PROJECT 10073 RECORD CARD

20 September 1957	2. LOCATION Mantauk, N.Y. to Benson, Pa	12. CONCLUSIONS ☐ Was Balloon ☐ Probably Balloon ☐ Possibly Balloon ☐ Was Aircraft ☐ Probably Aircraft ☐ Possibly Aircraft ☐ Was Astronomical ☐ Probably Astronomical ☐ Possibly Astronomical ☒ Other Radar malfunction & ECM ☐ Insufficient Data for Evaluation ☐ Unknown
3. DATE-TIME GROUP Local GMT 20/1906 to 1917Z	4. TYPE OF OBSERVATION ☐ Ground-Visual ☒ Ground-Radar ☐ Air-Visual ☐ Air-Intercept Radar	
5. PHOTOS ☐ Yes ☒ No	6. SOURCE USAF Radar Units	
7. LENGTH OF OBSERVATION approx 12 minutes	8. NUMBER OF OBJECTS exact nr not given	9. COURSE 275 dgr app

10. BRIEF SUMMARY OF SIGHTING

Two radar untis (one in N.Y. & other in Pa) observed high speed targets heading west. Alerted other radar units along a pre-plotted track. Fighter intercepter units (ADC) in Michigan & Wisconsin scrambled to intercept. No contact made. Nothing unusual seen. Targets faded. Radar investigation team set up to check this incident. Findings made in special report(in case file).

11. COMMENTS

Investigations disclose that there was an equipment malfunction in first radar unti; when frequency changed, spurious targets disappeared. //Determined that two SAC a/c were dropping streams of radar chaff in area. Also, the targets shown in the set were completely abnormal.//Conclusions: No compelling reason or indications that targets were hostile or enemy a/c or missiles.

ATIC FORM 329 (REV 26 SEP 52)

(7) Other applicable units were checked.

In brief, the conclusions are as follows:

a. From the information and data studied from all pertinent units it appears that the tracks were from separate causes; and, in fact much of the information appeared to be contradictory.

b. No hostile or unknown aircraft, missiles or vehicles were in the area at the time and places of the radar sightings. The UFOs were concluded to have been caused by radar-equipment malfunctions and interference.

[redacted]

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3. Alleged High-Speed "UFOs" Tracked from Montauk, New York and Heading towards SAC Headquarters, Nebraska - 20 September 1957 [redacted])

a. Commander, ATIC, was requested by Deputy ACS/I, Headquarters USAF to provide full particulars and other related information regarding a reported potential, very high-speed unidentified object alleged to have been picked up near Montauk, N.Y., passing over Buffalo, towards SAC Headquarters at Offutt AFB, Nebraska. The incident resulted in an immediate alert by both SAC and ADC.

b. Detailed report of the incident based on investigations and analyses conducted:

(1) Track was picked up originally by the radar unit at Montauk, N. Y. at 1906Z time, 20 September 1957. It was picked up by Benton, Pa., unit at 1918Z.

(2) The radar units at Highlands, N.Y., N. Truro, Mass., Locksport, N.Y. and Claysburg, Pa., were alerted. However, these units could not make contact with the supposed target.

(3) F-102 aircraft were scrambled from Kinross AFB (ADC) (Michigan) as well as additional F-102's from Truax AFB (Wisconsin) as the target was reported bearing on a pre-plotted track in that direction. No contact made; nothing unusual found. The tracks faded at this point. (Significant to point out that the last observed track was in the vicinity of Benton, Pa., and not in the vicinity of SAC Hq as reported to ATIC). Weather conditions: overcast and rain.

(4) NORAD set a radar team to study this incident, including similar targets if they should appear.

(5) On 25 September, a radar team noted a series of blips on the radarscope of the Montauk, N.Y. Station, the unit originally reporting the tracks. The tracks were "exactly identical" to those of 20 September. When the channel (frequency) was changed the blips disappeared. They reappeared when the original frequency was tuned in. A circuit malfunction or interference from a radar set having a non-rotating antenna was considered the most probable cause for this.

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Auth [illegible] LT COL, USAF
By [illegible]
Date 27 Jan 69
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(6) Meanwhile, a check of the Benton, Pa. radar unit disclosed that there were two SAC aircraft in the area which dropped "Streams of radar chaff" near the station on the day of the incident. It was also determined that the detection and characteristics of these targets were completely abnormal, probably caused by equipment malfunction.

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[redacted]

1230 - Wed sday, 26 Feb 58

Mr. [redacted]:

(Paraphrased) Reference inquiries regarding Martha's Vineyard radar incident evaluation requested by General W., full particulars are in. In brief, report not entirely correct that radar units made observation all the way across to point supposedly a target.

Track was picked up originally by two stations in New York. First contact was at Montauk, N. Y. However, radar units along line (paraphrase) to S were alerted. These units did not see target on radarscopes.

F 102 aircraft were scrambled from various bases in Michigan as well as Wisconsin. No contacts made, nothing unusual found, and tracks faded at this point.

A radar team was set up to study this incident, including similar targets if they should appear. On 25 September the radar investigating team was in the original radar unit that sighted the tracks. Exactly identical tracks appeared. When frequency was changed to new channel the blips disappeared. They reappeared when the previous channel was tuned back in.

A check of the second radar unit disclosed that there were two SAC aircraft in the area which dropped "streams of radar chaff" near the station on the date of sighting. It was also determined that the detection and characteristics of the targets observed were completely abnormal. The other applicable units were also checked by this investigative team.

CONCLUSION:

In brief the conclusions are as follows:

a. The information and data studied from all pertinent units appeared to be unrelated and in fact contradictory to each other.

b. It is, therefore, difficult if not impossible to draw any valid conclusions, although there is no compelling reason or indications that the tracks were hostile, or unknown aircraft, or missiles.

A full report will be on your desk upon return.

George T. Gregory/aa
Captain, USAF
Air Science Division
ATIC

file UFO

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

2 May 1958

MEMORANDUM FOR MAJOR GENERAL WALSH

SUBJECT: Air Defense Radar Incident

1. I have reviewed the attached account of an Air Defense radar incident with great interest. I referred the report to my electronics officer who advised me that he is inclined to agree with the NORAD team that the most probable cause of this incident was equipment malfunction. However, he also stated that he is unable to suggest a specific malfunction that would result in an incident precisely as reported.

2. Considering factors such as deceleration times, lack of good correlation, etc., I am inclined to believe that the object reported, if it actually existed, is most probably not a weapon of enemy origin. Nevertheless, I believe that from your standpoint, this incident should not be closed. Some additional engineering opinion would be of value and I suggest that your electronics people as well as ARDC may be able to shed further light on the problem. In the meantime, you may want to consider asking ADC's assistance in having radar sites report similar types of incidents on a special effort basis for the next few months with the objective of determining whether this is in fact an isolated instance.

Inclosure
NORAD Rpt
[redacted]

Howell M. Estes, Jr.
HOWELL M. ESTES, JR.
Major General, USAF
Assistant Chief of Staff for
Air Defense Systems

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Auth Quintanilla, LT COL, USAF
By [illegible]
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AFCAD Cont. #580808

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For Gen Walsh

26 February 1958

Had alerted *Gen Parts. 30 days before we heard of this particular event

MEMORANDUM TO: Mr. Arcier, 4X1

THRU: Colonel Gilbert, 4E

SUBJECT: Evaluation of Air Defense Radar UFO Incident - Requested by General Walsh

*on spurious radar returns mistaken for UFOs or hostile missiles

1. Reference is made to Gen Walsh's request to Gen Watson regarding full particulars on a long-duration, potentially hostile high-speed tracks (reportedly) originating near Martha's Vineyard, Mass., passing over Buffalo, New York, Cleveland, Ohio and pointed towards SAC Headquarters at Omaha, Nebraska. The incident resulted in an immediate alert by ADC and SAC.

2. Attached is a detailed report of the incident, properly plotted, carefully analyzed and concluded. For purposes of contacting Gen Walsh and presenting the incident in brief form, the following are submitted:

a. Track was picked up originally by the radar unit at Montauk, New York at 1906Z time, 20 September 1957. It was picked by Benton, Pa unit at 1918Z.

b. The radar units at Highlands, N.Y., N. Truro, Mass, Locksport, N.Y. and Claysburg, Pa. were alerted. However, these units could not make contact with the supposed target.

c. Two F-102 aircraft were scrambled from Kinross AFB (ADC) (Michigan) as well as two additional F-102's from Truax AFB (Wisconsin) as the target was bearing on a pre-plotted track in that direction. No contact made; nothing unusual found. The tracks faded at this point. (Significant to point out that the last observed track was in the vicinity of Benton, N.Y. and not in the vicinity of SAC HQ as reported to ATIC). Weather conditions: overcast and rain.

d. NORAD set up a radar team to study this incident, including similar targets if they should appear.

e. On 25 September, the radar team noted a series of blips on the radarscope of the Montauk, N.Y. Station, the unit originally reporting the tracks. The tracks were quote "exactly identical" to those of 20 September. When the channel (frequency) was changed the blips disappeared. They reappeared when the previous channel was tuned in.

Not reported to ACIN-4 ~~[illegible]~~ We investigated this after being told about it by Gen. Walsh.

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By [illegible]
Date [illegible]
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Classification Cancelled
(or changed to UNCLAS)
Auth. [illegible] LT COL, USAF
By [illegible] (UFO)
Date 27 Jan 69
AFR 205-1 para 1-12b

ATIC Electronics
Analysis Concurs
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Incl #1

f. A check of the Benton, Pa. Unit disclosed that there were two SAC aircraft in the area which dropped "streams of radar chaff" near the station on 20 September 57. It was also determined that the detection and characteristics of these targets were completely abnormal.

g. Other applicable units were checked.

3. Conclusions: In brief, the conclusions are as follows:

a. The information and data studied from all pertinent units appeared to be unrelated, and in fact contradictory to each other.

b. It is therefore [redacted] impossible to draw any valid conclusions, although there appears no indication that the tracks were hostile or unknown aircraft or vehicles.

4. This report has not been channeled through the Electronics Division, because of the urgent request that all results be brought immediately to your attention, for subsequent transmission to AFCIN. This report, in the opinion of the undersigned, should be of value to personnel involved in analyzing radar UFOs. It will, therefore, be reproduced and forwarded to AFCIN-4E1 for their possible guidance.

do this

George T. Gregory

1 Incl
NORAD Rpt, cy #1
(T58-5070)

GEORGE T. GREGORY
Captain, USAF
AFCIN-4E4

Reason why NORAD Radar Ev. Rept Not Sent Ry 4E1:

Mr. [redacted] was standing by and ready to leave for Wash D.C. when this rept came in. Summary (This memo) made that afternoon — and given to Mr. G. who left the next morning.

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3. Benton established an initial plot on an unknown target north of the station at 1918Z. The track described a westerly course at a speed of about 920 knots. The target was tracked continuously until it faded at 1926Z. At 1924Z, 2 minutes prior to the fading of the unknown target, a new target appeared at a position northeast of the station at a speed of 1,200 knots. This target described a track that closely paralleled that of the first track and faded at 1943Z at a position northwest of the station.

4. These unknown tracks were passed to the 763d ACWRON (Migrate) at Lockport AFS, N.Y. and to the 772d ACWRON AFS (Silvertone) at Claysburg AFS, Pennsylvania; however, these radars failed to establish a contact with the targets.

5. Four Divisions went to a state of Increased Readiness during the time period. The 20th CADD and the 31st CADD at 2008Z and the 30th CADD and 37th CADD at 1943Z.

6. No scramble action was taken by the 26th CADD due to the very high speed of the target. When the track first appeared on the CFECR plotting board at 1907Z, the 37th CADD was notified and at 1910Z two F-102 aircraft from Kinross were scrambled. The 37th then scrambled two additional F-102s from Truax. By this time, both tracks had faded.

RELATED DATA

1. GENERAL: On 25 and 26 September 1957, ACW maintenance and operations personnel associated with the 20 September incident

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EVALUATION OF AIR DEFENSE INCIDENT OF 20 SEPTEMBER 1957

STATEMENT OF OBJECTIVES

The objective of this study is to evaluate the circumstances associated with the detection and reporting of high-speed radar tracks on 20 September 1957. Specifically, the evaluation was aimed at determining whether or not the tracks were caused by airborne objects and to determine, if possible, the nature of the airborne vehicles or other phenomena which caused the tracks.

RESUME OF EVENTS

1. On 20 September 1957 at 1906Z, the 773d ACWRON, located at the Montauk AFS, New York, established an initial plot on a high speed unidentified object southeast of the station at a range of 190 nautical miles, and tracking toward the station at an estimated speed of 3600 knots. Track information was forward told to the 26th CONAD Division, CFECR, and to NORAD COC. In addition, it was passed laterally to adjacent radars; the 646th ACWRON at Highlands AFS, N.Y. and the 762d ACWRON at North Truro, Massachusetts. These radars were not able to establish contact with the target.

2. The unknown track was lost at a range of 50 miles southeast of Montauk at 1907.45Z. The track was dead-reckoned by Montauk AFS and passed by the 26th CONAD Division to the 648th ACWRON at Benton AFS, Pennsylvania, as heading west at a speed of 2,000 knots and an estimated altitude of 50,000 feet.

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discussed with the NORAD team the events leading up to, and those associated with, the detection and reporting of the high speed tracks on 20 September 1957. The details of the above discussions along with the NORAD team observations are contained in the following paragraphs.

2. MONTAUK AFS: Montauk Air Force Station is located on the northeastern tip of Long Island, N. Y. The following is a list of radar equipment and operating parameters associated with this station at the time of the incident:

Prime Search AN/FPS-20	(1250-1350 mc) Dual Channel
Emergency Search AN/FPS-8	(1280-1350 mc) non-operational
Height Equipment AN/FPS-6	(2700-2900 mc)
Antenna Rotation Rate AN/FPS-20	5 rpm
Antenna Tilt (Electrical)	2.2°
Pulse Recurrence Frequency	400 pps
Blip/Scan Ratio on BB-6 from Detection to Fade	1.0

a. Circumstances Related by the Montauk Operations Personnel: Prior to the detection of the high speed track BB-6, the duty controller was engaged in an intercept over the Rocket and Gunnery Range south of the Montauk Station. Scope displays and the appearance of routine traffic seemed normal.

At approximately 1905:48Z, a target return was observed on a PPI console at a range of approximately 210 n.mi. east southeast of the station. An initial track was established on it at 1906Z,

Range 190 n.mi., azimuth 140°, speed 3,600 knots. The scope operator immediately called this track to the attention of the duty controller and the floor supervisor. The three operations personnel observed this track throughout its course until it faded at approximately 50 n.mi. southeast of the station. This fade occurred within the M. T. I. area. The average speed of the track over its entire length was 5,400 knots. At the time of the incident, there were 3 UPA-35, 4 GPS-23 consoles and one height scope in operation.

The basis for the altitude estimation on track BB-6 was so unreliable the NORAD team was forced to disregard it. Derivation of height associated with part of track BB-6 is discussed later in this report.

The target was detected and tracked on a UPA-35 scope but it was not observed on the height finder nor on any other scope in the operations room; however, due to the short time that this target was carried, it was impossible for the operations personnel to evaluate or assess the conditions of the other scopes in the operations room. No jamming or intense interference were present at this time and weather in this area was low overcast with slight rain. Further weather analysis is included later.

Upon receipt of the initial target information, the 26th AD alerted other related sites within the 26th AD area to be on the lookout for this high speed track. The stations initially alerted were Highlands and North Truro. Subsequently, Claysburg, Pa., Benton, Pa., and Lockport, N.Y. were alerted as a result of

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dead-reckoned pre-plot information. None of these stations except Benton, Pa., detected anything that could possibly have been correlated with track BB-6. Antiaircraft units in the area of the track penetration were also advised but were unable to obtain contact with this target. Texas Tower #2, the picket ships and AEW stations in the area did not report unusual, high speed targets during this time.

The characteristics of the target blip described by the three operations personnel indicated that this return appeared realistic insofar as shape and size were concerned. The initial target return observed at 210 n.mi. was thought to be that of an aircraft showing Mark X identification. Several sweeps later the Mark X beacon control at the scope was placed in the off position but the target characteristics remained the same. As the target approached the station, the size diminished but the intensity remained the same. Tracking continuity and blip/scan were 100% throughout the entire track.

The FPS-20 was operating on Channel 2 during this period. At 1910Z, Channel 2 failed and the set went off the air. Thirty seconds later Channel 1 was in operation. A defective tube in the modulator caused the above failure. Set operation and console noise level appeared normal during the time of the incident.

b. NORAD Team Observations: At 2000Z on 25 September, the NORAD team observed a series of random blips on a UPA-35 console. These blips occurred at a constant azimuth of 160° but at various ranges. The operations personnel involved in the 20

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September incident were called to observe this and they immediately identified the blips as being exactly the same as those observed on 20 September. The variations in ranges were to some degree uniform in their appearance, i.e., the blips would occur at approximately 210 n.mi., approach the station at speeds of 3,000 to 3,500 knots for 3 or 4 sweeps then would appear at a different range unacceptable to track coherence. Other scopes in the operations room were also displaying these blips. This condition was observed throughout the night by the operations personnel at Montauk. The next morning the transmitter was changed to Channel 1 and the condition disappeared. At the request of the NORAD team, on the evening of 26 September, the site changed back to Channel 2 and the condition again appeared.

The following is a summary of the most important characteristics of, and technical environment surrounding, the Montauk target phenomenon on 20 September 1957.

At the initial stage of detection, this object's electronic configuration was described as similar to that of B-52 type aircraft when observed at long range, with the exception of its speed. Several sweeps later the electronic configuration of this target changed to that of a smaller object, yet the heading of the target and its aspect remained constant. Normal target returns from conventional or jet type aircraft do not reflect such radical changes in their size as this target did unless they undergo radical changes in aspect ratio. In fact, it is very difficult for experienced operators to detect changes in target size when the aircraft

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is maintaining a constant track.

The target intensity of track BB-6 remained constant throughout the entire tracking period. Normal target returns fluctuate in intensity to such a degree that the condition is visually obvious to the operator.

Tracking was continuous and the blip/scan ratio was 1.0 over the entire track. A 1.0 blip/scan ration on conventional and jet aircraft without beacon or Mark X is a rare occurrence under normal operation.

The fact that this target was of such size to sustain a 1.0 blip/scan ratio at Montauk AFS would indicate that other stations within detection distances certainly should have received some indication of this track.

Mutual interference, that is, interference of one rotating radar with another rotating radar operating at or fairly close to the same operational parameters will normally produce "spirals" occurring at the outer edge of the PPI scope and spiraling into the center of the scope along with extremely high background noise levels. The noise level on the scope, of course, is proportional to the power transmitted by the interfering radar. It was impossible to associate track BB-6 with previously experienced mutual interference patterns of two rotating radars. It would be possible, however, to generate a condition of this sort with a fixed-antenna type radar operating at or close to the frequency and PRF of the rotating radar. The team was unable to ascertain the location of any fixed radar stations in that area that could produce such a

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condition. The non-rotating radar station would have to have mobility in view of the movement of this phenomenon from one azimuth to another over a period of several days, and its installation would have had to have been made recently due to the absence of this type phenomenon in the past.

3. BENTON AFS: Benton Air Force Station is located approximately 35 n.mi. NW of Wilkes-Barre, Pa. The following is a list of equipment and operating parameters associated with this station at the time of the incident:

Primary Search Equipment	AN/FPS-10 (2700-3020 mc)
Height Finding Equipment	AN/FPS-6 (2700-2900 mc)
Antenna Rotation Rate	5 rpm
Antenna Tilt (Electrical)	Search 1.5° Vertical Lower 3° Vertical Center 6° Vertical Upper 11°
Pulse Recurrence Frequency	300 PPS
Blip/Scan on BB-6 and BE-111 from Detection to Fade	1.0

a. Circumstances Related By Benton Operations Personnel: Prior to detection of high speed track BB-6, traffic and scope presentations at Benton were normal. At 1755Z and 1758Z two SAC aircraft requested permission to run ECM against Benton. The duty controller advised approval and the two aircraft commenced chaff runs at 1805Z and 1810Z, respectively. Aircraft dropped chaff in streams north of the station extending west to approximately 220 n.mi. Chaff dispensing ended at 1832Z and 1835Z. The residual effects of the chaff cloud were visible on the radar consoles for over an hour's period.

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At 1916Z, Benton received four overlap pre-plots from 26th AD Control Center on an unidentified target said to be heading west at 2,000 knots with an estimated altitude of 50,000 feet. At 1917Z Benton detected a target on the vertical upper beam heading northwest with an estimated speed of 920 knots. This target was correlated as being BB-6 from Montauk. The track was carried on VU until contact was lost at a point approximately 135 n.mi. northwest of the station. It was again picked up on vertical center and tracked until it faded at 1926Z. No further pickup on this track was made.

At 1924Z the second track was detected on VU 75 n.mi. north of the station heading 290°, estimated speed 1,200 knots. This track had no correlation and was numbered BE-111. It was carried on VU until contact was lost at a point approximately 145 n.mi. northwest of the station. It was again picked up on vertical center at 160 n.mi. northwest and carried until it faded at 190 n.mi., 305°. Both tracks were interrogated by Mark X with no response. All track information was passed to the ACW site at Lockport and Claysburg but these sites did not detect either of these tracks. Lockport was off the air for maintenance during the entire time Benton was tracking and did not return to operation until 1935Z, one minute after the track BE-111 faded. Lockport observed the residual effects of the chaff drop. Anti-aircraft units in the area of concern did not report any unusual, high-speed target activity.

B-58 aircraft activity was considered as a possible cause for the track at Benton AFS; however, a message to WADC established that no B-58s were flying in this area at this time.

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Technical data and radar performance characteristics associated with B-58 aircraft are non-existent at this time and as a consequence, the NORAD team was without a capability to effectively assess the target data derived and properly associate this data with B-58 characteristics.

At the time of the incident, Benton had one OA-99 PPI console on each of the three vertical beams and the Air Surveillance Officer used a fourth OA-99 to monitor all beams. Of these, only one OA-99, manned by two airmen, displayed the targets (first on the VU and then on the VC beams). No detection of BB-6 or BE-111 was made on any other scope in the station. No detections were made on FPS-6 or on the VL or search beams of the FPS-10. The operating parameters of the FPS-10 were within normal operating limits. Weather at this station was low overcast with slight drizzle.

b. NORAD Team Observations: The NORAD team was unable to duplicate the above condition by scope analysis. All scopes had indications of interference patterns typical of those that would be generated by interference from other radars. The technical parameters associated with this type interference should not produce crossing tracks. The degree of this interference was not sufficient to deteriorate the performance of the station. The radar returns as described by the operations personnel indicate that these returns were not characteristic of normal radar targets. Except for the high rate of speed and unexplained variations in speed, the blips described a normal aircraft track. These blips differed from normal returns in that they were round in shape with

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a slight fuzziness around the periphery and were estimated to be about twice the diameter of a return from a B-52 at maximum radar range. The intensity of the blips remained constant throughout the entire track. Tracking continuity and blip-scan ratio was 1.0.

The following is a summary of the characteristics of, and technical environment surrounding, the Benton target phenomenon on 20 September 1957.

The two tracks did not possess qualities of normal radar returns, i. e., they had a 1.0 blip-scan ratio throughout the entire tracking period. They maintained a constant target intensity. The size and shape varied considerably from that of normal returns and they were not detected on the search or vertical lower beams. Targets having returns as strong and persistent as these should be seen on all beams of an FPS-10. Only one scope in the station displayed this track and detection could not be made on the height finder. In addition, other sites in the immediate area were alerted sufficiently in advance to acclimate themselves to the situation, yet no other detections were made by these other stations.

It should be noted that Lockport was off for maintenance and did not return to operation until one minute after the target faded at Benton. The 1.0 blip-scan Ratio at Benton and the target location at the time of the fade would indicate the track should have been detected by Lockport.

The detection and fading characteristics of these targets were completely abnormal. The screening angles for Benton AFS do not exceed 0° throughout the area of concern. The tracks were detected well within the

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line of site capabilities of the station and faded well within the line of site capabilities of the station. Both detection and fade plots were at 1.0 blip-scan ratio.

EVALUATION

1. Operational Procedures: Operational procedures as demonstrated by the NORAD system and its subordinate elements were as specified by appropriate operational directives. Weapon commitment procedures were appropriate to the speed, altitude and radar tracking characteristics of the target track.

a. Montauk AFS: The actions of the radar surveillance personnel were commendable in that during a 2-minute period the target was detected, initiated as a track, five position plots recorded and forward told to the 26th CONAD Air Division, and to adjacent radars.

It was noted that the height-range indicator at Montauk is physically located so that it cannot be used on short notice. It was also noted that radar scope photo equipment was not readily available to obtain a photographic record of this track.

b. Benton AFS: The operation at Benton, Pa., was in accordance with current operational directives. The target was detected and passed to adjacent radars and to higher echelons. A determined effort to collect data was made.

It was noted that radar scope cameras were committed to a training program and were not employed to record this track.

c. 26th CONAD Air Division: The control center personnel promptly noted the track, assembled personnel of authority and passed track information

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to other concerned radars and to higher echelons.

d. CONAD Forces Eastern CONAD Region: The Combat Operations Center personnel promptly noted the track and properly passed track information to those Air Defense Divisions along the probable flight path of the object. The appropriate divisions were placed on increased readiness. Interceptors were scrambled ahead of the track along its dead-reckoned course.

e. NORAD: Operational procedures at the NORAD Combat Operations Center were in accordance with current directives. Track information was passed to CONAD Forces Central CONAD Region in time for them to have interceptors on CAP along the probable flight path of the track. Preliminary information on this track and on NORAD actions were passed to the SAC Control Center and to the USAF Command post.

2. Analysis of Track Overlays: The most obvious feature of the two segments of Track BB-6, and one which contributed most directly to the original correlation, was the similarity of their courses. The first portion carried by Montauk described a course of approximately 289° while the course of the second portion carried by Benton was about 278°. A line drawn along the "average" course of the first segment and extended to the area where the second part of the track was established passes within about 20 miles of the point of detection of the second segment. Courses of radar tracks on bomber aircraft are seldom more consistent than this.

The first track segment appeared to curve slightly toward the west just prior to its fade. This change in course was based on only one or two returns; however, after discussing the track with the station operating personnel it was concluded that this change was well within the normal variations caused by plotting errors. This turn then, may not have actually occurred.

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The speeds of the two portions, while far less consistent than the courses, were compatible enough to preclude discounting a correlation on the basis of speed. The track carried by Montauk attained a length of about 143 n.mi. in 95 seconds, giving an average speed of 5,400 knots (as opposed to 3,600 knots reported on the initial plot). Although the time period over which the track was carried by Montauk was too short to provide accurate estimates of speed changes, it appears that the track speed was, if anything, increasing. The last two plots, covering a 15-second time span, advanced the track approximately 45 n.mi. giving an average speed of about 10,000 knots for this portion of the track. Again it is emphasized that these estimates must be viewed with caution because of the very short observation time.

The second part of BB-6 covered a distance of 128 n.mi. in a period of 8 minutes. The average speed here was about 960 knots. The plots in this track segment indicate a speed of above 1,200 knots at the beginning and end of the track and a speed slightly below 900 knots in the middle portion of the track. Track BE-111, which paralleled the segment of BB-6 carried by Benton, achieved a length of 205 n.mi. in 10 minutes for an average speed of 1,230 knots.

Since the speeds of the two segments of BB-6 differ by a factor of nearly six to one, a logical attempt to correlate the two segments can be made only if one assumes that the track decreased in speed during the 10 1/4 minutes it was dead-reckoned. On the basis of the two average speeds, i. e., 5,400 knots and 960 knots, an average deceleration of 26,600 knots per hour would be required over the entire 10 1/4 minutes to account for the

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speed difference. If the track had decelerated at this rate it should have progressed about 530 n.mi. during the dead-reckoned period instead of the 280 miles it actually did travel. Since neither segment indicated a marked deceleration it would be more logical to suppose that if the track decelerated, it did so only for a part of the dead-reckoned time. In this case, the time and distance correlation would have been even less acceptable.

Except for the high blip-scan ratio observed at each station, there was virtually no similarity in the scope displays on the track segments. The return seen at Montauk appeared to represent a normal target. The blips were approximately the same size and shape as normal target returns and the only discrepancy observed was the relatively great decrease in blip size as the track approached the station. The returns seen at Benton were larger than normal blips and appeared round in shape. All blips in Benton's track were identical and exhibited none of the variations in size or intensity characteristic of real target returns. The manner in which the second portion of the track faded was entirely unrealistic for an outbound track. The blips remained large and round out to the point where the fade occurred and at this point the "paints" abruptly stopped. The fade on the portion of BB-6 carried by Montauk was more abrupt than would be expected for such persistent returns but is believed that a real track could fade in this manner.

To summarize the discussion on track correlation: the correlation in the courses of the two segments of BB-6 is remarkably good while the correlation in time and distance, even assuming a highly unlikely speed profile, is questionable. There seems to be no similarity between the scope displays seen at the two stations. Track BE-111 carried by Benton

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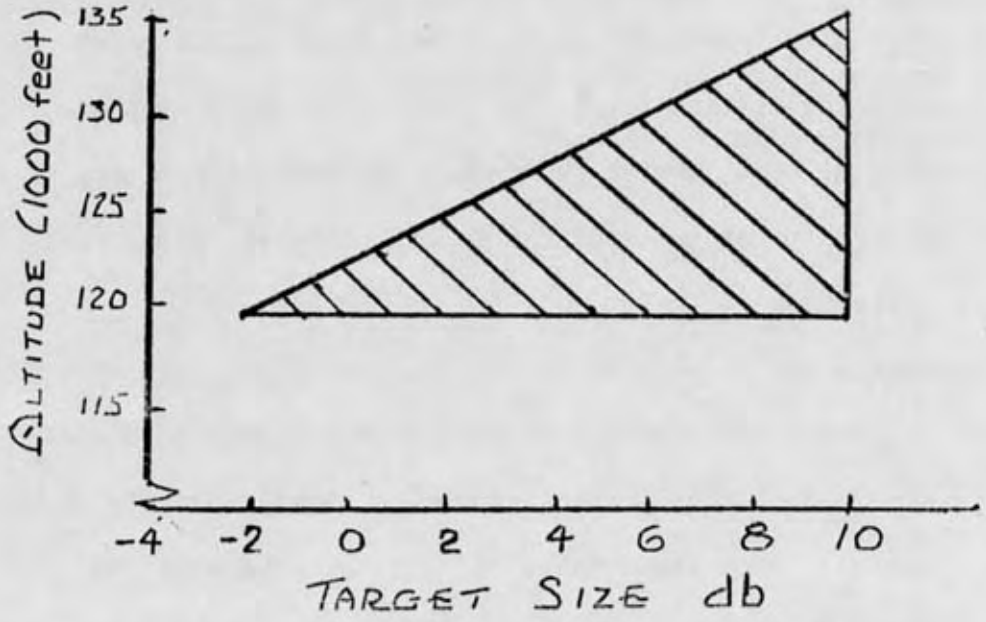
must be considered an extra track which correlates with neither of the other segments.

3. Characteristics of Airborne Objects: The ADC Range Coverage Indicator was used in an attempt to determine the characteristics of an airborne object which could produce tracks similar to the ones observed at Benton.

Using an average range based on the range at which the target was last observed on the VU lobe and the range of initial detection on the VC lobe, an estimate of target size and altitude was made. It was found that a plus 10 db target at 135,000 feet is the smallest object that could be lost on the VU lobe and be detected on the VC lobe at approximately this range. Applying the same procedure to the range at which the target disappeared from the VC beam, it was determined that the smallest object which could produce this effect would be a minus 2 db target at 120,000 feet. This information is shown graphically in the following figure:



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The cross-hatched area of the figure represents the limits of the characteristics of an object which could produce the tracks observed at Benton; however, two major discrepancies must be noted concerning the above target size and altitude data:

a. No known type of airborne object should produce a 1.0 blip-scan ratio during the entire length of the track from its initial detection to its abrupt disappearance.

b. Based on the above target size and altitude estimates, the RCI indicates that the observed tracks were also within the detection capability of the VL and search kit beams; therefore, the tracks should have been detected in these beams.

4. Missile Characteristics:

a. Possibility of Cruise Type Missile: Tracking subsequent to the first pickup indicated a speed of approximately 5,400 knots or Mach 9. Considering the so-called heat or thermal barrier problem this would be an extension of the state of the art so far beyond present day accomplishments as to be considered impossible for some time to come. In order to escape the heat barrier an airplane flying at this speed would have to fly above 300,000 feet. This again is so far beyond present day accomplishment as to be considered extremely unlikely. On the other hand, if we consider only the second pickup (by Benton), the ground speed of that portion (approximately 1,000 knots) would be consistent with the present state of the art.

b. Possibility of Ballistic Missile: A horizontal speed of Mach 9 is consistent with a 900 n.mi. range ballistic missile. The 1,000 knot portion of the track is also consistent with ballistic missile re-entry

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speeds; however, a ballistic missile would re-enter the atmosphere and land in a period of 30 to 200 seconds and cover only 20-40 miles while doing so, whereas, the track carried by Benton extended over 100 miles and about 8 minutes subsequent to detection. Similarly, the second track carried by Benton fails to demonstrate the deceleration characteristics of a ballistic missile re-entry. Thus, if we consider the two pickups to be on the same object, it seems unlikely that the object was a ballistic missile.

c. To summarize: Considering the two tracks as a unit it seems very unlikely that the object was either a cruise type or a ballistic missile.

Considering tracking on the first segment only, one might conclude that it could have been a ballistic missile.

Considering tracking subsequent to the second pickup only, one might conclude that it could have been a cruise type missile.

5. Meteor Characteristics: Meteors were also considered as a possible cause of high speed radar tracks. It was hypothesized that a meteor approaching the earth at a relatively large angle (as measured from the horizontal) might produce a track having a horizontal component of velocity which could correlate with the portion of track BB-6 observed from Montauk. Upon closer examination, however, it appears that such a hypothesis is untenable.

Meteors penetrating the earth's atmosphere can be detected and tracked by radar, but the results of research in this area indicate that it would be extremely unlikely that a radar return from a meteor would

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