case.

T. Tamefuji Oh . . .

P. Beckner Seem to travel with you?

T. Tamefuji Humm, I saw ah, light, just like landing lights, so ah, I'm pilot it has landing light so, head-on traffic . . .

P. Beckner Right.

T. Tamefuji . . . at that time, but ah, I can - I cannot say which direction they move.

P. Beckner Okay, okay. This head-on traffic, how long did you see this total, the length of time that you saw it?

T. Tamefuji Humm, humm

P. Beckner Just you.

T. Tamefuji Humm, five minutes at first inside and ah, five minutess Captain and ATC call short conversation . . .

P. Beckner Conversation, right.

T. Tamefuji . . . (unintelligible) hummm, hummm I can't say (unintelligible) five minutes. . .

P. Beckner Okay

T. Tamefuji . . . hummm, and ah, I have ah, monitoring, monitor so inside and outside . . .

P. Beckner Okay, inside and an outside, yeah.

T. Tamefuji . . . ah, while doing those, it became unvisible.

S. Mimoto While looking outside and looking on the inside, and then so he couldn't see anymore.

P. Beckner Okay, so - you sa - you saw the head-on traffic - whatever we want to call that - for about five, five minutes, ten minutes, somewhere in there?

T. Tamefuji Humm, yes . . .

P. Beckner Okay

T. Tamefuji Yeah

P. Beckner Okay, ah, was there anything else that you saw aside from this - from this pattern here, was there, was there anything else that you saw?

T. Tamefuji Humm, you mean ah, other stars or what?

P. Beckner Other than, I mean as far as these obj - the objects were concerned, was there any other ah, features that you saw, was there any shape that you saw, or you just saw the head-on light?

T. Tamefuji Yes, and of course it ah, was clear so ground you could see . . .

P. Beckner Okay you saw . . .

T. Tamefuji . . . but ah, hummm, how should I say, but ah, the traffic, I mean the UFO . . .

P. Beckner Yes

T. Tamefugi . . . it's ah, so, I'm sure it was not on ground . . .

P. Beckner Okay

T. Tamefuji (unintelligible)

P. Beckner Yeah, could you see the horizon, the . . .

T. Tamefuji Yes

P. Beckner . . . mountains?

T. Tamefuji Yes, ah, perfect.

P. Beckner Right

T. Tamefuji This is ah, horizon . . .

P. Beckner Of the horizon?

T. Tamefuji . . . and I could see . . .

P. Beckner Okay

T. Tamefuji . . . the horizon.

P. Beckner Okay. So these were above the horizon line?

T. Tamefuji (unintelligible) I don't mean ah, (unintelligible)

P. Beckner Okay

T. Tamefuji Ah, we can see the flying over aircraft ah, near the horizon . . .

P. Beckner Okay

T. Tamefuji (unintelligible)

P. Beckner Right

T. Tamefuji . . . so . . .

P. Beckner You saw this . . .

T. Tamefuji . . . I cannot say it was ah, (unintelligible)

P. Beckner Okay, okay, um somewhere down, I guess by Fairbanks area, you guys, the Captain or yourself requested a 360?

T. Tamefuji Mmmm hum

P. Beckner Did you happen to see the object while in the 360?

T. Tamefuji Humm, the pilot was right-hand . . .

P. Beckner Right-hand turn, right?

T. Tamefuji Humm, so I watch, what . . .

P. Beckner Right

T. Tamefuji . . . so I couldn't find what Captain saw.

P. Beckner Okay, you were flying the aircraft then, is that correct?

T. Tamefuji Ah, yes

P. Beckner Okay

T. Tamefuji But ah, um, I saw (unintelligible) ah, Captain said ah, UFO big, quite big Captain said, and how should I say - so I tried doing this. . .

S. Mimoto I looked all over the place.

T. Tamefuji And the Captain was in the way(Japanese). . .

S. Mimoto Oh so Captain was in the way.

P. Beckner Well, okay he was in the way of you seeing?

T. Tamefuji Yes, and ah, some ah, pillar, window pillars . . .

P. Beckner Oh, pillars?

T. Tamefuji Yeah

P. Beckner Okay

T. Tamefuji . . . so ah, we, ah, I couldn't see well, but some hum, hum this - this is not exact picture, but ah, like similiar like aircraft is (unintelligible) . . .

P. Beckner Okay

T. Tamefuji I dark is background, but I - you cannot say it was UFO or not.

P. Beckner Okay, was it different then what you saw here?

T. Tamefuji Completely different.

P. Beckner Completely different, okay. But was it brighter, were these brighter, er . . .?

T. Tamefuji . . . brighter . . .

P. Beckner These are brighter?

T. Tamefuji Yes, ah . . .

P. Beckner The first sighting was brighter?

T. Tamefuji Yes

P. Beckner Okay, the head-ons were brighter?

T. Tamefuji Er, yes

P. Beckner Okay, um - was there anything else on the radar that you were able to see, or was that the only target that you had on the radar?

T. Tamefuji Oh yes, and ah, I think ah, Captain tilt . . .

P. Beckner Tilt right

T. Tamefuji . . . and ah, a certain tilt angle could catch the object . . .

P. Beckner Okay, so, so was there anything else showing on the radar . . .

T. Tamefuji Hummm . . .

P. Beckner (unintelligible)

T. Tamefuji . . . that should be something spot or ground-echo, ah, . . . ?

P. Beckner (unintelligible) . . . okay

T. Tamefuji . . . ah, I - I have many experience ah, ah, aircraft, echo or radar screen . . ., echo . . .

P. Beckner Right

T. Tamefuji . . . yeah, ah, so I could identify that is . . . ah aircraft echo . . . I have many experiences before in checking oncoming aircrafts on a radar.

S. Mimoto I experienced often in checking oncoming aircraft on radar before.

T. Tamefuji Just like ah traffic.

P. Beckner Okay . . .

T. Tamefuji . . . just the right (unintelligible) . . . talking.

P. Beckner . . . so what you saw was similiar to what you seen before, when you were picking up other traffic?

T. Tamefuji Yes

P. Beckner Okay, okay, um, the lighting conditions, I talked about the lighting conditions outside. How 'bout the lighting conditions inside the aircraft? Were there cockpit lights on . . .

T. Tamefuji Hummm, no . . .

P. Beckner . . . and all that sort of stuff or . . .

T. Tamefuji . . . hummm, it was for night flights seeting.

P. Beckner Right, okay.

T. Tamefuji Bright, it looked bright . . .

P. Beckner Not bright but . . .

T. Tamefuji Dim

P. Beckner . . . dim, okay. Was there? Was there any attempt to - did you guys turn them down all the ways, or . . .

T. Tamefuji Hummmm . . .

P. Beckner . . . what you saw outside couldn't have possibly, could have possible been a reflection or something from inside the cockpit?

T. Tamefuji Hummmm . . .

P. Beckner I'm just, just asking . . .

T. Tamefuji Yeah, yeah . . . I understand that. Ah, I - I want to say there is not possibility what you think . . .

P. Beckner Okay of reflection . . .

T. Tamefuju . . . ah, no.

P. Beckner Okay. Was the light turned all the way off just to see if it made any difference, er . . . ?

T. Tamefuji Um . . .

P. Beckner . . . do you remember if - if you did that, er, the Captain may have done it?

T. Tamefuji Umm, ah, I was very busy, so, ah, I . . .

P. Beckner That's right you were the flying pilot . . .

T. Tamefuji Yes, and ah, 150 feet . . .

P. Beckner Yeah

T. Tamefuji . . . and so, but ah, maybe, maybe not good word but, maybe ah, Captain try down dark - darker . . .

P. Beckner Okay, darker, okay

T. Tamefuji . . . and ah, I flight engineer calculator (unintelligible) so he had ah . . .

P. Beckner So he had a spot on his table?

T. Tamefuji Yes

P. Beckner By the engineer table?

T. Tamefuji Yes, I - when I saw, but ah, cockpit was ah, dark.

P. Beckner Okay. Ah, what size would you estimate this - this object to be?

T. Tamefuji Hummm, it is hard to say, but - ummm, I thought it was ah, ah, I thought it was larger than ah, aircraft.

S. Mimoto What kinds of aircrafts?

T. Tamefuji An originally oncoming aircraft . . .

S. Mimoto It feels like it's larger than normal airplane. Oncoming airplane . . .

P. Beckner Okay. Okay. Ah, did you notice any magnetic disturbances, ah, the compass . . .

T. Tamefuji No . . .

P. Beckner . . . swing or anything . . .

T. Tamefuji . . . but ah, um, I think you have ATC tape of that time?

P. Beckner Right

T. Tamefuji And controllers tape, ah, said that several times you're garbling . . .

P. Beckner No . . .

T. Tamefuji . . . but ah, my English is so hee . . . how should I said that reasoning . . . I thought perhaps the air traffic controller did not understand my English, so, he said 'garbling'.

S. Mimoto Oh, maybe Air Traffic Control did not understand my English, so . . .

P. Beckner No

S. Mimoto . . . he was polite and said 'garbling'

P. Beckner . . . said (unintelligible) government garble, okay.

T. Tamefuji (unintelligible) but ah . . .

S. Mimoto That's the way I thought . . .

P. Beckner Was that all the way, the whole length of the trip? He felt that, er, er, was it just during this period of time when you were working with . . .

T. Tamefuji Oh yeah, hummm . . .

P. Beckner . . . when you were asking him about the other traffic?

T. Tamefuji Yes

P. Beckner Okay. How 'bout later on in the flight? Did he ask you to say again, you're garbled, er . . .?

T. Tamefuji No, no . . .

P. Beckner . . . okay, just . . .

T. Tamefuji . . . just ah, ah, from Pottat, Alaska til . . .

P. Beckner Right

T. Tamefuji . . . and ah, radar contact with controllers, and ah, there was no garbling . . .

P. Beckner Okay

T. Tamefuji . . . ah, at that time.

P. Beckner And your initial contact was Center?

T. Tamefuji Yes

P. Beckner Okay

T. Tamefuji It clear after that moment.

P. Beckner Okay

T. Tamefuji (unintelligible)

P. Beckner How 'bout navigation, did you notice any navigation interference, ah . . . ?

T. Tamefuji (unintelligible)

P. Beckner . . . I understand you're on I N S, so there, there is no problem there, okay. Was there any turbulance, did the airplane experience any turbulance anytime you saw this, the objects??

T. Tamefuji (unintelligible)

P. Beckner Okay. How 'bout the autopilot, did - was it on autopilot?

T. Tamefuji Yes

P. Beckner Okay, did the autopilot kick off?

T. Tamefuji No

P. Beckner Er, it stayed on all the time?

T. Tamefuji No

P. Beckner Okay. Um, let me just read my notes here and see if I have got everything I needed to ask you about. You say that you had suggested to the Captain that you call Center and ask if they had any targets?

T. Tamefuji Hum . . .

P. Beckner About how long after you first saw this did you go, b-before asking about calling Center?

T. Tamefuji Hummm, hum - at first in my mind . . .

P. Beckner Right, yeah

T. Tamefuji . . . and conversation so it was not too long but, ah - hummm, I can't say exactly but two or three minutes.

P. Beckner Okay, okay. Um - Was the Captain the first one to spot the ob - the ah, lights?

T. Tamefuji The who?

P. Beckner First saw the object?

T. Tamefuji Hummm, I think ah, at the same time, almost.

P. Beckner Okay

T. Tamefuji But ah, it is not impossible to at same time . . .

P. Beckner Right, but . . .

T. Tamefuji (unintelligible)

P. Beckner . . . but - but communicating, yeah.

T. Tamefuji Humm, um, not so much different between . . .

P. Beckner Okay. So pretty much at the same time you both saw it?

T. Tamefuji Right

P. Beckner And at that time it was ten to eleven?

T. Tamefuji Hummm, I thought.

P. Beckner That's what I'm asking is what you thought?

T. Tamefuji Yeah

P. Beckner Okay. Um. Okay we discussed the ah, turn, the 360?

T. Tamefuji Um hum

P. Beckner I understand somewhere in the flight you guys also descended from 3, 5, 0 to 3, 1, 0?

T. Tamefuji Yes

P. Beckner Did - did the object stay with you at that point, or did the lights stay with you, or whatever?

T. Tamefuji Humm, hum at that time . . .

P. Beckner At that time did you still have them in sight?

T. Tamefuji Yes, but ah, different.

P. Beckner Um hum

T. Tamefuji Ah, the object was different side the captain's side so I can not . . .

P. Beckner Okay you could not see it, okay. So you actually saw it only for about five to ten minutes?

T. Tamefuji Hummm, I think so.

P. Beckner Ah, because I understand that the - the target was ah, not target, but the item, object, lights, whatever, were in sight for upwards of around fifty minutes, total. That's what the Captain saw, was about that length of time.

T. Tamefuji Umm, um

P. Beckner And ah, but I understand that from where you were sitting you might not have been able to see it as long as he could have?

T. Tamefuji Yeah

P. Beckner Especially during the turn?

T. Tamefuji Yeah

P. Beckner Okay. Were there any other ah - was there any other aircraft? Did you see any other aircraft during that particular flight?

T. Tamefuji No ah, no other ATC ah, I mean ah, um, as . . .

P. Beckner Right

T. Tamefuji . . . and ah . . .

P. Beckner You didn't see any other aircraft at all?

T. Tamefuji In last part of the incident United Air . . .

P. Beckner Right

T. Tamefuji . . . ah, from Anchorage.

P. Beckner Hum, huh

T. Tamefuji . . . And we can - what's that - we could see . . .

P. Beckner You could see (unintelligible)

T. Tamefuji United

P. Beckner Okay you could see United . . .

T. Tamefuji (unintelligible)

P. Beckner Okay, did he - did United when you saw him was he flashing his lights at you or anything, er just normal nav lights, er . . .

T. Tamefuji Humm . . .

P. Beckner . . . do you remember what . . .?

T. Tamefuji Humm, remember, just she passed my left-hand side . . .

P. Beckner Hum huh

T. Tamefuji . . . and ah, I can't say.

P. Beckner Okay. Okay ah, did the intensity of these lights change, at all . . .

T. Tamefuji Humm . . .

P. Beckner . . . or were they pretty much the same intensity for the time that you saw them?

T. Tamefuji Hummm, was it a change of intensity? How should I say . . . ? On and off but became stronger ah, became weaker, became stronger, became weake, different from the strobe lights.

S. Mimoto Some got stronger, and changed to weaker stronger again then weaker, and stronger, weaker . . .

P. Beckner Okay. Okay. Okay. Okay, ah, you mentioned the lights that you've shown me here. This pattern that you've shown me here, the Captain has also, shown us also. But just so I, make sure I understand everything here, let me just show you ah, the details of what the Captain - and I don't know if you've seen these or not, but you've . . .

T. Tamefuji Hum, hum

P. Beckner This was in the newspaper here in Anchorage, for example. And this shows a similiar type pattern is what you have here . . .

T. Tamefuji Humm

P. Beckner . . . but I just wonder if you - you also may have seen this particular ah, shape or ah, object?

T. Tamefuji Hummm

P. Beckner And you can probably read what is - is written here so, just kinda read that over, and . . . Do you remember seeing anything like that yourself?

T. Tamefuji Humm, I don't see ah, anything like this, but ah, as I told . . .

P. Beckner Yeah, this ah . . .

T. Tamefuji . . . and you if, we can connect these lights - are - it will be a big object but, ah . . .

P. Beckner Right

T. Tamefuji I can not just - there are some lights ahead or not.

P. Beckner Okay, that was during the turn . . .?

T. Tamefuji No ah, I think it was before turn . . .

P. Beckner Oh okay

T. Tamefuji . . . and ah, we of course we convesed a lot and . . .

S. Mimoto We are talking, discussing . . .

T. Tamefuji And while we were talking I saw it momentarily.

S. Mimoto While conversation was going, I peeked out and momentarily I saw it.

P. Beckner You saw this, okay. Um, after the turn. Were you able to see anything anymore, like this light pattern here?

T. Tamefuji No

P. Beckner Okay, er this - this pattern here?

T. Tamefuji Humm, no.

P. Beckner Okay. And tha - so that was the last time you saw it, was prior to the turn . . .

T. Tamefuji Humm

P. Beckner Okay, okay. Well sir, that's all I can think to ask you. Is there anything you'd like ta - to further add - and give us some more understanding to what you folks saw up there?

T. Tamefuju Humm, no well, I am certain that I saw something.

S. Mimoto Well I'm - I'm sure I saw something.

T. Tamefuji It was clear enough to make me believe taht there was an oncoming aircraft.

S. Mimoto This is clearly enough to make me believe it was an oncoming airplane.

P. Beckner Okay

T. Tamefuji That's the starting point of this story.

S. Mimoto That's the beginning of this story.

P. Beckner No the story, ah, (laughter). Okay um, well that pretty much concludes the questions I have for you. And again I appreciate you coming in. Especially on such short notice. And Sy I appreciate you coming in also on such short notice. So thank you very much . . .

T. Tamefuji And ah, can I ask one question?

P. Beckner Sure

T. Tamefuji Ah, I read the FAA news hummm, ah, humm, I found military radar picked up some kind of target on their radar. (unintelligible) What type of understanding?

P. Beckner Umm, I'm not sure what they seen on that radar, right at the present moment.

T. Tamefuji Ah huh

P. Beckner And um, let me just do this. I can find out and let you know.

T. Tamefuji And ah, well Saturday ah, ah, TV interview from New York.

P. Beckner Oh is that right.

T. Tamefuji Yeah

P. Beckner Oh

T. Tamefuji And ah, the interview said military, some kind of commander I don't remember, but, ah, some military . . .

P. Beckner Military - military ah, commander?

T. Tamefuji Ah, how should I say, but some personnel from military said this was a weather interference.

S. Mimoto And this military commander said it was a weather interfere . . . interference.

P. Beckner (unintelligible)

T. Tamefuji Ah, on the radar

S. Mimoto On the radar

P. Beckner Okay, that I - that I don't know, um . . .

T. Tamefuji But ah, it was clear sky, so . . .

P. Beckner Right

T. Tamefuji . . . there's no possibility of weather interference.

P. Beckner On the weather, interference, okay. Well I'll do this, I will find out what the result of the analysis is on those. We're going to eventually get that anyway. And I'll let you know what we have. Okay? I have your phone number so I'll do that. Okay?

T. Tamefuji Yes

Satoshi Mimoto Jan 21, 1987

A JAL flight engineer, Yoshio Tsukuba, was interviewed by Pete Beckner of FAA on January 15, 1987, through an interpreter, Sayoko Mimoto, regarding to the UFO which had been sighted on the 17th of November, 1986, by Captain Terauchi.

Beckner: Describe what you saw.

Tsukuba: May I speak in Japanese?

Beckner: Oh! Yes, please.
Mimoto: Oh! yes, please.

Tsukuba: The first time I saw it was through the L1 window, at the 11 o'clock position. It looked larger than navigation lights. I do not remember exactly how many of those (lights) were there but clusters of lights were undulating.

Beckner: What was the color of those lights, was it green?

Tsukuba: I can not describe the details but it was white or amber colored lights.

Beckner: When you saw the object was it obvious to you? Did you notice it immediately?

Tsukuba: Yes, it was. I noticed it immediately.

Beckner: Did it stay with you at position 11 o'clock? How long did you see this object?

Tsukuba: Yes, approximately 5 minutes, 10 minutes, I think I saw it for about 10 minutes after I sighted it the first time. The reason is because the Captain wanted to take pictures. His camera bag was placed behind his seat, beside mine, and I handed it to him. But he could not take pictures, so I placed his camera bag beside my seat again. So I think it took about 10 minutes.

Beckner: Why could he not take any pictures?

Tsukuba: Well, his camera is Alpha 7,000, with film ASA 100. He could not operate it well. I mean the operating procedure of the camera was not understood well.

Beckner: What kind of camera did he have?

Tsukuba: Alpha 7,000. It is made by Minoruta. I wonderwhat it is called in America.

Beckner: Have you seen this kind of thing before? Was this the first time anything of this nature has happened to you?

Tsukuba: Yes, this was the first time.

Beckner: Who first sighted the object?

Tsukuba: I do not know which person picked it up first. I was making a landing data. The Captain told us to see if there is a some kind of object outside.

Beckner: Did you see the radar?

Tsukuba: When the Captain told me to look, I could see the radar.

Beckner: Were you able to see it on radar? What did you see on the radar?

Tsukuba: Yes, a green dot like, not exactly like a dot. It was not a dot, but stream like, I think the range was about 10 miles. I do not think it (on the radar) was the same lights as the one I saw in front of us.

Beckner: How was the intensity of the lights? Did the intensity of the objects' lights change?

Tsukuba: Basically the same. I cannot describe it. Not even in Japanese. The first one did not change. The second light was very difficult to see. It was so vague.

Beckner: Was any other target picked up on radar?

Tsukuba: I cannot remember. The tilt angle of the radar was difficult to see.

Beckner: Difficult to remember, on the radar, did you have to look for the object?

Tsukuba: I identified immediately the one in front of us .

Beckner: At the time of sighting, how were the lighting conditions outside?

Tsukuba: It was just at sunset at right front of us. There was a stripe of red line and almost dark, it was almost pitch dark behind us.

Beckner: How was the lighting conditions inside the cockpit?

Tsukuba: We had night illumination at above sideways. I was using a spot light while calculating the data. I do not remember whether the Captain had the lights turned off or not. There is a switch that can turn the light to regular fluorescent or to dark. It was set to dark.

Beckner: How long did you see the object?

Tsukuba: The one in front of us, as I mentioned earlier, I saw it for about 10 minutes, then, the one on our left side at 9 o'clock, together, a total of 30 minutes. The lights in front of us and the other one were of two absolutely different nature of lights.

Beckner: Would you show us what they looked like on this paper?

Tsukuba: The lights in front of us were clusters of lights like this. I think they were made of two parts. How should I say this, but the lights were shaped like windows of a passenger aircraft.

Beckner: What was the shape of the object like?

Tsukuba: I do not know. It was just lights. The one in front of us was like an aircraft viewed from another aircraft which was ours.

Beckner: Did the object move with your aircraft when you changed direction or altitude?

Tsukuba: When we saw the first one in front of us, we did not change the heading, but the second one, it was really hard to see, I had to try real hard to see it, so we changed heading. I think the object was with us when we changed altitude. When we changed altitude, I could not see. The Captain said it was still there, so I felt like it was there.

Beckner: Did you see another aircraft?

Tsukuba: I saw United Air Line.

Beckner: Any other lighted, or unlighted objects?

Tsukuba: When the United aircraft was passing by, we were seeing the second lights.

Beckner: Did the intensity of lights change?

Tsukuba: The first lights I saw was unchanged until they disappeared. The second one, it was so hard to see. In my mind, I am not certain whether it was lights of a distant town or a strange object.

Beckner: What were the weather conditions?

Tsukuba: It was clear.

Beckner: Did you see any stars?

Tsukuba: I think there were stars, but...

Beckner: Any magnetic disturbance?

Tsukuba: No.

Beckner: Were there any instrument fluctuations on your Flight Engineer's panel during the objects presence?

Tsukuba: No, it didn't (there weren't).

Beckner: Do you wear glasses?

Tsukuba: No, I don't.

Beckner: Was there any reflection on the inside of the glass?

Tsukuba: Reflection? What do you mean?

Mimoto: Did you see any reflection of inside lights on the aircraft window glass?

Tsukuba: No. there was not any.

Backner: Would you like to add anything? Do you have any questions? We have come here and interviewed you a lot. Is there anything we can answer regarding your questions?

Tsukuba: The points I would like to reinforce are that the lights in front of us were different from town lights. I can not describe the shape. I am not as certain as I am about the lights on the left side. I do not know what the shape of the objects was. So I am sure that the lights that were in front of us were different from town lights. When I was interviewed here at the first time by FAA personnel, I was not sure whether the object was an UFO or not. My mind has not changed since then.

Peter E. Beckner
A.S.I.

Sayoko D. Mimoto
Interpreter

F.E.'s DRAWINGS

PERSONNEL STATEMENT

FEDERAL AVIATION ADMINISTRATION
Anchorage Air Route Traffic Control Center

January 6, 1987

The following is a report concerning the incident to Japan Airlines Flight 1628 (JL1628) North of Fairbanks, Alaska on November 18, 1986 at 0218 UTC.

My name is Carl E. Henley (HC). I am employed as an Air Traffic Control Specialist by the Federal Aviation Administration at the Anchorage Air Route Traffic Control Center (ARTCC), Anchorage, Alaska.

During the period of 2030 UTC, November 18, 1986, to 0430 UTC, November 18, 1986 I was on duty in the Anchorage ARTCC. I was working the R/D15 position from 0156 UTC, November 18, 1986 to 0230 UTC, and the R15 position from 0230 UTC, November 18, 1986 to 0258 UTC, November 18, 1986.

I am making this statement to clarify certain points in my original statement dated November 19, 1986.

Ref paragraph 4:

I stated in paragraph four that several times I had several primary returns where JL1628 reported traffic; in actuality I observed three types of targets. I saw tentative radar targets which showed up as a (-) symbols. I saw (+) symbols that indicate radar only tracks. I also saw non run lenth targets which show up as a (.) symbols.

Additionally, I stated the traffic stayed with JL1628 through turns and descent, this information was what I received from JL 1628.

Carl E. Henley
Air Traffic Control Specialist
Anchorage ARTCC

(10)

PERSONNEL STATEMENT

FEDERAL AVIATION ADMINISTRATION

Anchorage Air Route Traffic Control Center

The following is a report concerning the incident to aircraft JL1628 on November 18, 1986 at 0230 UTC.

My name is Carl E. Henley (HC) I am employed as an Air Traffic Control Specialist by the Federal Aviation Administration at the Anchorage Air Route Traffic Control Center, Anchorage, Alaska.

During the period of 2030 UTC, November 17, 1986, to 0430 UTC, November 18, 1986 I was on duty in the Anchorage ARTCC. I was working the D15 position from 0156 UTC, November 18, 1986 to 0230 UTC, November 18, 1986.

At approximately 0225Z while monitoring JL1628 on Sector 15 radar, the aircraft requested traffic information. I advised no traffic in his vicinity. The aircraft advised he had traffic 12 o'clock same altitude. I asked JL1628 if he would like higher/lower altitude and the pilot replied, negative. I checked with ROCC to see if they had military traffic in the area and to see if they had primary targets in the area. ROCC did have primary target in the same position JL1628 reported. Several times I had single primary returns where JL1628 reported traffic. JL1628 later requested a turn to heading 210°, I approved JL1628 to make deviations as necessary for traffic. The traffic stayed with JL1628 through turns and decent in the vicinity of FAI I requested JL1628 to make a right 360° turn to see if he could identify the aircraft, he lost contact momentarily, at which time I observed a primary target in the 6 o'clock position 5 miles. I then vectored UA69 northbound to FAI from ANC with his approval to see if he could identify the aircraft, he had contact with the JL1628 flight but reported no other traffic, by this time Jl1628 had lost contact with the traffic. Also a military C-130 southbound to EDF from EIL advised he had plenty of fuel and would take a look, I vectored him toward the flight and climbed him to FL240, he also had no contact.

Note: I requested JL1628 to identify the type or markings of the aircraft. He could not identify but reported white and yellow strobes. I requested the JL1628 to say flight conditions, he reported clear and no clouds.

Carl E. Henley

November 19, 1986

PERSONNEL STATEMENT

FEDERAL AVIATION ADMINISTRATION
Anchorage Air Route Traffic Control Center

January 9, 1986

The following is a report concerning the incident to Japan Airlines Flight 1628 (JL1628) north of Fairbanks, Alaska on November 18, 1986 at 0218 UTC.

My name is John L. Aarnink (AA). I am employed as an Air Traffic Control Specialist by the Federal Aviation Administration at the Anchorage Air Route Traffic Control Center (ARTCC), Anchorage, Alaska. During the period of 2230 UTC, November 17, 1986 to 0630 November 18, 1986 I was on duty in the Anchorage ARTCC. I was training on Sector D13 from 2300 UTC, November 17, 1986, to 0300 UTC, November 18, 1986.

I was on my way to take a break when I noticed the unusual activity at the Sector 15 positions. I plugged into the C15 position and assisted them by answering telephone lines, making and taking handoffs, and coordinating as necessary. As to the specific incident, I monitored the aircrafts transmissions and observed data on the radar that coinsided with information that the pilot of JL1628 reported. I coordinated with the ROCC on the BRAVO and CHARLIE lines. They confirmed they also saw data in the same location. At approximately abeam CAWIN intersection, I no longer saw the data and the pilot advised he no longer saw the traffic. I called the ROCC and they advised they had lost the target. I then unplugged from the position and went on a break.

John L. Aarnink
Air Traffic Control Specialist
Anchorage ARTCC

PERSONNEL STATEMENT

FEDERAL AVIATION ADMINISTRATION
Anchorage Air Route Traffic Control Center

January 7, 1987

The following is a report concerning the incident involving aircraft JL 1628 north of Fairbanks on November 18, 1986 at 0218 UTC.

My name is Samuel J. Rich (SR). I am employed as an Air Traffic Control Specialist by the Federal Aviation Administration at the Anchorage Air Route Traffic Control Center, Anchorage, Alaska.

During the period of 0035 UTC, November 18, 1986, to 0835 UTC, November 18, 1986, I was on duty in the Anchorage ARTCC. I was working the D15 position from 0230 UTC, November 18, 1986, to 0530 UTC, November 18, 1986.

The pilot of JL 1628 reported that he had traffic at his altitude. He stated it was a big plane with yellow and white lights. We advised him we had no traffic in his position. We adjusted the radar PVD to approximately a 25 mile scale and there was a radar return in the position the pilot had reported traffic.

I called ROCC to ask if they had any military traffic operating near JL 1628. The ROCC said they had no military traffic in the area. I then asked them if they could see any traffic near JL 1628. ROCC advised that they had traffic near JL 1628 in the same position we did.

I asked ROCC if they had any aircraft to scramble on JL 1628, they said they would call back. However, there was no further communication regarding the request for a scramble.

Samuel J. Rich
Air Traffic Control Specialist
Anchorage ARTCC

PERSONNEL STATEMENT

FEDERAL AVIATION ADMINSTRATION
Anchorage Air Route Traffic Control Center

January 9, 1987

The following is a report concerning the incident involving Japan Airlines Flight 1628 (JL1628) North of Fairbanks, Alaska on November 18, 1986 at 0218 UTC.

My name is Joseph Rollins (JR). I am employed as an Air Traffic Control Specialist by the Federal Aviation Administration at the Anchorage Air Route Traffic Control Center (ARTCC), Anchorage, Alaska. During the period of 2340 UTC, November 17, 1986 to 1850 UTC, November 18, 1986 I was on duty in the Anchorage ARTCC. I was working the E1 position from 0006 UTC, November 18, 1986 to 0425 UTC, November 18, 1986.

During the time period prior to this incident all operations were normal. I had assigned Mr. Henley to the combined R15, D15 position to work by himself. The traffic was light and lunch breaks were in progress. At approximately 0220 UTC Mr. Henley informed me that JL1628 had indicated that he had traffic and wanted information. I then advised the Area Manager that JL1628 was requesting information on traffic that we were not aware of. Mr. Rich returned from lunch and was assigned the D15 position and Mr. Henley was moved to the R15 position. I understood that Mr Aarnink had plugged into the C15 position only to observe. During the time following my being notified, I was involved in operational supervision and coordinatation between the controllers and the Area Manager. I intermittently monitored the radar but at no time observed any radar data that in my opinion, conclusively indicated traffic for the JL1628 flight. At 0254 UTC I informed the Area Manager that the pilot of JL1628 had lost visual contact with his traffic.

Joseph Rollins
Area Supervisor
Anchorage ARTCC

PERSONNEL STATEMENT

FEDERAL AVIATION ADMINISTRATION
Anchorage Air Route Traffic Control Center

January 9, 1987

The following is a report concerning the incident to Japan Airlines Flight 1628 (JL1628) north of Fairbanks, Alaska on November 18, 1986 at 0218 UTC.

My name is Erland D. Stephens (AS). I am employed as an Air Traffic Control Specialist by the Federal Aviation Administration at the Anchorage Air Route Traffic Control Center (ARTCC), Anchorage, Alaska.

During the period of 0100 UTC, November 18, 1986, to 0900 UTC, November 18, 1986, I was on duty in the Anchorage ARTCC. I was working the Area Manager in Charge position from 0100 UTC, November 18, 1986, to 0900 UTC, November 18, 1986.

At 0221 UTC I was notified by Joe Rollins, Area B Supervisor, that JL1628, had reported traffic at his altitude (FL 350), distance one (1) mile with a white and yellow strobe light. I notified the Alaska Regional Operations Center (ROC) and the Elmendorf Regional Operational Control Center (ROCC) about this observed traffic.

At 0233 UTC, after Mr. Rollins advised me that JL1628 had reported the traffic to be paralleling his route and that Sector R15 radar and ROCC had intermittent radar returns in the area of JL1628s observed traffic I notified the U.S. Customs office at Anchorage International Airport about the possibility of a lost aircraft following JL1628 to Anchorage. At 0245 UTC, Mr. Rollins advised me that JL1628 had lost visual contact with the unknown traffic at 0257 UTC. Mr. Rollins advised me that ROCC had lost radar contact with the unknown traffic. At 0423 UTC I gave this information to the Washington D.C. ROC.

Erland D. Stephens
Air Traffic Control Specialist
Anchorage ARTCC

PERSONNEL STATEMENT

FEDERAL AVIATION ADMINISTRATION
Anchorage Air Route Traffic Control Center

January 7, 1987

The following is a report concerning the incident to JL1628 North of Fairbanks, Alaska, on November 18, 1986 at approximately 0218 UTC.

My name is Anthony M. Wylie (AW). I am employed as a Quality Assurance Specialist by the Federal Aviation Administration at the Anchorage Air Route Traffic Control Center, Anchorage, Alaska.

I have reviewed the Continuous Data Recording of ZAN EARTS, (radar data), reference JL1628 alleged sightings. I could not find any target information in the vicinity of the reported traffic. The radar track appeared to be normal and consistent with other tracking data I have reviewed in the past.

Anthony M. Wylie
Quality Assurance Specialist
Anchorage ARTCC

PERSONNEL STATEMENT

FEDERAL AVIATION ADMINISTRATION
Anchorage Air Route Traffic Control Center

January 9, 1987

The following is a report concerning the incident to aircraft JL1628 north of Fairbanks, Alaska, on November 18, 1986 at 0218 GMT.

My name is Manfred F. Keller (FK). I am employed as an Automations Specialist by the Federal Aviation Administration at the Anchorage Air Route Traffic Control Center, Anchorage, Alaska.

I interpreted the recorded data (radar) reference JL1628. I searched the specific areas where the pilot reportedly had traffic and could not find any indications of other target information.

Manfred F Keller

Manfred F. Keller
Air Traffic Control Specialist
Anchorage ARTCC

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AIR TRANSPORTATION SECURITY

On November 17, I responded to a call from the ROC reference an incident involving unidentified air traffic (UAT) following JAL flight 1628 into Anchorage. I asked Agent Mickle to meet me at Anchorage Airport.

Upon arriving at ANC, I met Agent Mickle and Inspector Wright (FSDO-63) who had been at the aircraft. All three of us then proceeded to JAL operations to interview the crew. At JAL Operations we met with Captain Terauchi, 1st Officer Tamefuji, and 2nd Officer Tsukuda along with Mr. Shimbashi, the JAL Operations Manager at Anchorage.

The three crewmen stated that just after passing POTAT intersection inbound to Anchorage on J529 they observed strange lights ahead of their B-747. These lights changed position after 2 minutes but remained in front of the A/C for another 10 minutes, then moved to the left side of the A/C. They stated that all they could see were the lights and at no time could they see any craft. However, they did show an object on their WX radar at about 7 miles. The lights were yellow, amber, and green, but no red. The lights were in two seperate sets which changed position relative to one another. The crew said that they contacted ARTCC confirmed that they also had it on radar. Near Fairbanks, the crew executed a 360° turn and the lights stayed with them off of their left side. They then proceded to Anchorage and the lights were still visible until around 40 miles north of TKA when they moved away to the east. The crew reported their speed as 0.84 Mach and their altitude between FL390 and 310 as assigned along the route.

The only problem noted with their systems was some static in the VHF receiver. The Navigational system in use was INS with no apparent problems.

Upon completion of my discussion with the crew, I called Captain Stevens (Duty Officer to NORAD) and asked if he had any question other than what I had asked. He said he had no other questions, but they also showed two targets on radar (one was JAL). He stated that they would give all data to Intelligence in the morning. I then asked Bobby Lamkin by phone if AF was holding the data and he said yes.

INTERVIEWED/REVIEWED ON November 17, 1987, AT Anchorage, Alaska,

BY Special Agents James Derry [redacted], FILE NO. _____.

FAA Form 1600-32-1 (2-73)

GPO 842-884

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AIR TRANSPORTATION SECURITY

Agent Mickle and I then met with Dave Smith (ACS-300) and briefed him on the incident.

On the morning of November 18, I briefly discussed the incident with AAL-1 & 2.

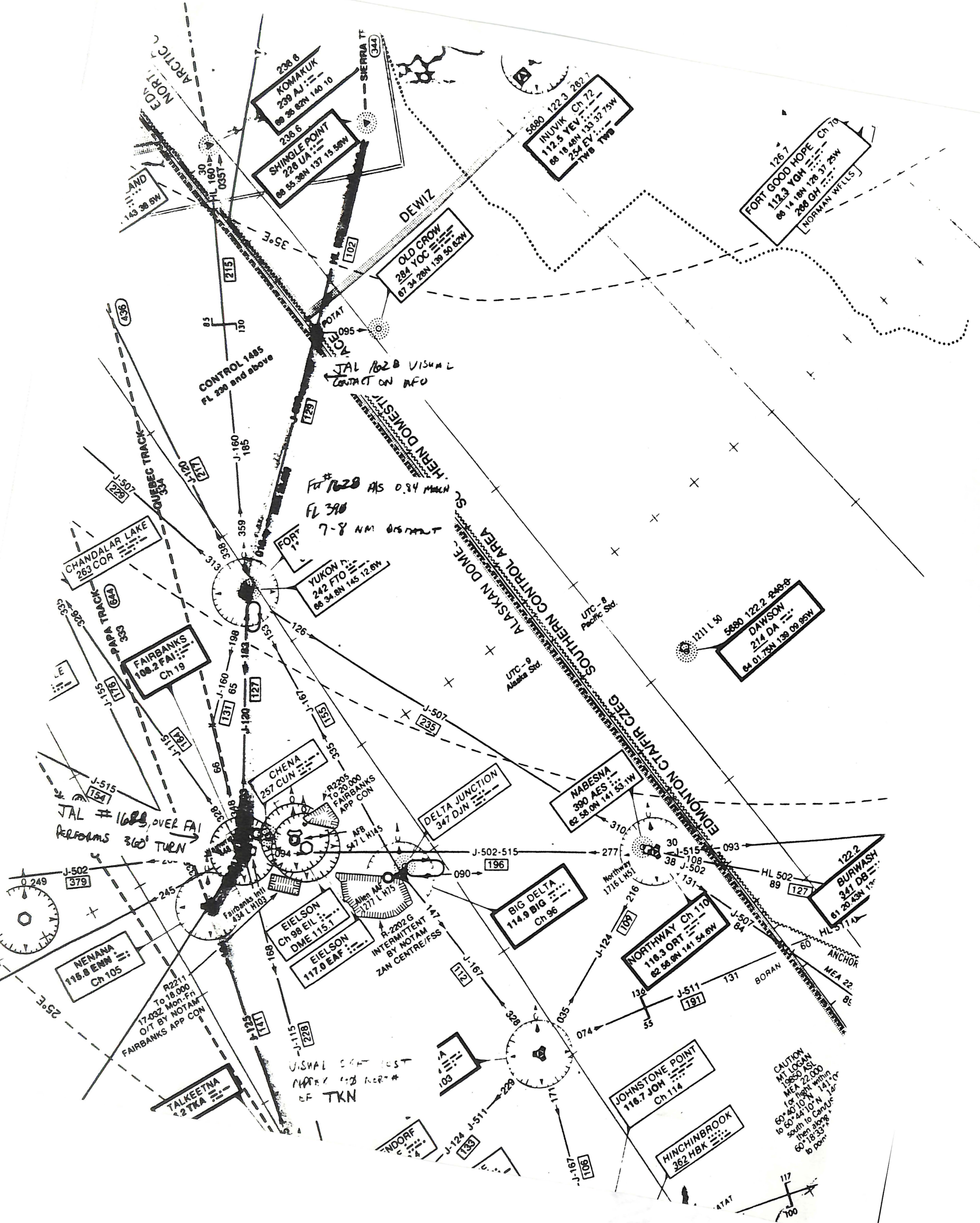
Attached is a statement from Agent Mickle and a chart and drawings by the JAL Captain.

Only the drawings are by Cpt. Terauchi
the chart was drawn by Agent Mickle from
the Captains statement [redacted] -

INTERVIEWED/REVIEWED ON November 17, 1986, AT Anchorage, Alaska,
BY Special Agents James Derry [redacted], FILE NO. _____.

FAA Form 1600-32-1 (2-73)

FOR OFFICIAL USE ONLY.
(Public availability to be de-


KOMAKUK
239 AJ
SHINGLE POINT
228 UA
DEWIZ
OLD CROW
284 YOC
67 34 28N 139 50 62W
INUVIK Ch 72
112.5 YEV
254 EV
FORT GOOD HOPE Ch 70
112.3 YGH
268 GH
NORMAN WELLS
POTAT
CONTROL 1485
FL 290 and above
JAL 1628 VISUAL
CONTACT ON AFO
QUEBEC TRACK
334
FLT 1628 HAS 0.84 MACH
FL 390
7-8 NM DISTANT
CHANDALAR LAKE
263 COR
YUKON
242 FTO
66 34.8N 145 12.6W
DAWSON
214 DA
64 01.75N 139 09.95W
SOUTHERN CONTROL AREA
ALASKAN DOMESTIC
EDMONTON CTA/FIR CZEG
UTC - 8
Pacific Std.
UTC - 9
Alaska Std.
PAPA TRACK
333
FAIRBANKS
108.2 FAI
Ch 19
CHENA
257 CUN
R-2205
To 20,000
FAIRBANKS
APP CON
DELTA JUNCTION
347 DJN
NABESNA
390 AES
62 58.0N 141 53.1W
JAL # 1628, OVER FAI
PERFORMS 360° TURN
J-502-515
BURWASH
341 DB
122.2
61 20.43N
Northway
1716 L H51
BIG DELTA
114.9 BIG
Ch 96
EIELSON
Ch 98 EIL
DME 115.1
EIELSON
117.0 EAF
R-2202 G
INTERMITTENT
BY NOTAM
ZAN CENTRE/FSS
NORTHWAY Ch 110
116.3 ORT
62 56.9N 141 54.6W
NENANA
115.8 ENN
Ch 105
R2211
To 18,000
17-03Z Mon-Fri
O/T BY NOTAM
FAIRBANKS APP CON
25°E
35°E
VISUAL CONTACT LOST
NEAR TKN
TALKEETNA
JOHNSTONE POINT
116.7 JOH
Ch 114
HINCHINBROOK
362 HBK
CAUTION
MT LOGAN
19850 ASL
MEA 22,000
BORAN
ANCHOR

AT POTAT

1.

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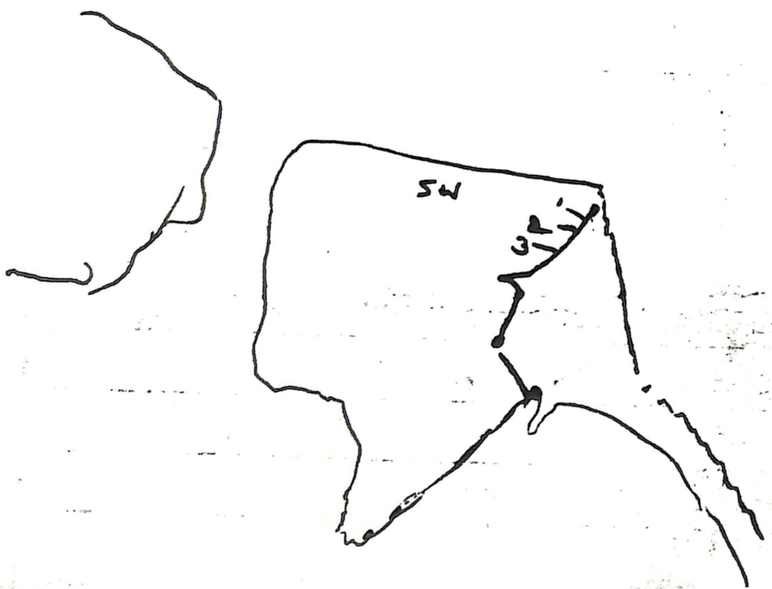

Drawing by
Capt. Kenji Toranchi
JAL – Pilot

INSPECTION AND SURVEILLANCE RECORD

1. WORK ACTIVITY	2. UNITS	3. HOURS
INCIDENT		

4. NAME AND ADDRESS OF CARRIER, OPERATOR, AIRPORT, AGENCY, OR AIRMAN	5. CERTIFICATE NO. OR AIRCRAFT REGISTRATION MARK (No.)	6. RESULTS		7. FURTHER ACTION REQ.	
			SATISFACTORY		NO
			UNSATISFACTORY (Explain in item 8)		YES (Explain action in item 8)

8. FINDINGS/RECOMMENDATIONS

J.A.L. B-747 CARGO FLT 1628 FROM ICELAND TO ANCHORAGE. CAPT. KENJU TERAUCHI. SPEED .84 MACH.

I RECEIVED A CALL FROM DICK POWERS CONCERNING A JAL FLT which the CAPT. HAD STATED HE WAS being followed or shadowed.

I observed The A/C LAND ON R/W 6R AT 1820 HOURS NO OTHER A/C WAS NOTED. THE B-747 TAXIED TO INTL RAMP Area. I INTERVIEWED CAPT. TERAUCHI & Crew of TWO (F/O & F/E) The CAPT. STATED THAT THIS WAS The 1ST TIME ANYthing like this had happened to him. He STATED that approx. 5NM AFTER PASSING the Canadian/Alaskan Border at 35,000' SOMEthing Appeared 5 to 7 NM in FRONT of the A/C it had lights 4 or 5 in a line (see drawings) and he said it was bigger than they were (B-747). AT TIMES this object WOULD TO the CAPT SIDE of the A/C (LEFT) NEVER the other side (Right). He referred to the dark side. - AFTER PASSING the FAI Area he requested to fly parallel to COURSE and this was granted. page 2

(If more space is required, use reverse side)

		DATE	REGION AND DISTRICT OFFICE	INSPECTOR'S SIGNATURE
	OPERATIONS	11/17/86	AAL-FSDO-63	
	MAINTENANCE			
X	AVIONICS			

FAA Form 3112 (8-70)

★ U.S. GOVERNMENT PRINTING OFFICE: 1982—571-368/313

INSPECTION AND SURVEILLANCE RECORD

1. WORK ACTIVITY	2. UNITS	3. HOURS

4. NAME AND ADDRESS OF CARRIER, OPERATOR, AIRPORT, AGENCY, OR AIRMAN	5. CERTIFICATE NO. OR AIRCRAFT REGISTRATION MARK (No.)	6. RESULTS		7. FURTHER ACTION REQ.	
			SATISFACTORY		NO
			UNSATISFACTORY (Explain in Item 8)		YES (Explain action in Item 8)

8. FINDINGS/RECOMMENDATIONS

when he turned to the right and flew parallel the object was gone. [IN ALL CASES the weather RADAR WAS ALSO USED to identify the object. and the 5 to 7 NM distance WAS taken from the radar display (20NM RANGE)]. They returned to COURSE and the CAPT SAID "There IT WAS, AS IF IT WAS WAITING for me". AT Approx. TALKEETNA Area the object took off to the East and WAS gone. A UNITED FLT departed from ANC & WAS REQUESTED to Check if they could see anything but it WAS gone before United got there. NOTHING ~~[illegible]~~ different WITH the CARGO EXCEPT SOME EXPENSIVE WINE. The CAPT. & Crew were shook-up but professional. JAMES Derry INTERVIEWED THE CREW AT JAL Operations. CAPT. TERAUCHI had asked ATC if they were picking up two targets and WAS told "just one". THE TOTAL TIME WAS Approx. 55 MINUTES. A new Crew took the flight ON TO TOKOYO. CAPT TERAUCHI & Crew were to be in

(Page 3)

(If more space is required, use reverse side)

☐ OPERATIONS ☐ MAINTENANCE ☐ AVIONICS	DATE	REGION AND DISTRICT OFFICE	INSPECTOR'S SIGNATURE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AIR TRANSPORTATION SECURITY

As per telephonic request from FSDO-63, the following are the events which took place on November 17, 1986 and were taken from my personal notes during the interview: Responded to Japan Airlines station office as instructed by Manager (James S. Derry), AAL-700. Myself and Jim Derry interviewed the crew of JAL Flight 1628, which reported the sighting of unidentified air traffic. The flight crew consisted of the Captain, Kenju Terauchi, First Officer Takanori Tamefuji, and Flight Engineer Yoshio Tsukuda. Captain Terauchi stated the cargo only flight had departed Reykjavik, Iceland. Captain Terauchi stated he first sited (visually) the unidentified air traffic (UAT) in the vacinity of Potat intersection and the ADIZ. The aircraft he was piloting (B747) was at flight level 390, airspeed 0.84 Mach. Captain Terauchi indicated the UAT was in front of his aircraft at a distance of approximately seven to eight nautical miles for approximately 12 minutes. The Captain stated the distance was indicated by the onboard Bendix color radar. Captain Terauchi stated that while he had a visual on the UAT, he spotted yellow, amber and green lights, and a rotating beacon, but no red lights. The Captain said there were two distinct sets of lights, but appeared to be joined together (as fixed to one object). Captian Terauchi ascertained through visual sighting and radar, that the UAT was equal in size to a B747, possibly larger.

Captain Terauchi stated that during the visual sighting, the lights of the UAT changed from a horizontal position to a vertical position and had positioned itself from in front of the B747 to port side. The UAT stayed on the port side for approximmately 35 minutes.

Captain Terauchi said he was communicating with ARTCC personnel during the sighting. The captain stated he requested, and received, permission to perform a 360 degree turn while in the vacinity of Fairbanks, Alaska, which he had a visual on. Captain Terauchi stated the UAT maintained its position on the port side during the turn. Captain Terauchi stated visual sight of the UAT was lost approximately 40 nautical miles north of Talkeetna, while continuing on to Anchorage.

Additional information regarding the flight:

Captain Terauchi stated there was static during VHF communications with the ARTCC.

Captain Terauchi indicated there was erratic movement with lights of the UAT during the visual contact.

Navigation was being performed by coupling of the onboard INS's.

INTERVIEWED/REVIEWED ON November 17, 1986, AT Anchorage, Alaska,

BY Ronald E. Mickle, FAA S/A, FILE NO. _____.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AIR TRANSPORTATION SECURITY

Captain TERAUCHI stated that FAA ATC had indicated to him the presence of a primary target in addition to his aircraft.

Ronald E. Mickle
PSI, AAL-700

Addendum: Through a confidential source at Japan Airlines, it was stated to me that this was not the first sighting of an unidentified aircraft by Captain TERAUCHI.

INTERVIEWED/REVIEWED ON November 17, 1986, AT Anchorage, Alaska,
BY Ronald E. Mickle, PSI, FAA, AAL-700, FILE NO.

FAA Form 1600-32-1 (2-73)

GPO 942-054

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(Public availability to be determined under 5 U. S. C. 552)

INSPECTION AND SURVEILLANCE RECORD

1. WORK ACTIVITY	2. UNITS	3. HOURS

4. NAME AND ADDRESS OF CARRIER, OPERATOR, AIRPORT, AGENCY, OR AIRMAN	5. CERTIFICATE NO. OR AIRCRAFT REGISTRATION MARK (No.)	6. RESULTS		7. FURTHER ACTION REQ.	
			SATISFACTORY		NO
			UNSATISFACTORY (Explain in item 8)		YES (Explain action in item 8)

8. FINDINGS/RECOMMENDATIONS

Anchorage for 3 days before any additional flights.

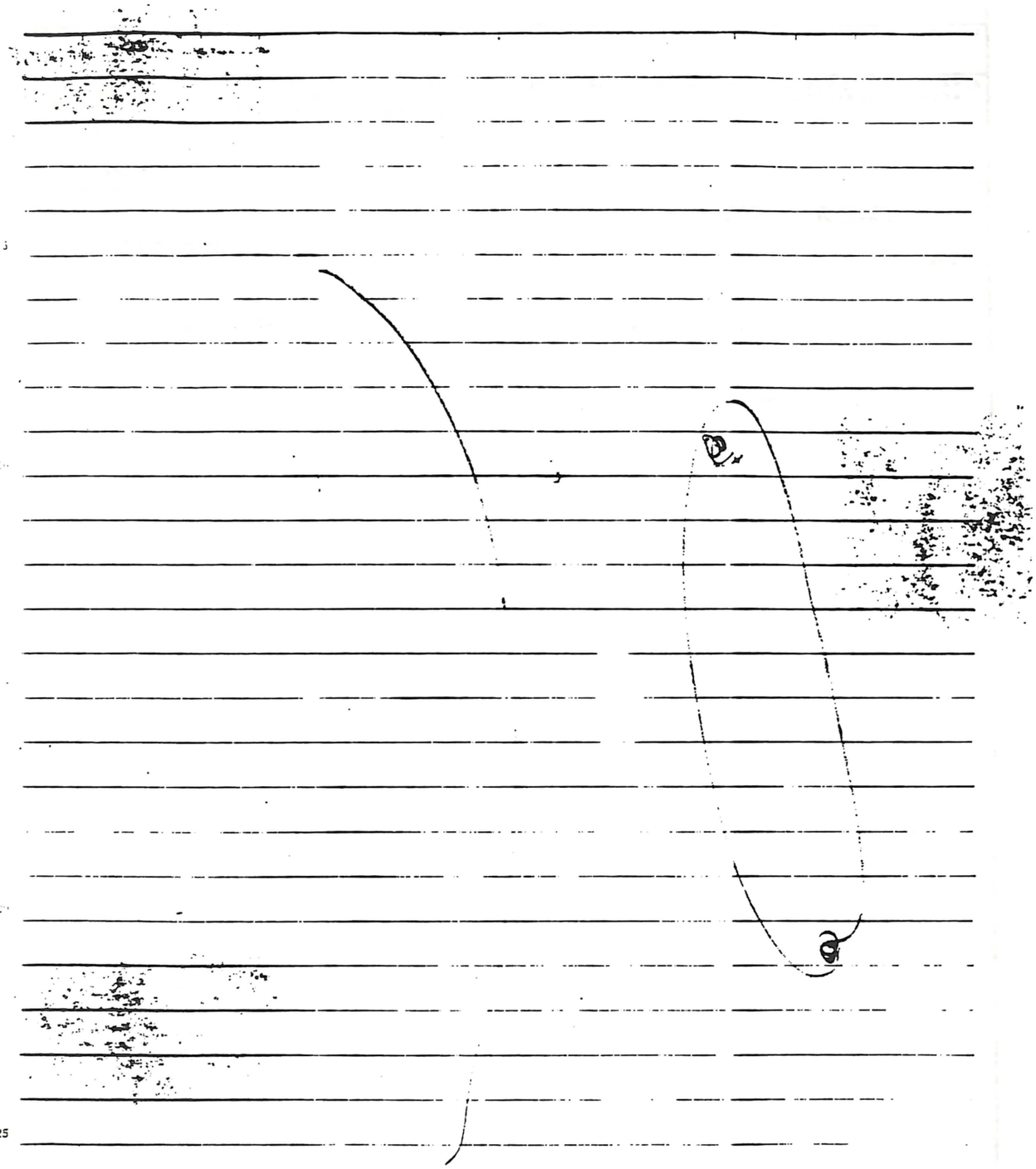
James Derry requested the tapes AND ANY OTHER info be saved.

(If more space is required, use reverse side)

		DATE	REGION AND DISTRICT OFFICE	INSPECTOR'S SIGNATURE
	OPERATIONS			
	MAINTENANCE			
	AVIONICS			

FAA Form 3112 (8-70)

☆ U.S. GOVERNMENT PRINTING OFFICE: 1982—571-368/313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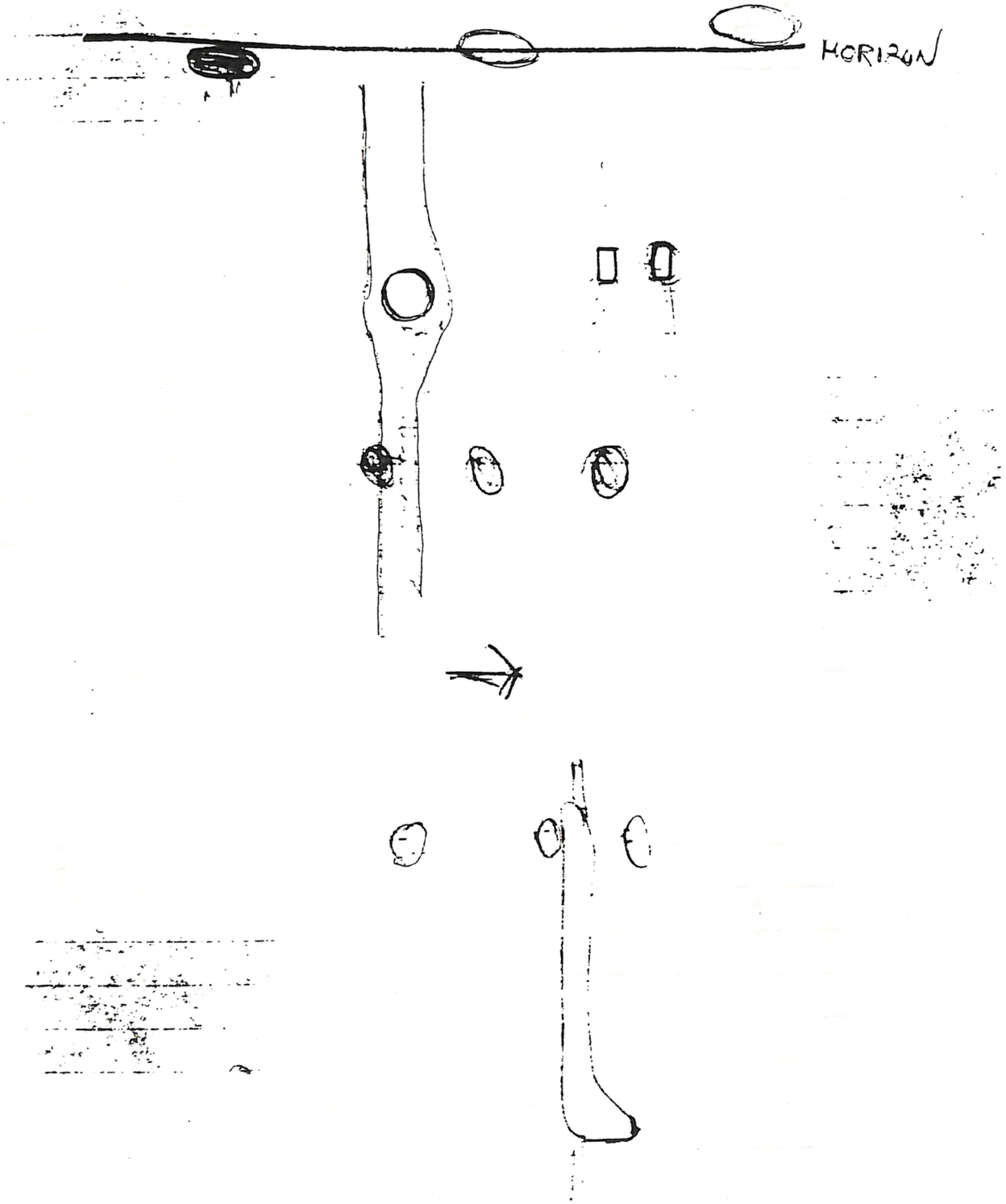
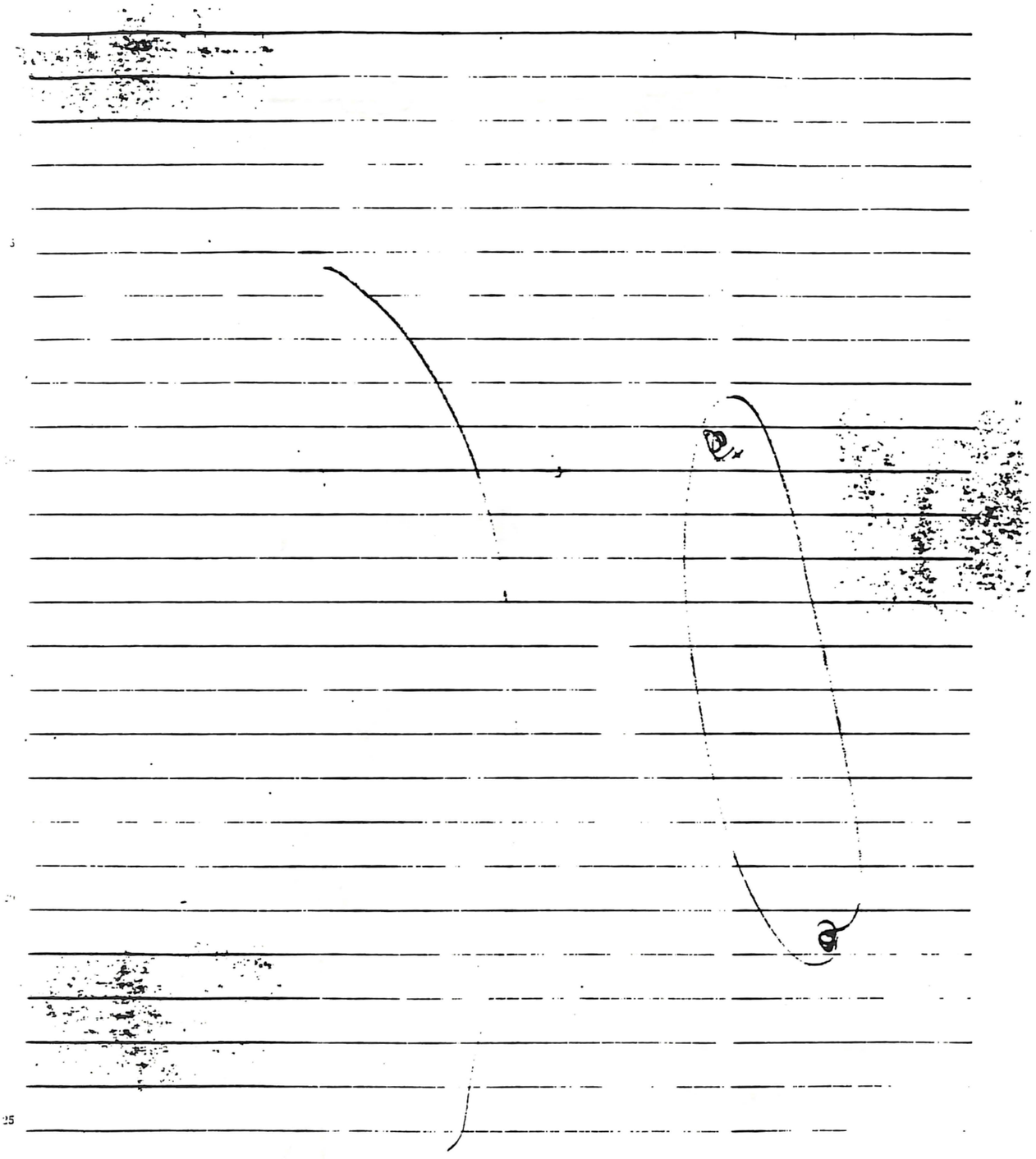

HORIZON

日本航空 JAPAN AIR LINES



Paul Steucke, FAA
Alaskan Region
701 C St. Box 14
Anch. AK 99513

March 5, 1987

UNIDENTIFIED AIR TRAFFIC SIGHTINGS, ALASKA

(1) An Alaska Airlines flight crew of a Boeing 737 aircraft, flight #53, enroute from Nome to Anchorage, Alaska, on January 29, 1987, reported to the FAA Anchorage Air Route Traffic Control Center, the sighting of unidentified air traffic on their onboard weather radar system. The incident occurred at about 6:39 pm, 60 miles west of the community of McGrath, which is approximately 200 miles northwest of Anchorage. The aircraft was flying at 35,000 feet altitude at night, and the weather was clear.

Both pilots noticed the target on their weather radar scope and looked out the window to see if there was any "traffic" in front of them. At no time did either crewmember see anything outside the aircraft. The area is not within radar coverage of the FAA and the military reported they did not have any aircraft operating in the area at the time.

The flight crew of the Alaska Airlines passenger aircraft reported that the target on their radar moved at a very high rate of speed, approximately 5 miles on each sweep of the radar (5 miles per second). As the target moved off their radar in front of them, they changed the range of their radar from 50 miles to 100 miles and saw the target briefly before it became lost in the ground clutter created by the Alaska Range of mountains. The flight crew was interviewed by FAA inspectors when they landed at Anchorage. The FAA has no opinions or conclusions regarding the sighting.

(2) On January 11, 1987, at approximately 7:30 am (Sunday), Captain Kenjyu Terauchi, piloting Japan Airlines flight #628, a Boeing 747 aircraft from Iceland to Japan via Anchorage, Alaska, reported to the FAA Air Route Traffic Control Center in Anchorage, that he was seeing a group of unusual lights in front of his aircraft.

more...

The Captain requested the Center to record his description: "Ah, would you please, ah, record my voice, ah, ah, ah...this is Japanese. Futeikina raito ga mieteriru. Choodo ookina kuroi katamari ga mae ni iru. Kyorinishite go mairu. Dooyara uchuusen no moyoo." English translation: "We see irregular pulsating lights just there is a large black chunk just in front of us distance is five miles it seems to be a spaceship. Ah, it likes, ah, UFO, please, ah, check on your radar. Over."

The cargo aircraft was about 240 nautical miles north of Nenana, Alaska, at 37,000 feet elevation. The weather was clear with a temperature inversion reported at 23,500 feet.

Captain Terauchi reported the lights appeared in front of the aircraft, about 2,000 feet below, moved below the aircraft, and then disappeared behind the aircraft. The phenomenon then occurred again at approximately 151 nautical miles north of Nenana.

It was noted at the FAA interview of the flight crew, which was conducted when they landed at Anchorage, that the aircraft flight path was north of and directly over the town of Arctic Village, Alaska, at the time of the first sighting and 45 nautical miles northwest and west of the village of Fort Yukon during the second sighting.

Captain Terauchi said at the FAA interview that he thought the unusual lights he saw were those village lights that had been obscured or changed by ice crystals present in the atmosphere (the temperature inversion). The FAA has concluded its inquiry into this report and agrees with the Captain that the phenomena was most likely caused by ice crystals created by the reported temperature inversion.

(3) The crew of a Flying Tigers Flight #73, Boeing 747, cargo aircraft, flying at 37,000 feet, reported observing a "target" heading 320 degrees as it approached Anchorage on November 21, 1985. The Air Force was unable to confirm the sighting. This sighting was not investigated by the FAA and there is no file or retrievable data.

Steucke said, "The FAA is not in the UFO business and is not interested in reports that do not involve aircraft or the air traffic control system."

# # #

U.S. Department
of Transportation
**Federal Aviation
Administration**

Alaskan Region

701 C Street, Box 14
Anchorage, Alaska
99513

February 21, 1987

IN RESPONSE TO YOUR REQUEST:

The attached order form is in response to your request for Federal Aviation Administration information regarding the unidentified traffic sighting by the flight crew of Japan Airlines flight 1628, on November 17, 1986.

We have described, itemized and listed all the materials that have been produced or obtained by the FAA in this investigation. They are listed on the attached order form.

Some persons may have found the cost of purchasing the entire inquiry package of materials to be expensive and contain items that they might not want. Hence, we have taken the opportunity to list and describe each item, with cost, so that your order can be tailored to fit your needs and budget. Please note that an order which totals $5.00 or less will be provided free of charge.

Please read the instructions carefully and return your request with payment in full.

Sincerely,

Paul Steucke
Public Affairs Officer

U.S. Department
of Transportation
Federal Aviation
Administration

Office of Public Affairs
Alaskan Region
701 C Street, Box 14
Anchorage, Alaska 99513
(907) 271-5296

LIST OF RECORDS AVAILABLE

ORDER FORM
for
JAL FLIGHT 1628
UNIDENTIFIED TRAFFIC SIGHTING
NOVEMBER 18, 1986 UTC
(The event occurred on November 17, 1986 Alaska Standard Time)

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for
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UNIDENTIFIED TRAFFIC SIGHTING
NOVEMBER 18, 1986 UTC
(The event occurred on November 17, 1986 Alaska Standard Time)

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◯ **$194.30** **Complete package of all written records and photographs plus all tape recordings.**

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◯ **$0.30** 3. FAA Form 1600-32-1, Notes of interview with all three crew members of JAL Flight 1628; completed by Security Inspector Ronald E. Mickle, 11/17/86. (2 pages)

◯ **$0.40** 4. FAA Form 1600-32-1, Notes on interview with all three crew members of JAL Flight 1628, map, and drawing by the pilot; completed by Special Agent James Derry, 11/17/86. (4 pages)

◯ **$1.15** 5. Transcript of Interview with Captain Terauchi, 1/2/87, by Richard Gordon, manager of flight standards district office in Anchorage. (19 pages)

◯ **$1.10** 6. Written Statement and Drawing by Captain Terauchi; in Japanese. (16 pages written, plus 2 pages drawings)

-more-

JAL UNIDENTIFIED TRAFFIC SIGHTING Order List continued

◯ $0.85	7.	Written Statement by Captain Terauchi; translated by S. Mimoto of FAA Alaskan Region. **English translation of item #6.** (13 pages)
◯ $1.35	8.	Transcript of Interview with First Officer Tamefuji, on 1/5/87 by Inspector Peter E. Beckner. (23 pages)
◯ $0.50	9.	Transcript of Interview with Flight Engineer Tsukuba on 1/15/87 by Inspector Pete Beckner. (5 pages written, plus 1 page drawing)

◯ **$67.70 Complete AIR TRAFFIC PACKAGE, includes Items 10 through 12.**

◯ $3.05	10.	Chronology of Events, report of Unidentified Traffic Sighting by Japan Airlines Flight 1628, November 17, 1986. (5 pages) . Transcription of communication between air traffic control and JAL Flight 1628. (23 pages) Flight path chart. 1 page (map) Personnel statements. (Statements by seven air traffic control specialists at Anchorage Center.) (8 pages) FAA Form 7230-4, Daily Record of Facility Operations for Anchorage Air Route Traffic Control Center, showing time and watch supervisors' entries of major items in facility log. (3 pages) FAA Form 7230-10, Position Logs. (Record of which employees were working each position at what time.) (2 pages)
◯ $7.75	11.	Anchorage Air Route Traffic Control Center computer printout of Continuous Data Recordings (radar tracking data) (151 pages)

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JAL UNIDENTIFIED TRAFFIC SIGHTING Order List continued

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◯	**$0.55**	13. Selected portions of voice transcriptions, pilot of JAL 1628 and FAA controllers, in chronological order; as released by FAA Public Affairs Office, March 5, 1987. (Data extracted from transcription in item #9)
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◯	**$50.00**	18. Cassette tape of communications between Air Traffic Control and JAL Flight 1628. 1 hour 30 minutes. (Same data as 23 page transcription in item #9)

FREE ITEMS:

◯	**free**	19. News release by FAA Public Affairs (Information constructed from personal notes provided by Jim Derry, obtained in interviews with JAL Flight 1628 crew the evening of 11/17/86) (2 pages)
◯	**free**	20. News release statement March 5, 1987, by FAA Public Affairs Office upon release of investigation materials.
◯	**free**	21. Description of "Split-Beacon Target" by FAA Alaskan Region Airway Facilities Division. (1 page)

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JAL UNIDENTIFIED TRAFFIC SIGHTING Order List continued

◯ free 22. Alert Report from Director of FAA Alaskan Region to FAA Administrator, 12/31/86. Record of telephone conversations of Deputy Director, FAA Alaskan Region with General Nichols, Colonel Wick, and Captain Jim Crickenberger (U.S. Air Force) on 1/2/87. Table of contents of file kept in FAA Alaskan Region Director's office, pertaining to 11/17/86 unidentified object sighting by Japan Air Lines flight 1628. (5 pages)

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August 2010

Technical Guidelines for Digitizing Cultural Heritage Materials: Creation of Raster Image Master Files

For the Following Originals - Manuscripts, Books, Graphic Illustrations, Artwork, Maps, Plans, Photographs, Aerial Photographs, and Objects and Artifacts

Acknowledgements: Federal Agencies Digitization Initiative Still Image Working Group; Rebecca Osborne and Catherine Scott, IBM; Karen Griggs; Erin Rhodes and Steven Puglia, US National Archives and Records Administration

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I. INTRODUCTION

Context

The *Technical Guidelines for Digitizing Cultural Heritage Materials: Creation of Raster Image Master Files* represents shared best practices followed by agencies participating in the Federal Agencies Digitization Guidelines Initiative (FADGI) Still Image Working Group for digitizing cultural heritage materials. This group is involved in a cooperative effort to develop common digitization guidelines for still image materials (such as textual content, maps, and photographic prints and negatives) found in cultural heritage institutions.

These *Guidelines* were prepared by members of the working group during the winter of 2009-2010. This document draws substantially on the National Archives and Records Administration's *Technical Guidelines for Digitizing Archival Records for Electronic Access: Creation of Production Master Files – Raster Images* (June 2004), but has been revised and updated in several areas to reflect the current recommendations of the working group and to reflect changes that have occurred in the digitization field during the last five years. Readers will find updated sections covering equipment and image performance metrics, quality management, and metadata in this revision.

For more information on the activities of the FADGI Still Image Working Group, please see http://www.digitizationguidelines.gov/.

Purpose

One of the tasks of the FADGI Still Imaging Working Group is to develop digital imaging guidelines that encourage and reflect collaborative digitization practices among federal agencies (and other interested institutions) in order to provide the public with images of uniform quality, and to provide a common set of practices and technical benchmarks for digitization service providers and manufacturers.

In the context of the work of the FADGI Still Imaging Group, some of the primary objectives of these *Guidelines* are to:

- Provide an approach to digitization that is practical today
- Describe technical parameters that promote a "well-defined" imaging environment
- Provide a consistent approach to imaging and metadata collection that will be appropriate for a wide range of outputs and purposes
- Define a common set of quality or performance metrics to be used in describing and evaluating the digital object, as well as methods of validating those measures to defined requirements
- Lay the groundwork for issues the Still Imaging Working Group intends to focus on in the coming months for potential incorporation into these *Guidelines*, including: metric aims and limits for imaging performance and quality specifications; color encoding accuracy; master and derivative file formats; transmissive image analysis targets; full lifecycle quality management plan; objective and subjective image performance analysis, and embedded/minimal metadata, among others

These *Guidelines* define approaches for creating high quality digital copies of originals used primarily for facilitating online access and hardcopy reproduction. They *may* be considered appropriate for preservation purposes (to create copies that could replace the original), but this largely depends on the local or internal policies of an organization. Therefore, the recommendations in this document may not be appropriate for all preservation uses (for example, scientific analysis).

Master files

These *Guidelines* provide technical approaches to the creation of raster image (pixel-based) master files. In creating master files, the primary objective is to produce digital images that look like the original items and to create a "reasonable reproduction" without enhancement. However, practice may vary from institution to institution regarding the amount of processing or editing that is performed on master files.

In general, master files have the following attributes:

- Maintain the essential features and information of the original
- Represent the best copy produced by a digitizing organization, with *best* defined as meeting the objectives of a particular project or program
- Represent digital content that the organization intends to maintain and manage for the long term
- Are created primarily for the production of a range of copies used for specific purposes (such as derivatives and duplicates)
- Document the image at the time of scanning, not what it may once have looked like if restored to its original condition

Institutions may create one or more digital master copies depending on the nature of the originals and the intended purpose of digitization. Digitization should be done in a "use-neutral" manner, and should not geared for any specific output. If digitization is done to recommended image parameters and all other requirements as described in these *Guidelines*, we believe the master image files produced should be usable for a wide variety of applications and outputs. If digitization is done to meet the alternative minimum image parameters and all other requirements, the master image files should be usable for many access applications, particularly for web usage and reproduction requests.

Generally, given the high costs and effort for digitization projects, we do not recommend digitizing to anything less than the alternative minimum image parameters. This assumes availability of suitable high-quality digitization equipment that meets the assessment criteria described (see the section on Quantifying Scanner/Digital Camera Performance) and produces image files that meet the minimum quality described in the *Guidelines*. If digitization equipment fails any of the assessment criteria or is unable to produce image files of minimum quality, then it may be desirable to invest in better equipment or to contract with a vendor for digitization services.

SCOPE

The focus of the *Guidelines* is on historical, cultural and archival materials. The scope is limited to digitization practices for still image materials only (e. g., textual content, maps, photographic prints and negatives).

The *Guidelines* are intended to be informative, not prescriptive. We acknowledge that this document does not address the entire range of imaging quality parameters (such as noise, distortion, etc.), but these topics will be incorporated as the Still Image Working Group identifies recommendations in these areas. The Working Group has produced a "Gap Analysis" document that identifies and prioritizes digitization activities that are not currently defined within existing agency guidelines, or are not adequately addressed by existing guidelines. The Gap Analysis contains topics that the Working Group intends to investigate and provide as updates and recommendations in future versions of these *Guidelines*.

The current Gap Analysis can be found on the FADGI website at:
http://www.digitizationguidelines.gov/stillimages/documents/Gap.html.

We hope to provide a technical foundation for digitization activities, but further research will be necessary to make informed decisions regarding all aspects of administrative, operational, and technical issues surrounding the creation of digital images. These guidelines provide a range of options for various technical aspects of digitization primarily relating to image capture, but do not recommend a single approach.

The following topics are addressed in this document:

- Digital image capture for still images – creation of master files, image parameters, digitization environment, color management, etc.
- Color encoding accuracy – color space, color temperature for imaging and viewing, quality of linear vs. area arrays, and quality of different interpolation algorithms

II. TECHNICAL OVERVIEW

Raster Image Characteristics

Spatial Resolution

Spatial resolution determines the amount of information in a raster image file in terms of the number of picture elements or pixels per unit of measurement, but it does not define or guarantee the quality of the information. Spatial resolution defines how finely or widely spaced the individual pixels are from each other. The higher the spatial resolution, the more finely spaced and the higher the number of pixels overall. The lower the spatial resolution, the more widely spaced and the fewer the number of pixels overall.

Spatial resolution is measured as pixels per inch or PPI; pixels per millimeter or pixels per centimeter are also used. Resolution is often referred to as dots per inch or DPI. In common usage, the terms PPI and DPI are used interchangeably. Since raster image files are composed of pixels, technically PPI is a more accurate term and is used in this document (one example in support of using the PPI term is that Adobe Photoshop software uses the pixels per inch terminology). DPI is the appropriate term for describing printer resolution (actual dots vs. pixels); however, DPI is used often in scanning and image processing software to refer to spatial resolution and this usage is an understandable convention.

The spatial resolution and the image dimensions determine the total number of pixels in the image; an 8"x10" photograph scanned at 100 ppi produces an image that has 800 pixels by 1000 pixels or a total of 800,000 pixels. The numbers of rows and columns of pixels, or the height and width of the image in pixels as described in the previous sentence, is known as the pixel array. When specifying a desired file size, it is always necessary to provide both the resolution and the image dimensions; ex. 300 ppi at 8"x10" or even 300 ppi at original size.

The image file size, in terms of data storage, is proportional to the spatial resolution (the higher the resolution, the larger the file size for a set document size) and to the size of the document being scanned (the larger the document, the larger the file size for a set spatial resolution). Increasing resolution increases the total number of pixels, resulting in a larger image file. Scanning larger documents produces more pixels resulting in larger image files.

Higher spatial resolution provides more pixels, and generally will render more fine detail of the original in the digital image, but not always. The actual rendition of fine detail is more dependent on the spatial frequency response SFR) of the scanner or digital camera (see Quantifying Scanner/Digital Camera Performance below), the image processing applied, and the characteristics of the item being scanned. Also, depending on the intended usage of the master files, there may be a practical limit to how much fine detail is actually needed.

Signal Resolution

Bit-depth or signal resolution, sometimes called tonal resolution, defines the maximum number of shades and/or colors in a digital image file, but does not define or guarantee the quality of the information.

In a 1-bit file each pixel is represented by a single binary digit (either a 0 or 1), so the pixel can be either black or white. There are only two possible combinations or $2^1 = 2$.

The common standard for grayscale and color images is to use 8-bits (eight binary digits representing each pixel) of data per channel and this provides a maximum of 256 shades per channel ranging from black to white; $2^8 = 256$ possible combinations of zeroes and ones.

High-bit or 16-bits (16 binary digits representing each pixel) per channel images can have a greater number of shades compared to 8-bit per channel images, a maximum of over 65,000 shades vs. 256 shades; 2^{16} - 65,536 possible combinations of zeroes and ones.

Well done 8-bits per channel imaging will meet most needs - with a limited ability for major corrections, transformations, and re-purposing. Gross corrections of 8-bit per channel images may cause shades to drop out of the image, creating a posterization effect due to the limited number of shades.

High-bit images can match the effective shading and density range of photographic originals (assuming the scanner is actually able to capture the information), and, due to the greater shading (compared to 8-bits per channel), may be beneficial when re-purposing images and when working with images that need major or excessive adjustments to the tone distribution and/or color balance. However, at this time, monitors for viewing images and output devices for

printing images all render high-bit images at 8-bits per pixel, so there is limited practical benefit to saving high-bit images and no way to verify the accuracy and quality of high-bit images. Also, it is best to do a good job during digitization to ensure accurate tone and color reproduction, rather than relying on post-scan correction of high-bit images. Poorly done high-bit imaging has no benefit.

Color Mode

Grayscale image files consist of a single channel, commonly either 8-bits (256 levels) or 16-bits (65,536 levels) per pixel with the tonal values ranging from black to white. Color images consist of three or more grayscale channels that represent color and brightness information. Common color modes include RGB (red, green, blue), CMYK (cyan, magenta, yellow, black), and LAB (lightness, red-green, blue-yellow). The channels in color files may be either 8- bits (256 levels) or 16-bits (65,536 levels). Display and output devices mathematically combine the numeric values from the multiple channels to form full color pixels, ranging from black to white and to full colors.

RGB represents an additive color process: red, green, and blue light are combined to form white light. This is the approach commonly used by computer monitors and televisions, film recorders that image onto photographic film, and digital printers/enlargers that print to photographic paper. RGB files have three color channels: 3 channels x 8-bits = 24-bit color file or 3 channels x 16-bits = 48-bit color. All scanners and digital cameras create RGB files by sampling for each pixel the amount of light passing through red, green and blue filters that is being reflected or transmitted by the item or scene being digitized. Black is represented by combined RGB levels of 0-0-0, and white is represented by combined RGB levels of 255-255-255. This is based on 8-bit imaging and 256 levels from 0 to 255; this convention is used for 16-bit imaging as well, despite the greater number of shades. All neutral colors have equal levels in all three color channels. A pure red color is represented by levels of 255-0-0, pure green by 0-255-0, and pure blue by 0-0-255.

CMYK files are an electronic representation of a subtractive process: cyan (C), magenta (M), and yellow (Y) are combined to form black. CMYK mode files are used for prepress work and include a fourth channel representing black ink (K). The subtractive color approach is used in printing presses (four color printing), color inkjet and laser printers (four color inks, many photo inkjet printers now have more colors), and almost all traditional color photographic processes (red, green and blue sensitive layers that form cyan, magenta and yellow dyes).

LAB color mode is a device independent color space that is matched to human perception: three channels representing lightness (L, equivalent to a grayscale version of the image), red and green information (A), and blue and yellow information (B). One benefit of LAB mode is that it is matched to human perception, and also LAB mode does not require color profiles (see section on color management). Disadvantages of LAB include the potential loss of information in the conversion from the RGB mode files from scanners and digital cameras, the need to have high-bit data, and the fact that few applications and file formats support it.

Avoid saving files in CMYK mode; CMYK files have a significantly reduced color gamut (see section on color management) and are not suitable for master image files for digital imaging projects involving holdings/collections in cultural institutions. While theoretically LAB may have benefits, at this time we feel that RGB files produced to the color and tone reproduction described in these guidelines and saved with an Adobe RGB 1998 color profile (or, alternatively, an sRGB color profile), are the most practical option for master files and are relatively device independent. We acknowledge that the workflow described in these guidelines to produce RGB master files may incur some level of loss of data; however, we believe the benefits of using RGB files brought to a common rendering outweigh the minor loss.

Digitization Environment

Our recommendations and the ISO standards referred to below are based on using CRT monitors; however, the criteria specified below also applies to LCD monitors, as LCDs have now replaced CRTs in most imaging environments.. Be aware that inexpensive LCD monitors may have artifacts that make it difficult to distinguish image quality problems in the image files, and the appearance of colors and monitor brightness can shift with the viewing angle of the LCD panel. We recommend using a high-end LCD monitor designed for the graphic arts, photography, or multimedia markets.

Viewing Conditions

A variety of factors will affect the appearance of images, whether displayed or printed on reflective, transmissive or emissive devices or media. Those factors that can be quantified must be controlled to assure proper representation of an image.

We recommend following the guidance in the following standards-

- ISO 3664 Viewing Conditions- For Graphic Technology and Photography

  Provides specifications governing viewing images on reflective and transmissive media, as well as images displayed on a computer monitor without direct comparison to any form of the originals.
- ISO 12646 Graphic Technology – Displays for Colour Proofing – Characteristics and Viewing Conditions

  Provides specific requirements for monitors and their surrounds for direct comparison of images on a computer monitor with originals (known as soft proofing).

NOTE: The following are common parameters controlled by users, however, refer to the standards for complete requirements and test methods. In particular, ISO 12646 specifies additional hardware requirements for monitors to ensure a reasonable quality level necessary for comparison to hardcopy.

Monitor Settings, Light Boxes, and Viewing Booths

We assume the assessment of many digital images will be made in comparison to the originals that have been digitized, therefore ISO 12646 should be followed where it supplements or differs from ISO 3664.

We recommend digital images be viewed on a computer monitor set to 24 bits (millions of colors) or greater, and calibrated to a gamma of 2.2.

ISO 12646 recommends the color temperature of the monitor also be set to 5000K (D50 illuminant) to match the white point of the illumination used for viewing the originals.

Monitor luminance level must be at least 85 cd/m², and should be 120 cd/m² or higher.

The computer/monitor desktop should be set to a neutral gray background (avoid images, patterns, and/or strong colors), preferably no more than 10% of the maximum luminance of the screen.

For viewing originals, we recommend using color correct light boxes or viewing booths that have a color temperature of 5000K (D50 illuminant), as specified in ISO 3664.

ISO 3664 provides two luminance levels for viewing originals, ISO 12646 recommends using the lower levels (P2 and T2) when comparing to the image on screen.

The actual illumination level on originals should be adjusted so the perceived brightness of white in the originals matches the brightness of white on the monitor.

The Room

The viewing environment should be painted/decorated a neutral, matte gray with a 60% reflectance or less to minimize flare and perceptual biases.

Monitors should be positioned to avoid reflections and direct illumination on the screen.

ISO 12646 requires the room illumination be less than 32 lux when measured anywhere between the monitor and the observer, and the light a color temperature of approximately 5000K.

Practical Experience

In practice, we have found a tolerable range of deviation from the measurements required in the ISO standards. When the ambient room lighting is kept below the limit set in ISO 12646, its color temperature can be lower than 5000K, as long as it is less than the monitor color temperature.

To compensate for environments that may not meet the ISO standards, as well as difficulties comparing analog originals to images on a monitor, the color temperature may need to be set higher than 5000K so that the range of grays from white to black appears neutral when viewed in the actual working environment. The higher color

temperature may also be necessary for older monitors to reach an appropriate brightness, as long as neutrals don't appear too blue when compared to neutral hardcopy under the specified illumination.

Monitor Calibration

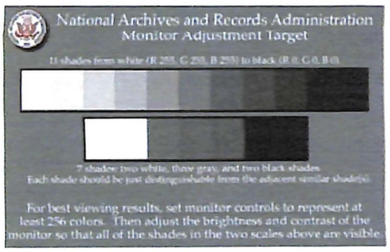
In order to meet and maintain the monitor settings summarized above, we recommend using LCD monitors designed for the graphic arts, photography, or multimedia markets.

A photosensor-based color calibrator (colorimeter or spectrodensitometer) and appropriate software (either bundled with the monitor or a third party application) should be used to calibrate the monitor to the aims discussed above. This is to ensure desired color temperature, luminance level, neutral color balance, and linearity of the red, green, and blue representations on the monitor are achieved.

If using an ICC color managed workflow (see section on color management), an ICC profile should be created after monitor calibration for correct rendering of images.

The monitor should be checked regularly and recalibrated when necessary.

Using a photosensor-based monitor calibrator, however, does not always ensure monitors are calibrated well. Ten years of practical experience has shown calibrators and calibration software may not work accurately or consistently. After calibration, it is important to assess the monitor visually, to make sure the monitor is adjusted appropriately. Assess overall contrast, brightness, and color neutrality of the gray desktop. Also, evaluate both color neutrality and detail rendering in white and black areas. This can be done using an image target of neutral patches ranging from black to white and saved in LAB color mode (since LAB does not require an ICC profile and can be viewed independently of the color managed process). In addition, it may be helpful to evaluate sample images or scans of targets – such as the NARA Monitor Adjustment Target (shown below) and/or a known image such as a scan of a Kodak grayscale adjusted to the aimpoints (such as the NARA aimpoints 8-8-8/105-105-105/247-247-247) described below.



When the monitor is adjusted and calibrated appropriately, the NARA Monitor Adjustment Target (shown at left) and/or an adjusted image of a Kodak gray scale will look reasonably accurate. Images with ICC color profiles will display accurately within color managed applications, and sRGB profiled images should display reasonably accurately outside color managed applications as well. The NARA Monitor Adjustment Target and the gray scale aimpoints are based on an empirical evaluation of a large number of monitors, on both Windows and Macintosh computers, and represent the average of the group. Over the last fifteen of years calibrating and adjusting monitors in this manner, we have found the onscreen representation to be very good on a wide variety of monitors and computers.

Quantifying Scanner/Digital Camera Performance

Introduction

A key element in our approach to developing guidelines is to describe and document a common foundation of quality metrics for investigating and evaluating digital objects created through digital imaging.

The first table in this section (Part 1 – Taxonomy of Digital Imaging Performance) provides just that - a taxonomy of imaging performance. This hierarchical classification demonstrates the connections among related [existing] imaging characteristics, and provides context and a framework for the array of commonly used terms and the appropriate imaging standards available for the evaluation of digital image files.

The additional five tables in this section (Part II – Evaluation and Quality Control of Digital Imaging) build upon the framework set forth in the first table and provide operational metrics and criteria for evaluating digital image characteristics for purposes of investigation or, when used with specific requirements, or for quality control purposes.

Future work of the Still Image Working Group will rely on the information in these tables to establish quantitative guidelines using the described derivative metrics and evaluation criteria. The actual values that will be inserted into specific imaging guidelines will depend on the content to be digitized and the objectives for digitization.

Graphical symbols used in the row labeled "Evaluative Criteria *(units)*" indicate Primary, Secondary and Tertiary measures (see tables below).

These have meaning both across and within metrics. Across the metrics or image characteristics, they indicate the relative importance as a factor of image quality; from the highest (Primary) to the lowest (Tertiary).

The same concept applies within the measurement for a given metric. Taking SFR as an example, Max SFR gain is suggested as the Primary Measure under Sharpening, and Sign of SFR slope as a Secondary Measure. There are also two additional informational tiers included in the table. One of these provides a listing of related descriptive terms that may be more commonly known to users. The bottom-most tier provides a list of possible causes of failure related to a particular metric.

A a short primer and overview on imaging science is available as a Powerpoint at
http://digitizationguidelines.gov/stillimages/presentations.html

Part 1 - Taxonomy of Digital Imaging Performance

See subsequent pages for information on definitions, candidate evaluation criteria, related descriptive terms, and failure causes

Foundation Metrics	Signal										Signal-to-Noise Ratio	Noise													
Engineering Metrics	OECF (Opto-Electronic Conversion Function)				SFR (Spatial Frequency Response)							Radiometric Distortion NPS (Noise Power Spectrum)									Geometric Distortion				
Derivative Metrics	*Speed / Sensitivity*	*Tone, Exposure*	*White Balance/ Neutrality*	*Color Encoding Accuracy*	*Sampling Rate*	*Resolution*	*Sharpening*	*Acutance*	*Flare*	*Depth of Focus*	*Dynamic Range*	*Total Noise*				*Chroma Noise*		*Regional (deterministic)*	*Color Misregistration (deterministic)*	*Aliasing (deterministic)*	*Spatial SFR Uniformity (deterministic)*	*Pincushion/Barrel (deterministic)*			
												Temporal	*Fixed pattern*												
												Random (stochastic)	*Banding/Streaking (deterministic)*	*Defects (stochastic)*	*Non-uniformity (deterministic)*	*Color Uniformity (deterministic)*	*Color SFR Uniformity (deterministic)*							

* While imaging noise is generally considered to be of a random or stochastic granular nature (e.g., photographic film grain), it can actually take many forms. We have chosen to categorize it in both by its deterministic and stochastic behaviors.

Part II - Evaluation and Quality Control of Digital Imaging

- SIGNAL -

Engineering Metrics	OECF – Opto Electronic Conversion Function (ISO 14545) TTF – Tone Transfer Function TRC – Tone Reproduction Curve *definition* : Average large area digital response of an electronic imaging device to light stimuli			
Derivative Metrics	**Sensitivity** **(ISO 12232)** *definition:* The reciprocal of the amount of light necessary to achieve a desired output response.	**Tone and Exposure** *definition* : characteristic behavior of large area digital output response (count value) to spectrally neutral input stimuli (gray patch)	**White Balance/Neutrality** *definition* : equivalence of large area color channel output responses to a range of spectrally neutral input stimuli	**Color Encoding/Rendering Accuracy** *definition:* The difference between selected physically measured input colors and their intended output rendering from a given color space.
Related descriptive term	– Responsivity – Speed – Exposure Index (EI)	– Too dark/light – Under/over exposed – No shadow/highlight detail – Clipping – Contrast – Exposure Accuracy	- Color cast - Gray balance	– Over/under saturated colors – Color balance is wrong – Memory colors are not correct – Color Accuracy – Color Saturation
Evaluation Criteria *(units)* ●=Primary ●=Secondary O=tertiary	●: Saturation based speed *units: TBD*	●: Average, median, maximum or RMS deviation from aim for neutral patches of interest. *units:* Count Values, ΔL*, Density, F-stops	●: Average, median, maximum, or RMS deviation from aim between color channels (R-G, R-B, G-B) for neutral patches of interest. *Units (●):* Count Values, $\Delta E_{a^*b^*}$, *Units (●):* Delta C, Delta H	●: Average, median, maximum, or RMS deviation from aim for chromatic patches of interest *Units (●):* Count Values, Delta E (ΔE), Delta E ($\Delta E_{a^*b^*}$), *Units (●):* Delta C, Delta H
	●: Noise based speed *units: TBD*	●: Deviation from a reference OECF gamma value *units:* gamma (unitless)		
	O: Exposure Index, Standard Output Sensitivity			
Possible failure causes	- Inefficient imaging detector	–Auto-contrast failures –Inappropriate black/white point calibration. - Wrong gamma selection or tone aim	– Poor auto-white balance algorithm – Bad white /black point calibration – Sparse gray patch balancing – Color Balance – Strongly colored environmental surround	– Color profile tweaked for preference – Wrong color profile intent – Wrong color profile chosen/embedded – Color profile assumptions inconsistent with practice (i.e. lighting quality, gamma, intent, etc.) – Environmental : highly chromatic color surround/clothing

- SIGNAL -

Engineering Metric	SFR - Spatial Frequency Response – (ISO 12233, ISO 16067-1, ISO 16067-2, ISO 15524) MTF – Modulation Transfer Function *definition* : A spatial frequency descriptor of an imaging system's ability to maintain the relative contrast of input stimuli					
Derivative Metrics	**Sampling Rate** *Definition:* The reciprocal of the center-to-center distance between closest adjacent pixels. The number of samples per unit distance.	**Resolution** *Definition: An* imaging system's ability to resolve finely spaced detail. The level of spatial detail that can resolved in an image	**Sharpening** *Definition* :Amplification of the SFR by means of image processing to achieve sharper appearing images	**Acutance** *Definition:* An objective SFR based metric that is used as a correlate to perceived image sharpness.	**Flare** *Definition:* a skirty or wide spreading of light.	**Depth of Focus** *Definition: The distance along the optical axis that remains within acceptable focus.*
Related descriptive term	- Megapixels - Dots per inch (dpi) - Pixels per inch (ppi) - Sampling frequency	– Blurred – Soft – Sharp – In/Out of focus – Spherical aberration – Spatial detail	– Oversharpening (haloing, garish edges) – Snap – Edgy, Sharp, Crisp – Edge enhancement - Unsharp masking	- Sharp	– Low contrast – Hazy – Ghosting - Veiling flare - Glare - Integrating cavity effect (ICE)	- Depth of field - Circle of confusion - Focus tolerance - Hyperfocal distance
Evaluation Criteria (*units*) ●=Primary ◒=Secondary ○=tertiary	●: The number of captured or delivered pixels per unit distance in both the horizontal and vertical dimensions *units:* dots-per-inch, pixels-per-inch	●: 10% sampling efficiency based on Luminance SFR *units:* (unit less) ●: Min/Max 10% spatial frequency limits of Luminance SFR *units:* dpi, cycles/mm ◒: Min/Max 50% spatial frequency limits of Luminance SFR *units:* dpi, cycles/mm	●: Max SFR gain *units:* % SFR response ◒: Sign of SFR slope *units :* positive/negative slope value	●: Area under the SFR as weighted by an appropriately chosen visual contrast function. *units:* TBD	● % Flare - *units: (unit less)*	●: Distance along the optical axis that remains in acceptable focus *units:* inches, mm.
Possible failure causes	- Poor calibration technique - Wrong choice of units at calibration	- Poor (auto) focus - Poor optics - Poor choice of aperture stop - Mechanical vibration - Over aggressive noise control	- Over aggressive sharpening settings - Insufficient signal to amplify - Thinking that if a little is *good* then *more* must be better.	- Optical performance exceeds sampling rate	- Dirty lens - Light source directed into lens - Poor quality lens - Stray light	- Poor F-number choice

– NOISE –

Engineering Metric	– Radiometric Distortion – *definition:* The deviation of any given spatially imaged point from an aim radiant energy value relative to the input object.					
Derivative Metrics	Noise Power Spectrum (NPS) *Total Noise* *Definition* : A spatial frequency descriptor of the sources of radiometric noise of an imaging component or system				Chromatic Noise *Definition* : The inter-color channel radiometric deviations relative to an identified aim	
Derivative Metrics	Temporal Noise	Fixed Pattern Noise			Color Uniformity (deterministic) *Definition* : A difference in large area uniformity/shading between color channels	Color SFR uniformity (deterministic) *Definition:* The differential spread of light between color channels.
	Random (stochastic) *Definition* : The root mean square deviation (std. deviation) of both temporal and fixed pattern noise for a single color channel	Banding/ Streaking (deterministic) *Definition* : One dimensional patterns	Defects (stochastic) *Definition* : point or clusters of defective or poorly corrected pixels	Non-Uniformity/ Shading (deterministic) *Definition:* A deviation in the effective illumination over a capture device's field of view; usually with lower illumination near the field's outer extent.		
Related descriptive term	- Temporal noise - Grain - Shot noise - Read noise - White noise	- Stripes - Banding - Streaking	- Hot, Cold, or Dead Pixels - Wounded Pixels - Blinkers	- Vignetting - Relative illumination	- Rainbows	– Colored edges – Color Bleed – Fringing
Evaluation Criteria (*units*) ●=Primary ❤=Secondary O=tertiary	●: RMS deviation of pixel values in terms of selected metric(i.e., counts, density, Luminance) over an identified region of interest *units:* counts, density, Luminance	●: The relative amount of variance or noise power that a selected spatial frequency band contributes to the total noise. *units:* TBD	●: The number or size of defects per unit sensor area. *units:* # of defects/unit sensor area	●: The percent deviation of several large area luminance measurements over the field of view relative to the average of those measurements. *units:* % Luminance difference (unit less)	●: The percent deviation of several large area chroma measurements over the field of view relative to the average of those chroma measurements. *units:* % chroma difference (unit less)	●: The difference in SFR response between selected color channels. *units:* % deviation in SFR response relative to the highest measured SFR (unit less)
Possible failure causes	- Aggressive digital signal amplification or processing - High ISO speed selection - High throughput workflows	- Poor sensor calibration - dust/dirt on linear array sensor - poor sensor calibration	- dust on sensor - poor sensor fabrication hygiene - poor sensor calibration	- poorly designed optics - non-uniform lighting	- Chief ray angle (CRA) mismatch between optics and sensor - Non-uniform color coatings at sensor fabrication.	- Poor optical design or performance