Exhibit 3C

Letter from Captain Mohsen El Missiry, dated 7/31/00,
Egyptian Delegation comments on
Air Traffic Control Group Chairman's Factual Report

39 pages

July 31, 2000

Mr. Gregory Phillips
National Transportation Safety Board
490 L'Enfant Plaza, S.W.
Washington, DC 20594

Dear Mr. Phillips

Please find attached herewith, the Egyptian Delegation comments to be included in the docket with reference to the "ATC Group Chairman's Factual Report".

Sincerely,

Captain / Mohsen El Missiry
Chief of Egyptian Investigation Committee

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EGYPTIAN CIVIL AVIATION AUTHORITY

AIR TRAFFIC CONTROL ACCIDENT INVESTIGATION SUMMARY AND SUMMARY OF ADDITIONAL TASKS

July 24,00

Subject: EgyptAir Flight 990
Atlantic Ocean
October 31, 1999

Background: The Egyptian Civil Aviation Authority (ECAA) has worked closely with the National Transportation Safety Board (NTSB) since the opening stages of the subject accident investigation. During the past 9 months, the ECAA has submitted numerous requests for data, tests, documents and clarification on many aspects of the Safety Board's air traffic control investigation. The following document is a factual, chronological summary of the air traffic aspects of the accident which underscores areas where the ECAA believes the procedural ATC irregularities in the handling of EgyptAir Flight 990 are related to the accident. This summary also discusses ATC radar data issues involving possible other aircraft near Flight 990. Finally, the summary provides a complete list of the requests made by the ECAA to the NTSB and to the Federal Aviation Administration (FAA) for air traffic data, procedural information, and other material that is critical to understanding the impact of the air traffic control handling and processes on the EgyptAir Flight 990 accident.

Discussion: The summary ATC report addresses the following four areas:

1. The Radar Analysis Report discusses the likelihood of at least 3 unidentified objects near EgyptAir Flight 990 just before the onset of the accident sequence at 0649:53 UTC.

2. The handling of EgyptAir Flight 990 with respect to the flight plan, the performance of the air traffic control specialists who handled this flight, the status of the primary Host/NAS computer and the operation of the backup Direct Access Radar Channel, the routing of EgyptAir Flight 990, other aircraft that were in the ATC system (ATC transcript and/or radar transponder return), and the status of various military warning areas.

3. A summary of the requests made by the ECAA to the NTSB and a discussion of how well each was resolved along with follow-on questions.

4. Open, unresolved issues, especially those outlined in a June 18, 2000 letter to Administrator Jane Garvey.

1. Radar Analysis Report dated July 21, 2000

The report was developed by the ECAA with assistance from a consultant is based on extensive analysis of the radar data from the numerous radar sites which were related to or involved in the accident. The report contains three pages of discussion and three radar data plots. The summary of the report is as follows:

- Many unidentified returns formed continuous flight paths. These targets were traveling generally from east to west at a high ground speed;
- The altitude of the targets is not identified;
- The continuous flight paths of the unidentified returns crossed the path of EgyptAir Flight 990 several times;
- The only explanation for the returns are:
  - An unknown, undocumented phenomenon that is unique to that location;
  - That they were caused by objects in the area which were operating without a transponder, at a high speed, in the various military warning areas.
- That further information is needed from the NTSB, the FAA, or from other U.S. government agencies to resolve the issues discussed in the report.

The ECAA Summary Report are directly related to the Radar Analysis Report, and reflect requests by the ECAA, dating back to April 25, 2000 for important date and clarification of information that have a direct impact on the resolution of the questions related to other unidentified objects that may have been near EgyptAir Flight 990 just before, or at the time of the accident.

2. The Air Traffic Handling of EgyptAir Flight 990

The ECAA summery report provides a detailed, time frame-based discussion of the air traffic handling of the flight. Specific air traffic control specialists' conversations from FAA ATC transcripts are cited to underscore the procedural irregularities. One important observation is that from about 0647:18 UTC to 0654:00 UTC EgyptAir Flight 990 was not observed by any air traffic control specialist. At the same time, questions still remain unresolved whether the air traffic controllers failed to note other primary radar targets that are discussed in the Radar Analysis Report and in other parts of the ECAA Summary Report.

Also the report contain conclusions related to the ATC handling of EgyptAir Flight 990.

A brief review of the air traffic information covering the period from when EgyptAir

Flight 990 taxied at JFK until the accident indicates the following:

- The Host was out of service and ZNY was operating in a backup mode - DARC.

- Flight plan information for EgyptAir Flight 990 was not complete and at least at one point the flight plan was not passed to the appropriate controllers.

- There is no radar data for El Al 2812 although it took off shortly after 0616:32 UTC.

- At 0624:48 UTC the R66 controller did not have flight plan data on EgyptAir Flight 990.

- At 0632:43 UTC the R86 controller entered data on ARISE 57. However, there is no radar data on this aircraft.

- The last transmission from EgyptAir Flight 990 was at 0647:39 UTZ yet it was not until 0654:00 UTC that the R86 controller announced radar contact lost.

- Between 0649:53 UTC and 0650:29 UTC the EgyptAir Mode C went from FL329 with a full data block to FL183, which was the last transponder return in the ZNY computer.

- Recorded discussions between air traffic control specialists indicated problems with the ATC data process, ATC procedural irregularities, a lack of knowledge of procedures, and a general unawareness to the flight path of EgyptAir Flight 990.

0624:48 UTC	ZNY	"Doesn't anybody know over at the tower that they gotta put these flight plans back in?"
0625:01 UTC	N90	"It's disgusting."

  0625:03 UTC through 0632:23 UTC - Exchanges between controllers about problems caused by lack of data and flight plans.

- Several aircraft were cited in ATC transcripts but no radar data was found.

  ARISE 57 squawk 1625, ELY2812 squawk 3002
  Aircraft with squawk 5606, 1216, 3635 and 6757
  Aircraft with squawk 2855

3. Summary of ECAA Requests to the NTSB

The ECAA summary report list the ATC requests on March 2, 2000 and June 19, 2000. Additionally, a letter will be sent to the State Department following the recommendation of the U.S. NTSB who said they were unable to obtain the information requested by the ECAA. This letter will request additional ATC information that the NTSB could not provide.

The numerous requests of the ECAA for ATC data were made in an effort to complete, as quickly as possible, the ATC investigation. A review of the requests to the NTSB, the U.S. State Department and the FAA clearly illustrates the unanswered questions related to the ATC handling of EgyptAir Flight 990, a lack of awareness to the total ATC environment, and unexplained radar data which indicates the presence of other objects near EgyptAir Flight 990 just before the accident.

4. Open, Unresolved ATC Requests and the June 18, 2000 Letter to the FAA

The following requests have been made to the FAA for answers to questions that continue to be critical to the investigation of EgyptAir Flight 990.

1. The clutter and interference studies for the radar sites, RIV, ZNY, and NOR.

2. Multiple radar coverage charts for New York and Boston Centers at FL 50, 100, 200 and 300.

3. The antenna radiation pattern for the ASR 9 and ARSR radar.

4. Available technical data to analyze any interference affecting RIV.

5. The ATC transcript shows the ARISE 57 is radar contact, yet the radar data fails to show this aircraft.

6. El Al Flight 2812 (squawk 3002) was cleared to depart JFK, but does not appear in the radar data.

7. An unknown aircraft (squawk 2655) was detected at FL 3330 until 0619:25 UTC, but has no data thereafter.

8. Unknown aircraft (squawk 5606, 1216, 3635 and 6757) appear in Navy data, but not in Air Force data.

9. NOR radar data terminates at 0652:04 UTC, while RIV data continues until 0659:02 UTC.

SUMMARY

The Radar Summary Report, the ECAA Summary Report of the air traffic control investigation, and the June 18, 2000 letter to Administrator Garvey illustrate the extent and complexity of this aspect of the investigation. They also clearly outline the work that remains and the issues and questions that have not been resolved. A critical question that has not been addressed centers on the likelihood that there were undetected (by ATC) objects near EgyptAir Flight 990 just before the accident which could have influenced the actions of the pilot of EgyptAir Flight 990.

EGYPTIAN CIVIL AVIATION AUTHORITY

Subject: EGYPT AIR MSR 990 ACCIDENT OCTOBER 31st, 1999

Summary:

Reference is made to the factual report prepared by NTSB ATC/RADAR group, documents, radar data and information received consequently from NTSB as indicated below:

1. The primary Host/NAS (National Airspace System) Computer and software were out of service since 04 30 00 UTC.

2. Traffic control center (ZNY) was operating in a backup mode called Direct Access Radar Channel (DARC).

3. The DARC system does not have the capability to process flight plan data base information as the Host/NAS does. Controllers must transfer flight plan data either verbally or via paper flight strips, per standard FAA procedures.

4. As part of the transition to DARC, all flight plans stored in the Host/NAS, including MSR 990, were printed out at the appropriate sector in the procedure called "flush". This procedure gives the controllers a printed flight strip of the flight plan, although altitude and time references need to be manually written on the strip. The strips of MSR 990 didn't include written altitude & time.

5. While operating in DARC controllers must pass flight plan information to other facilities verbally via telephone landlines.

6. After returning to Host/NAS operation flight plan data must reentered into the computer.

7. ZNY logs indicates the warning areas were not in use on the night of accident, another document indicates that W 105 was hot on 31st of October 1999...!!!!

8. The sectors have direct radar and radio coverage out to approximately 200 miles offshore.

9. At 05 53 UTC the pilot of EgyptAir 990 (MSR 990) called the JFK Tower Clearance Delivery (CD) position for clearance.

10. LC asked ZNY "I had EgyptAir 990, he was proposed out at 03 30 is that flight plan still good or ... computer just came up."

11. ZNY respond that's still good.

12. <u>LC asked ZNY to give him a new code or the 3000 code or give him...!!!</u>

13. ZNY respond "the code that he has is good" and added "I need you to clear him gayle as filed, and ...!!! Looking for thirty one."

14. LC respond "ah thirty one thousand no ...!!" and then LC mentioned "alright I'll give him thirty one".

15. Both ZNY and LC confirmed the flight level thirty one thousand by saying alright (at 05 56 41 & 05 56 43 See page A6).

16. At 05 59 43 MSR 990 advised "we are ready for our clearance".

17. At 06 00 20 LC issued the IFR clearance to MSR 990 to Cairo via the Kennedy seven departure, gateway climb, vectors shipp then as filed. Maintain five thousand expect flight level three three zero, one zero minutes after. Squawk one seven one two, Oscar the current atis, departure frequency one two five point seven.
<u>Notice the assigned altitude is 330 while it was 310 in 14, 15 & 16</u>.

18. The pilot of MSR 990 read back the clearance.

19. At 06 11 56 MSR 990 requested taxi clearance. LC instructed MSR 990 to taxi via taxiway B and hold short of runway 31 R at taxiway ZA.

20. At 06 13 05 advised "hold short left bravo and hold short three one zulu alpha".

21. At 06 13 51 ELY 2812 called LC for clearance.

22. LC respond "EL Al two eight one two good morning you are cleared to Frankfurt via Kennedy seven departure actual it is a betty two departure and Nantucket transition start out with a gateway climb then as filed maintain five thousand expect flight level two niner zero, one zero minutes after squawk three zero zero two and ah Oscar the current atis departure frequency one two point seven.

23. El Al pilot read back the clearance and advised that "we would like a possible take off on runway three one left".

24. LC informed El Al 2812 that the runway 31 left is available, but it is not noise abatement, selected runway tonight so we are going of two two right.

25. El Al 2812 insisted for runway 31 left, and called LC to confirm three one left for him.

26. So at 06 15 32 UTC, LC respond "alright El Al 2812 when you are ready to taxi if you

need 31 left I will give you 31 left".

27. El Al respond "ok thank you".
Notice that there is no information or radar data shown for the El Al 2812 flight.

28. At 06 15 42 MSR 990 reported approaching the hold short position for runway 31 R. At the same time the ZNY Host/NAS system returned to service, flight plans purged from the Host/NAS during the earlier flush procedure were no longer stored in the computer.

29. LC cleared MSR 990 to cross runway 31 R and to hold short of runway 22 R. The pilot acknowledged, then at 06 17 56 UTC the pilot reported holding short of runway 22 R.

30. LC instructed MSR 990 to taxi into position and hold on runway 22 R, then notified the NY TRACON controller (N 90) that ZNY had confirmed plan was still good.

31. LC told MSR 990 the wind was from 240 degrees at 10 knots and the runway visual range was greater than six thousand feet.

32. At 06 19 22 UTC LC cleared MSR 990 for take off, the pilot acknowledged the take off clearance.

33. At 06 21 07 UTC LC instructed MSR 990 to contact N 90 on frequency 125.7.

34. At 06 21 20 UTC N 90 departure controller established radar contact with MSR 990 and issued a climb to FL 130.

35. 06 21 57 UTC N 90 cleared MSR 990 direct to SHIPP intersection.

36. 06 24 46 UTC N 90 initiated hand off of MSR 990 to ZNY Manta sector R66.
R66 he didn't have flight plan data on MSR 990 ...!!!
R66 authorized N 90 to issue a climb to FL 230 for MSR 990.
N90 read R66 the flight plan route.

37. 06 25 48 UTC R66 accepted the hand off and placed a data tag on the aircraft transponder return.

38. 06 26 04 UTC R66 authorized N90 to issue the climb clearance to FL 230 for MSR 990 and to contact ZNY on frequency 134.55.

39. 06 29 57 UTC R66 looked for, and found the flush strip with MSR 990 flight plan, he entered flight with an abbreviated route and verbally confirmed the mode C altitude of MSR 990.
40. 06 31 26 UTC R66 completed a hand off and frequency change to ZNY Atlantic/Jaboc sector R86.
MSR 990 reported on R86's frequency climbing to FL230.
R86 was on the land line with ZNY sector R89 accepting flight data on ARISE 57, a military

aircraft that would entering R86's space from the south.

41. 06 31 40 R86 interrupted the land line call acknowledge MSR 990.

42. 06 32 16 UTC:

R66 Ok. I just wanted to make sure there wasn't anybody else so, I didn't have to threw out the strips and then not find them.

KDR Well just because you don't have a ticket on anybody doesn't meant there is nobody else, but that is all you know, that's the best information I have got now.

R66 Yeah, if you don't have a ticket and it is not in the machine, I don't have a ticket either so we are both gonna be in dark.

43. 06 32 43 UTC R86 completed entering data on ARISE 57.

44. 06 32 53 UTC ATC radar indicated MSR 990 leveled at FL 230, approximately 62 miles southeast of JFK.

45. 06 35 52 UTC:

- MSR 990 passed airspace boundary with Boston ARTCC approximately 90 miles southeast of JFK.
- R 86 instructed MSR 990 to climb to FL 330 and to proceed forward to the DOVEY intersection.

This new route crossing warning areas w 105 & w 506, where the flight level 110 to 500 is permissable when release to FAA.

46. 06 41 59 UTC R 86 issued the oceanic clearance via North Atlantic Track Zulu and MSR 990 read back the clearance.

47. 06 44 27 UTC ATC radar displays indicate MSR 990 leveled at FL330.

48. 06 47 18 UTC R 86 instructed MSR 990 to change radio frequencies to 125.9 for better communication coverage.

49. 06 47 38 UTC The pilot acknowledged and reported on frequency125.9 to R 86.

There were no further transmissions from MSR 990. No deviations from the Air Traffic Clearance were observed on the atc displays through this time

50. DATA EXTRACTED FROM ZNY HOST/NAS COMPUTER

06 49 53 UTC MSR 990 Mode C indicated FL 329, the full data block associated with the aircraft indicated FL 330 C (C means that the mode C is within 300 feet of the assigned value)

06 50 05 UTC MSR 990 mode C altitude indicated FL 315

06 50 17 UTC MSR 990 mode C altitude indicated FL 254

06 50 29 UTC MSR 990 mode C altitude indicated FL 183 (LAST TRANSPONDER RETURN IN THE ZNY COMPUTER)

06 50 41 UTC A primary radar return from MSR 990.

The last three Transponder mode C altitude returns would have been presented as XXXX on the controller's screen, this would have indicated an abnormal condition.

06 51 33 UTC MSR 990's data block indicated cost status which means that the computer could no longer associate MSR 990's flight plan with a radar target.

06 52 05 UTC The last primary target from MSR 990 was received at ZNY.

06 52 41 UTC The last primary target history symbol was displayed at the R 86 position.

06 55 00 UTC R 86 transmitted to MSR 990 that radar contact was lost

There was no reply

51. Video recording of ATC information does not exist, the SATORI playback system does not reflect the actual display presented to the Controller in a perfectly accurate format (Gregory Philips letter on March 2, 2000).

ICAO DOC. 9426 Air Traffic Planning Manual Part 1 Planning Factors, Section 2, Chapter 8 - Requirement for communication

8.4.8 when using such recording in investigations, it should, however, be kept in mind that what has been said in 8.4.6 above with respect to the relative value of voice recordings applies even more so to radar recordings. Recordings based on data as provided by radar antenna may have little resemblance to what the controller concerned saw on his display at the time of the incident in question because the controller may have used the off-centering device or limited the range on his display to suit his particular needs. To be conclusive, it would be necessary to record the presentation on each display used for control purposes...

Annex 11 requirements

- If the recordings are required for accident or incident investigations, they are to be retained for longer periods until it is evident that they will no longer required. The practice in most states is to retain the recordings at least until the investigation has been completed and the report issued.

52. The traffic was slow and there were some delays at the beginning of the midnight shift. Notice that there is no reason indicated for that delay.

53. There were no problems at radar or communication equipment.

There is a radar data file from ZNY recived on May, 2000 indicated that the last transponder return from MSR 990 when it was at FL 290 at 06 49 53 UTC...!

54. Egypt Air Flight MSR 990 was within the radar coverage along its flight path until it crashed down into Atlantic Ocean.

55. Ms. Ann Brennan (section R 86 radar controller) indicated that she usually works only day shifts and that is rare for her to work an evening or midnight shifts.

- She stated that MSR 990 was the only aircraft using the southerly oceanic track (North Atlantic Track Zulu) during her session.
- She had no radar or communication problems.
- She issued the oceanic clearance to the pilot and recalled being impressed that teh pilot knew the track message identification number without her prompting.
- She went to strip printer (away from her display by approximately six feet) to sort strips for approximately 30 to 45 seconds while MSR 990 was approximately 15 minutes from DOVEY intersection.
- When she looked back at the radar display she noticed MSR 990 was in coast track status.
- Mr. Ray Redhood indicated during the interview that at approximately 06 50 he was have a conversation with Mr. Brennan, when she noticed a coast track on her display, he said he could see the data block on her display from where he was sitting, but it was too far away for him to read any details.

56. It is obvious from the transcription that the midnight shift was not familiar with the equipment (initial operational capability -- April 29, 1999 and operational readiness demonstration i.e. final acceptance July 1999 as notified by Mr. English). This why there were a lot of discrepancies in ATC performance as some are indicated below:

56-a

05 56 08	LC	Oh hi yeah I had Egypt Air nine ninty from ah he was proposed out at 03 30 is that flight plan still good (unintelligible) computer just came up
05 56 20	ZNY	Yeah that is still good
05 56 22	LC	Give him a new code or three thousand code or give him (unintelligible)
05 56 26	ZNY	The code that he has is good
05 56 28	LC	Yeah

05 56 29	ZNY	Yeah ah I need you to clear him gayle as filed
05 56 33	LC	Ok
05 56 34	ZNY	And (unintelligible) looking for thirty one
05 56 35	LC	Ah thirty one thousand no
05 56 37	ZNY	Yea
05 56 39	LC	Alright I will give him thirty one
05 56 41	ZNY	Alright
05 56 43	LC	Alright

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06 00 20 LC You are cleared to hotel charlie alpha via the Kennedy seven departure it is gonna be a gateway climb vectors shipp then as filed maintain five thousand expect flight level three three zero one there minutes after squawk one seven one two oscar the current ATIS departure frequency one two five point seven.

Notice that LC and ZNY agreed to clear MSR 990 for FL 310 at 06 56 41 while the LC cleared MSR 990 to FL 330 on 06 00 20 UTC

56-b

06 21 57	N90	Egypt Air nine ninety heavy turn left and proceed direct shipp
06 22 01	MSR 990	Direct shipp nine ninety right
06 24 46	N 90	(Unintelligible) Kennedy manual handoff Egypt Air nine ninety
06 24 48	ZNY	Doesn't any body know over at the tower that they gotta put these flight plans back in
06 25 01	N 90	Its disgusting
06 25 03	ZNY	Uh let me see if they put anything in I may be just did not get the paper hang on I see him coming keep him coming
06 25 10	N 90	Welco
06 25 11	ZNY	Let's see you can go to twenty three with him
06 25 13	N 90	Twenty three
06 25 14	ZNY	Yeah uh and let me see if there is any thing in here of course not uh I don't have all of his routine either oh that's wonderful
06 25 23	N 90	Shipp Linnd lacks Dovey Santiago stg and he is going to Cairo HECA
06 25 33	ZNY	Ok Cairo and what code do you have him on
06 25 36	N 90	Seventeen twelve
06 25 38	ZNY	Ok let me start a track track pick this new equipment I don't even know how to do it this stuff enter there he is ok interim two three oh do you know what he wants for a final

56-c

06 31 57	R 66	You got any more surprises after this LACSA

		coming off or is he the last one
06 32 01	KDR	Um he is the last proposal I got that goes out that way

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06 32 08	R 66	(Unintellible) didn't just let one guy
06 32 10	KDR	Uh it is the last ticket I have bot on any body
06 32 13	R66	Yeah cause no body typed in Egypt Air but they did type in the LACSA
06 32 15	KDR	Yeah
06 32 16	R 66	Ok I just wanted to make sure there wasn't anybody else so I didn't have to throw out the strips and then not find them
06 32 18	KDR	Well just because you don't have a ticket on anybody doesn't mean there is nobody else but that is all you know that is the best information I have got now
06 32 23	R66	Yeah if you don't have a ticket and it is not in the machine I don't have a ticket either so we are both gonna be in the dark

56-d

06 31 40	MSR 990	New York center Egypt Air nine nine zero heavy good evening approaching two two zero up two three zero
06 31 45	R 86	Egypt Air niner niner zero New York center roger
06 31 51	R 86	Now what call sign I am looking for
06 31 54	D 89	ARISE stand and rise
06 31 55	R 86	No I
06 31 57	D 89	Five seven
06 31 58	R 86	Don't have it
06 31 59	R 86	I don't have it that is that guy going to see ISLE right
06 32 00	D 89	Yep

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06 32 09	D 89	There is a printer over there
06 32 11	R 86	I am sorry
06 32 12	D 89	What is the printer over there
06 32 14	R 86	My printer
06 32 15	R 86	Yeah
06 32 17	D 89	What the eighty six printer
06 32 20	D 89	How do I send it a something to you
06 32 21	R 86	Um send to ah seventy one
06 32 23	D89	Zero two five space champ zero one invalid field record come on man it is on it is way
06 32 41	R86	Okay
06 32 42	D 89	I will walk over
06 32 43	R 86	Okay

57. National Airspace System (NAS) was returned back into service at 06 15 00 UTC before the departure of Egypt Air.

58. R 66 couldn't find the flush strip for MSR 990 before 06 29 00 UTC
Notice that the flush strip were printed out at the appropriate sector
Before transition to DARC at 04 30 00 UTC.

59. The original flight route assigned for MSR 990 was Shipp / linnd / Lacks / Dovey outside all the warning areas

60. The MSR 990 was instructed by R86, before reaching linnd, to go direct to Dovey crossing the warning areas W 105 A & W 506 where it was crashed down into Atlantic Ocean at W 105 A after few minutes.

61. It is clear from the transcription, video and voice recorder that the Egypt Air MSR990 flight was not under any ATC as from 06 47 18 UTC to 06 54 00 UTC, as R 86 (Ms. Ann Brennan) left her position to sort out the flight strip as she stated, or she was in conversation with Mr. Ray Redhood R81(CIC) as he stated in the interview, or she was in contact with washington center and ARISE 57 as shown in the ATC voice recording.

62. The following aircraft were in contact with the ATC, but their radar data could not be found: ARISE 57 was declared by R 86 as a radar contact.

63. The aircraft with squawk of 5606, 1216, 3635 & 6757 were on navy file and did not exist on Air force file 84th Rades (both files contain ARSR 4 data from the Riverhead NY radar site). These codes were passed to Mr. English for explanation on 28/03/2000, he was also requested to clarify the meaning of A, B & C letters as indicated in Navy Vecapes files, it was expected to receive the response by 29th June 2000.

64. The aircraft was squawk 2855 was detected near Nantucket by five radar at flight level 330 ft up to 06 19 25 UTC, but there is no radar data shown after that time from any of those radar albeit it was within the radar coverage of those radar.

65. The radar data of the Royal Jordanian air flight RJ 262 NYC/AMS is requested.

66. There were some returns constituting a track crossing the MSR 990 path.

67. It is proved that the strobe may have been existing beyond 240 NM from RIV radar site and at azimuth 124.5 degree (far from the flight path of MSR 990 and the crash site).

68. The last altitude information was 16700 feet after which the transponder stopped due to power cut. The aircraft manufacturers should have been aware of such defect and use batteries as a backup power source for the essential and more vital avionics equipment such as transponder, communication, and CVR & FDR.

69. On Jan 2000 ECAA requested some documents and information from NTSB in accordance with the attached list.

70. On March 2, 2000, ECAA received the attached negative response from the NTSB.

71. The following are our response for the NTSB response:

The Response Of ECAA Delegation For The Letter Of Mr. Gregory Phillips Dated March 2, 2000.

History:

- These documents were requested by ECAA from NTSB since January 2000

- Mr. William English advised ECAA that most of these requested documents were available.

- Moreover at the meeting held on Feb. 17, 2000, NTSB group advised that they were working on these documents and will provide them to ECAA as soon as possible.

Anyhow, the following are our response:

- The FAA order 7400.8 and ICAO 4444

In fact we do have the ICAO document at our office. We asked you to provide us with it because it was not in our hands when we were in the states, and it was out intent to reach together to the proper conclusion about that task while we were in USA, unfortunately it wasn't the case albeit our delegation spent one month in the states awaiting your response.

- Charts covering the route of MSR 990 FROM JFK to Dovey, including warning areas (Jeppsen North Atlantic Plotting Charts)

We have already got those charts, thanks.

- Recorded videotape for accident from ZNY and Boston centers in two scales Fifty NM & two hundred NM.

Thank you for your answer. We were being very grateful if video recorder of ATC information reflect the real situation at the controller radar display were available (as required by ICAO Air Traffic Services Planing manual chapter 8 item 8.4.8).
We do have now the recorder videotape from ZNY.

- Letter of agreement between FAA and Military authorities concerning special use (Warning areas W 105, W 102 & W 106)

According to the information we got (ref. AIP USA ENR 5.1.1 item 4 & FAA handbook 7110.65

page 8 item 9-4-4-a and note indicated "The FAA has no jurisdictional authority over the use of prohibited or non joint use restricted/warning airspace, therefor clearance cannot be issued for flight therein", i.e. there are some limitation and restriction of flying across these areas until releasing to the FAA and as you know that Egypt Air were directed by the controller to change its route and to cross these areas where it was crashed down into Atlantic Ocean after few minutes from its route diversion, that's why these agreement should be available for Egyptian delegation as they are already exist.

- The list of the activated warning areas during October 1999 (conditions, period of activation and the notification of releasing back to the FAA)

In accordance with code of federal regulation (Aeronautics and space) 14 part 73, Special Use Airspace, item 73.1.7. each using agency shall prepare a report on the use of each restricted area assigned thereto during any part of the preceding 12 months period ended September 30, and transmit it by the following January 31 of each year to the manager, Air Traffic Division in the regional office of the Federal Aviation Administration having jurisdiction over the area in which the restricted area is located, with a copy to the director, office of Air Traffic System Management, Federal Aviation Administration, Washington, DC 20591.
So, we do believe that this information concerning warning areas can be acquired by NTSB and provided to us.

- A description of the responsibilities of R 86 A:

The provided layout of the NY control wing shows that each position consists of three sections, e.g. 86 sector consists of R 86, D86& A 86. The Egyptian delegation was already provided with the responsibilities of only R 86, so the information of the others are urgently required; we do like to understand, how the R 86 position or any such position responsible for large geographical area of 200 NM can be left without controller.

- the steps must be taken for the controller to override the XXXX in the data block and display the mode C:

Please refer to the interview made with MR. Ted Jean (ZNY National Airspace System (NAS) operation manager who indicated that the controller can override the XXXX and display the received mode C data, however it may take up to 30 seconds. Moreover MR. William English stated that this procedure is very easy and he can write it. However as you stated that in order to conduct an investigation, the ATC system must be understood, the same statement can be applied to the controller, with interrogation mark why the controller didn't take any Action when she noticed the XXXX and when the target indicated coast status.
By the way we didn't ask for the computer entries, and we didn't have a chance to receive the indicated explanation from Ms. Rowlett.
(The procedure were written by MR. English and presented to ECAA ON March 23rd, 2000)

- Multi Radar Coverage Charts for New York and Boston Centers at 5000, 10000, 20000 & 30000 feet

Ret. is made to ICAO Air Traffic Services Planning Manuals document 9426 and ICAO Annex 11 chapter 6 (6.1.1.2, 6.2.2.3.3, 6.2.2.3.7, 6.2.2.3.9, 6.2.3.1.3, 6.2.3.5, 6.3.1.2, 6.4.1.1 and 6.4.1.2). Some of the paragraphs are Standards and some are Recommended Practices

These charts are very important for our investigators, so kindly requested to provide us by these charts which we had a look to one of them at MR. English office. These kinds of charts should be available for any system and ours is published in AIP. These charts will help of understanding which radar has the best detection at the crash area.

- Multi radar tracking mosaic and clutter and interference study for radar Sites:

This information is very important in our point of view. In addition we don't have any idea about the charts delivered from ZNY, so, would you please provide us with these charts which should be available before starting the operation or acceptance of any system.
As for the clutter charts and interference study for radar sites, we remind you that the provided document indicated that the RIV radar is subject to Interference from other radar, but they are not sure which radar causes the Interference. Your scenario for tracking Egypt AIR at its final stage is based mainly upon a RIV radar, so it is very important for us, in order to follow this scenario to exactly understand this interference and clutter charts and to be sure that the primary returns are real returns from Egypt Air and not clutters or false echoes. By the way, in Egypt we do such interference study and analysis during the stage of radar siting in accordance with FAA siting document.
Kindly requested to provide us with the explanation, which you recited from the airforce experts on clutter and interference plus the report of MR. John O'Callaghan.

- The configuration of the ATC system, including radar and flight data processors, radar and voice data recorders, and voice communication switching system, for the relevant radar sites:

Thank you very much for your offer. Would you please provide us with the commercial publication and AIM as soon as possible.

- The printed log file for the Host/NAS system at the relevant sites:

The log file which was received by the Egyptian delegation comprised of only one page indicating the track of Egypt Air between 06 49 45 UTC and 06 50 57 UTC. We do need the complete log file covering the Egypt Air flight path of MSR 990 and all other targets for the period time from 06 05 00 UTC to 07 00 00 UTC. (Only maintenance log file was received on March 23rd, 2000).

- The last flight check reports for the relevant radar sites

We didn't ask for something new, we asked about the last flight check reports, which usually carried out before putting the equipment into operation and periodically whenever it is necessary and should be available during the whole life period of the equipment.

- Date of provisional and final acceptance of the Host/NAS System and the relevant radar sites:

We know that this information is requested by ECAA not by NTSB. We urge you to review the transcription once more and notice how the air traffic controllers were confused, as for example how R 66 didn't discover that the flush strip was at his position since more than two hours back before the main system turned out for maintenance, or how R 86 didn't notice the lot of changes happened to the Egypt Air Flight data block by adding the letter C to the altitude, adding the XXXX, then CST status, appearance of the aircraft as primary target and completely disappearance of Egypt Air while she was in front of radar display contacting Washington center or military aircraft Arise 57 squawk 1625
(those dates were provided to ECAA on March 24rd, 2000 as April 29th, 2000 for initial operational and July 31st, 2000 for final acceptance)

- The extracted data for all targets in ZNY, Boston and Nantucket radar's from 06 20 to 07 00 UTC on October 31, 1999:

When reviewed the provided CD data, we found out that some targets exist on one file and don't exist on the other file, albeit the source of both files is the same. So you are kindly requested to review it and provide us with the correct ones.
Moreover the provided data from New York center is excluded all targets rather than MSR 990, the same is applied for Boston
(The targets of squwak 5606, 1216, 3635 & 6757 were presented to MR. English for checking as examples also, requested the meaning of target classification into A, B, C).

- Any additional ATC data including any milltary radar data from relevant sites at the time of accident event:

You are kindly requested to provide us with all the pertinent data for the Time of accident.

- A reexamination of all available radar data for primary targets that may represent other aircraft at the separation of the flight Egypt Air aircraft:

We preserve our right to do reexamination of all available radar data for all primary targets that represent other targets at the separation of the flight 990 aircraft. (the beacon targets 5606, 1216, 3635 & 6757 will be checked by MR. English).

Please be informed that you have not answered our herein below previous requests:

a - Antenna radiation pattern for ASR-9 and ARSR-4's,

b - sufficient technical data to make analysis for the interference affecting RIV radar.

Important notice:

- Making the necessary documents available for both parties will help too much of reaching the same and the proper conclusion,
- The proper conclusion should be based only upon the factual data,
- Our delegation were awaiting for one month in USA for the above information,
- Your kindly cooperation will be very much appreciated.

72. On 25 April, 2000 ECAA received some documents and the report of MR. John O'Callaghan. The following is the ECAA's response to the information in the NTSB package of documents and reports:

- On 25th April, 2000 the following documents were received:
- FAA ODER 7400.8,
- Copy of the Washington Center, New York Center, Boston Center, Jacksonville Center, and FACSFAC VACAPES ATCF Letter of Agreement (Effective date July 15, 1999),
- Copy of the Fleet Area Control and, Surveillance Facility Virginia CAPES Boston ARTCC Center and CAPE TRACON Letter of Agreement (Effective date January 13, 2000),
- Copy of ZBW Form 7610-12, Warning Area of Activity for October 31, 1999. (Boston ARTCC has no record of a yearly activity report concerning Warning Area),
- Listing of Latitude and Longitude Coordinates of the Sort Boxes in the vicinity of Aircraft Accident, MSR 990,
- Floppy discket containing the radar data from Boston and zny,
- Copy of the MR. John O'Callaghan report,
- Copy of the report of MR. A. Khafaja the captain of flight RJ 262 NYC / AMS on 31st October 1999.

The Following Are Our Comments:

1 - The FAA ORDER 7400.8 G

This order, published yearly, provides a listing of all regulatory and nonregulatory Special Use Airspace designations, and pending amendments to those designations, established by Federal Aviation Administration (FAA).
The altitude of warning area from surface to FL 500.

2 - Item 2 letter of agreement was not officially signed.
The logs file for Boston and ZNY did not indicate that the procedures mentioned in the LOA had been taken.

3 - The effective date of the letter of agreement (Item 3) is January 13, 2000 i.e. after the accident date on October 31st 1999). Requested the letter of agreement which was valid during the accident period.

4 - There is no letter of agreement regarding warning area W506.

5 - Boston ARTCC has no record of a yearly activity concerning warning areas (This against what is indicated in the order 7400.8G see point 1 above). It was requested the list for October 1999. This request should be fulfilled and can be requested by NTSB from FAA.

6 - The copy of ZBW form 7610-12, warning activity for October 31, 1999 cannot be considered as an official document as its information are not completed, not signed by any one, no indication about the notification time of releasing or recalling back, or the acknowledge time of ZNY by these information.

7 - By receiving the above mentioned documents the status of ECAA requests on 25th of April 2000 will be as follows:

- The total number of requests 18 items
- The number of closed items 7 items
- The number of items partially closed 2 items
- The number of open items 9 items
- The total number of remaining items 11 items

8. - By reviewing the floppy disk data the following points were noticed:

- ☐ The last associated / reinforced (search + beacon) return in ZNY file was at 06 49 53 UTC when the MSR 990 was at FL 290 starting the diving stage.

- ☐ The radar data for target of squawk 2655 up till 06 22 15 & 06 22 27 in ZNY and ZBW files respectively and then no data for that target was shown albeit, it was at

FL 330 and within the coverage of more than 4 radar.

- ☐ The target of squawk 2403 and FL 330 appeared in both files at 06 49 51 UTC.
- ☐ Two targets of squawk 5224 & 5620 appeared without mode C for 3 scans and 2 scans respectively in ZBW file.

9. - Radar Data

a - Pages 3, 4 and the first paragraph of page 5 describe the primary and secondary radar and the differences between their information.
b - According to data recorded by the 84th RADES, four ARSR4 sites received returns from MSR 990. These sites are located at North Truro, Massachusetts (NOR); Riverhead, New York (RIV); Gibbsboro, New Jersey (GIB); and Oceana, Virginia (OCA). In addition the FAA ASR 9 radar at Nantucket, Massachusetts (ACK) received and recorded returns from MSR 990 during the time of accident.
c - Another FAA ASR 9, at Islip, New York (ISP), may have received returns from MSR 990 during the time of the accident, but the aircraft was over 57 NM from the antenna at the time, the computer software used to process the data would have returned these data out and so no radar returns identified as MSR 990 were recorded in ISP CDR file. However, some returns from the Islip radar during the period of interest were made available to the NTSB by the MEGADATA company. The ISP data provided by MEGADATA is consistent with the radar returns from the ACK ASR9, and sinc the ACK data is more complete than the ISP data, it is used for the plots and discussions in this study.
d - If the radar is unable to sense a weak reflected signal (primary return), it will sense the response signal broadcast by the transponder and be able to determine the aircraft position (page 5).
e - Each FAA ARTCC records data used by that center and displayed to its controller.
(Ref. is made to Mr. Gregory Phillipps on March, 2000 indicates that the SATORI information does not reflect a perfect and accurately information as displayed on controller display).
f - The report indicated that the root mean square accuracy of the altitude data is ± 3000 ft, while the analysis of long range radar data made by Department of the Air Force (84th RADES) shows that any single radar return height value could far exceed 3000 ft and some times more than 50000 ft.
g - On page 8 the report indicates that ACK ASR9 (Nantucket) picked up primary returns consistent with the flight path of MSR 990.
h - The same returns were detected by ISP radar and shown in the radar data provided through MEGADATA system.
i - On page 7, last paragraph stated that "If the primary returns are real, meaning that they correspond to a radar signal that has been reflected from an object in the path of the signal, then similar returns should be received by other radar sites whose range is sufficient to cover the area in question.
This means that the primary returns detected by ACK & ISP are real primary returns not for MSR 990 and has the same flight path of MSR 990.

j - The report indicates that the strobing is the result of the mutual intererence of radar signals from to neighboring sites that are transmitting at frequencies that are close to one another, and that cause the radars to detect false signals. The 84th RADES confirms that the strobing at RIV is the result of interference from an ARSR4 at Buck Harbor (no document provided to prove that).
There is a report from 84th RADES indicates that they don't so far know which radar is causing that problem. However if the ARSR 4 at Buck Harbor causes this strobing, so it should be affected too (The chart of ARSR 4 at Buck Harbor should be requested). Moreover, according to the Navy file, the strobing at RIV could be only happened at 244 NM away from accident site.
k - At the end of the flight, the airplane is much closer to NOR than GIB, and here the NOR sensed altitudes are more accurate than GIB sensed altitudes.
l - On page 10, the fourth paragraph indicates that "A recovery from the initial dive is consistent with the secondary altitude data from the ACK ASR9". While there was no altitude data as the transponder was out of operation due to the power cut during the first dive.
m - The same paragraph indicates that at ET = 99 seconds, single returns from both NOR and RIV show radar targets at about 18,000 ft in the second dive; at about ET = 123 seconds, NOR shows a target at about 8000 ft, while RIV shows a target about 13,000 ft. No further returns are received from NOR, but at ET = 146 seconds RIV shows another target at 10,000 ft. These last few returns from NOR and RIV may be reflected off of separate targets (which would be consistent with parts separating from the airplane), but this is not the nessarily case.
n - On page 10, last paragraph stated that ".... that multiple refractive layers were present in the atmosphere, which caused abnormal bending of the radar beams. The ducting phenomenon, which is not uncommon for the time of year of accident, can cause significant errors in the radar altitude estimates when the target is at altitudes.

This is true, taking into consideration that the altitude errors is only one of the effects of that phenomena, some of the other effects are:

- Extend the distance to the horizon, thus increasing the radar coverage
- Refraction is troublesome primarily at low angles of elevation, especially at or near the horizon (which is not the case of the MSR 990 with respect to both NOR & RIV radar). It can be neglected at angles greater than 3-5 degrees in most radar applications.
- The extension of the radar range within the duct results in a reduction of coverage in other directions. The regions with reduced coverage are called radar or radio holes. If, for example, the radar range is extended against surface targets by the presence of a surface duct, air targets just above the duct that would normally be detected might be missed.

73- In May, the ECAA received from NTSB the Group Chairman's Factual report - ADDENDUM (DCA 00MA006) indicates that:

- ❑ Each sort box is programmed to use information from the most appropriate radar site for that geographical area. Which is true.

- ❑ The anomalous propagation mentioned in the airplane performance study was not visible to the ZNY controller in the sort boxes surrounding MSR 990. The accident site is contained within ZNY sort box number 3235. Preferred site for both beacon and search

in that sort box is the North Truro ARSR - 4 (QAE or NOR). The nearest sort box adapted to display Riverhead ARSR - 4 {QVH or RIV} is number 3232. The southeast corner of sort box 3232 is at approximately N 40 20 / W 070 18, which is 40 miles west of the accident site. Which is true.

- The Boston ARTCC (ZBW) sort box grid is not coincident with the ZNY grid. In addition, the preferred and back up sites are adapted differently. The ZBW sort boxes surrounding MSR 990's flight path are programmed to use targets from Riverhead ARSR. NTAP extractions obtained from ZBW include the anomalous propagation. This point needs explanation as it is against the principal as indicated in the first point above and also as the Riverhead radar is subject to anomalous propagation.

74- Also in May, 2000 the memorandum from Operation officer, FACSFAC VACAPES to NTSB was forward to ECAA concerning AIRSPACE LOG for October 31, 1999. This memorandum includes the following:

- The only airspace that we activated on October 31, 1999 was W 386. All times are Zulu with a minus 5 to determine local time.

  There is no doc. received for the activation period or codition of W 386

- There were only 2 events scheduled October 30 and 31 in the W 105 or W 107 areas; neither event was activated.
  The enclusers of that memorandum indicated that the events were scheduled on October 30, 1999 and not on October 31, 1999 in W 105 and W 107.

- During the period in question, the area was cold and released to the FAA.

- ZNY logs file indicates the warning were not in use on the night of the accident.

- ZWB log file indicates the warning area W 105 was hot in the night of the accident

75- The report from the pilot of flight RJ 262 NYC / AMS on 31st October 1999 3 hours ahead of MSR 990 indicated that:

"Take off from JFK, SID was Haple 2 Yahoo Trans. Whale, Enances. After cruising at FL 330 with Boston ATC, I was looking ahead down to the left on NAV chart 3, 4 Canada to pick some en route airports, suddenly the F/O shouted "Allah Akber, Allah Akber, La llah Ella Allah" repeatedly, so I looked at him and asked him Awad what happened .. he said "Captain I saw a fire ball like a shooting star passing ahead at us very close from right to lift going down... (said "how far do you think it was passing ahead of us?" ... He said "Captain I could say around less than 60 meter." .. I noticed from the way he was talking from his look that it was serious, so I said to him "Awad don't worry, we have so many good airports en route any thing happens God's will we will manage." I really don't know what hold me not to report that to ATC, but

after Egypt Air flight 990 accident in that area which had the SID clearance as we had, I found myself obliged to submit this report to you as it is never too late to improve the aviation safety."

76- ECAA received the flight check reports for Riverhead and North Truro but unfortunately both for old equipment ARSR-3 and ATCB5 while the requested reports are for the new equipment ARSR-4, ASR9 and MSSR.

77- On June 19, 2000 ECAA received the response from NTSB signed by Mr. Gregory Philips, the following are our comments bit by bit for that letter:

Subject: Gregory Philip's letter dated June 19, 2000

Dear Sir,

With reference to the above-mentioned subject, please be advised that ECAA delegation had requested the said documents and information since January, 2000 but no positive response was received until now. The aforesaid letter indicated some items as have been closed. In fact, ECAA does wonder how items requested by ECAA can be closed by one side (NTSB) without providing the requirement by the other side (ECAA delegation).
Example:
Letter of agreement between FAA and Military Authorities concerning Special Use Warning Areas W102, W105 and W506

NTSB response:

The LOA dated 1/13/2000 involves special use airspace outside the flight path of the accident airplane. Safety Board staff believe that this LOA is not relevant to the accident investigation. The LOA for W608 was not requested nor has it been provided because MSR 990 did not get to the lateral confines of W506. Furthermore, logs indicate that W506 was not active.
I consider item number 4 closed. No further action will be taken.

ECAA comment:

Quick review of the copy of the LOA dated 1/13/2000 revealed that it is in respect of the warning area W105 i.e. it is not outside the flight path of the MSR 990. ECAA believe on contrary of NTSB believe that this LAO is relevant to the accident investigation.
The LOA for W506 had been requested by ECAA since January,2000.
Furthermore Warning areas W107, W386, W72, W50, W110, W122, were provided without any request from ECAA.
No document available to prove that W506 wasn't active. Moreover, ZNY log indicated that warning areas were not active, while, ZBW log indicated that W105 was active in the part of that accident night. Also the provided memorandum received from FACSFAC VACAPES indicated that the W386 was the only activated area on that night...!

- The configuration of the ATC system, including radar and flight data processors, radar and voice data recorders and voice communication switching system and the relevant radar sites.

NTSB response:

The FAA has indicated that no single manual or book provides this information. Safety Board ATC specialists have determined that the fulfillment of this request is not required for their investigation of the MSR 990 accident. Therefore, I consider item number 10 closed and no further action will be taken.

ECAA Comment:

In fact, ECAA has nothing to say rather than to remind you by NTSB responses for the same item by Mr. Gregory letter dated March 2, 2000 which indicates:
"In order to conduct an investigation, the configuration of the ATC system must be understood. ATC specialist will provide the delegation an Airman's information manual (AIM)."
So far nothing was provided...!

- The last flight check reports for relevant radar sites.

NTSB response:
The flight check reports for North Truro and Riverhead have been provided to the ECAA. These were the only sites used for air traffic control of MSR 990.

I consider this item closed no further action will be taken.

ECAA comment:

ECAA confirms receiving of the flight check reports for NOR and RIV, but unfortunately the received reports were for the old equipment ARSR-3 and ATCB5 which had been already replaced by ARSR-4 and MSSR. More over the flight path of the MSR 990 was covered by 4 ARSR - 4 RADAR and two ASR 9 radar (Please refer to MR. John O'Callaghan and the 84th RADES reports.)

- A reexamination of all available data for primary targets that may represent other targets of the separation of the MSR 990 flight.

Beacon targets of SSR codes 5606, 1216, 3635 and 6757 which are existing in Navy file and not existing in AF file will be checked by Mr. English. ECAA reserves the right to reexamine all radar data.

NTSB response:

The safety Board's aircraft performance engineer working with the ATC specialist (Mr. English) will reexamine the targets in question and provide an answer to this item by June 30, 2000.

ECAA comment:

By the end of July, 2000 ECAA still waiting NTSB response. ...!

- Sufficient technical data to make analysis for the interference affecting RIV radar.

NTSB response:

Frequencies of RIV, NOR and BUCS Harbor Have been provided. All other information relative to this request is classified.

ECAA comment:

The said frequencies were not received even so, the frequencies only are not enough for making any analysis.

- Multi radar coverage at different altitude level multi radar tracking, clutter and interference study, antenna radiation pattern for ASR 9 and ARSR 4s, and sufficient technical data to make analysis for the interference affecting RIV.

NTSB response:

These items are classified and restricted by NTSB.

ECAA comment:

In accordance with the ICAO recommendation and standard (ANNEX 11 and DOC.9426) these information are recommended to be used in investigation of incidents and or accidents. Therefore, NTSB is kindly requested to, urgently, reconsider ECAA requests regarding this serious matter and provide the proper required documentation which are in ECAA delegation's opinion very important for their analysis, so as to enable them to reach the proper conclusion and results.

Conclusion In The Light Of the Available Documents on July, 2000:

In fact ECAA would be very grateful if the document, information radar data, video recording which reflect the real situation as displayed on the ATC displays were made available to ECAA' inspectors. Unfortunately it was not the case, as most of the essential document as recommended by ICAO were considered by NTSB as classified and restricted for ECAA' inspectors.

Some of them were not complete, and some of them were conflict with each other as indicated above.

On the other hand both ECAA and Egypt Air made available for NTSB all document and information had been requested by NTSB' inspectors.

In spite of the above and in the light of the available document, information and data, ECAA' inspectors are fairly reached to the following conclusion:

A - The performance of MSR 990:

- No deviations from the air traffic clearance were observed.

- The original route Egypt Air MSR 990 was Shipp, Linnd, Lacks and Dovey until 06 00 35 52 UTC when R86 instructed MSR 990 to climb and maintain FL 330 cleared direct Dovey,

- The Air Traffic controllers were impressed by the pilot behavior

  - "Ms. Ann Brennan issued the oceanic clearance to the pilot and recalled being impressed that the pilot know the track message identification number without her prompting." (factual report page 5 & point 54 above).

  - Mr. Dennis Yesenowski stated that "the pilot's English was "petty good" and the flight path and climb appeared normal" (NTSB factual report page 7).

B - The ATC performance:

The MSR 990 was not under the proper ATC due to the discrepancies notices about the ATC performance as indicated hereafter:

- In spite of there were no problems at radar or communication equipment and the traffic was slow there were some delays at the beginning of the midnight shift.

Notice that there is no reason indicated for that delay.

- In spite of the MSR 990's flight plan was still good when the computer came up and as ZNY confirmed, LC asked ZNY go give him a new code or 3000 or give him . . . !!!

- AT 05 56 41 and 05 56 43 both ZNY and LC agreed together to clear MSR 990 to FL 310, later on at 06 00 20 LC cleared MSR 990 to FL 330

- AT 06 24 46 ZNY asked N90 doesn't anybody at the tower that they put these flight back in?

- At 06 25 38 ZNY controller R 66 mentioned that he doesn't even know how to do this stuff enter here ...!

- 06 32 15 R66 asked "nobody typed in the Egypt Air but they did type in the LACSA ...!

- The following conversation was between R66 and KDR also refer to point 55 A-D above:

06 32 16	R66 OK, I just wanted to make sure there wasn't any body else so I didn't have to throw out the strips and then not find them
06 32 16	KDR Well just because you don't have a ticket on any body doesn't mean there is no body else but that is all you know that is the best information I have got now
06 32 23	R66 Yeah if you don't have a ticket and it is not in the machine I don't have a ticket either so we are both gonna be in the dark

- R66 couldn't find the flash strip of MSR 990 before 06 29 00 UTC. As part of the transition to DARC at 04 30 00, all flight plans stored in the Host/NAS, including MSR 990's flight plan were printed out at the appropriate sector.

- 54 - Ms. Ann Brennan (sector R 86 radar controller) indicated that she usually works only day shifts and that is rare for her to work an evening or midnight shift.

- The original flight rout assigned for MSR 990 was Shipp/Iinnd/Lacks/Dovey outside all the warning areas

- The MSR 990 was instructed by R86, before reaching Iinnd, to go direct to Dovey crossing the warning areas W 105 A & W 506 where it was crashed down into Atlantic Ocean at W 105 A after few minutes.

- It is clear from the transcription, video and voice recorder that the Egypt Air MSR990 flight was not under any ATC as from 06 47 18 UTC to 06 54 00 UTC, as R86 (Ms. Ann Brennan left her position to sort out the flight strips as she stated, or she was in conversation with Mr. Ray Radhood R81(CTC) as he stated in the interview, or she was in contact with Washington center and ARISE 57 as shown in the ATC voice recording.

- The R86 did not realize the meaning of the lot of changes happened to the MSR 990 flight data block when XXXX appeared, converted to coast status, showed as primary returns only, . . . so, she didn't take any action before 06 54 00 when she started to recall the MSR 990. At that time every thing was over . . . !!!

- ZNY logs indicated that warning areas were not active while ZBW logs indicated that W 105 was active on part of that night, and FACSFAC VACAPES indicated that the W 386 was the only activated area on that night . . .!!!

- The flight strips of MSR 990 didn't include written altitude and time as requried by the flush procedure.

C- The radar data:

- In light of the received data and information and in spite of the most essential data were considered as restricted data only for ECAA inspectors.

- Video recording of ATC information does not exist, the SATORI playback system does not reflect the actual display presented to the Controller in a perfectly accurate format (Gregory Phillips letter on March 2), on the contrary of what indicated in Mr. John O'Callahan report that "each FAA ARTCC records data used by that center and displayed to its controller.

- The conflict between the different document concerning the warning areas as indicated above (refer to point 73 above) are:

1 - The primary target which was detected for fourteen successive scans by Nantucket radar at 59.88 NM very close to and having the same path of the MSR 990. This target also detected by ISP radar site. MSR 990 was at that time at FL 330 and the transponder was still into full operation condition as detected by many other radar. It is impossible for Nantucket radar to detect MSR 990 at that level and that range as the software programmed for approximately 57 NM (Gohn Callhan report). The last detection of the primary target was just before MSR 990 started its dive ....!
The radiation pattern and flight check were requested from NTSB since January, 2000.
NTSB classified that request as restricted.

Fortunately there are three sites of ASR12 (the solid state version of ASR9), have been installed in Egypt.
The radiation pattern and flight check reports indicates that the primary returns can't be detected from the targets at FL330 and distance 60NM as the target will be within the gap between high beam and low beam of the antenna (same antenna as for ASR9).

2 - There are some fast target tracks crossing the MSR990 flight path before the diving stage by few minutes.
The 84th RADES classified those targets as strobing problem for Riverhead radar due to the interference from other radar as the ARSR 4 frequencies are too close together. They don't know exactly which radar is causing this problem
Performance study report indicated that Buc Harbour radar is the radar which cause the problem
NAVY file indicates the strobe may happen at 240 NM from Riverhead rada and the MSR 990 was only at 130 NM from Riverhead ...!
The interference and clutter charts were requested from NTSB since January 2000. NTSB classified this request as restricted one ...!

3 - The provided radar data is not complete as summarized below:

- *The targets of squawk 5606, 1216, 3635 & 6757* are existing in Navy file and not existing in Air Force file, as targets detected by RIV radar ARSR4 (attach).

- The target of squawk 2655 was detected by five radar up to 06 19 25 an no data shown after that time, albeit it was still at FL 330 feet and within the radar coverage of these radar, files from ZNY and Boston received on May had information for the same targets up till 06 22 17

- The El Al flight ELY 2812 of squawk 3002 was cleared to Frankfurt via Petty to Nantucket transition at 06 15 25 UTC. The runway was approved for it whenever they are ready for taxi but no radar data shown for that aircraft.

- The military aircraft ARISE 57, squawk 1625 was cleared by R86 as radar contact, but there is no radar data shown for that aircraft.

- Two targets of squawk 5244 and 5620 without mode C for 3 scans and 2 scans respectively in ZBW file received on May 2000.

- The radar data file from ZNY received on May 200, indicated that the last transponder return from MSR 990 was at 06 49 53 UTC when the MSR 990 was at FL 330...!

Radar Analysis Report Prepared by ECAA Specialists and Consultants

There are two areas of the radar data analysis that remain as significant open items, the unidentified returns that crossed the flight path of Egypt Air 990 and some questions regarding the data recorded by the Nantucket ASR.

UNIDENTIFIED RETURNS

The analysis of the radar data revealed unidentified targets along the flight path of Egypt Air 990. Data from the Air Force radar at RIV, Navy Fleet Area Control and Surveillance Facility Radar, and Boston ARTCC all showed unidentified targets crossing the path of 990. The other facilities did not record these unidentified targets. Comparing the data from the three radar stations, there were small differences in time and precise location of individual returns; however, they all reported essentially the same returns.

Many of these unidentified returns formed continuous flight paths. The targets in these flight paths were traveling generally East to West as a groundspeed of about 850 knots. Taking the wind at altitude into account, the Mach number of these targets is about 1.4. The continuous flight paths of the unidentified returns crossed the path of Egypt Air 990 several times. The closest one of the unidentified returns in the continuous light paths got to 990 was at 06:48:14 when the unidentified target was about 3 nautical miles off 990's left wing. After 06:48:14, no unidentified returns that formed a continuous flight path appeared in front of 990.

The altitude of the targets is not revealed by the Navy or Boston data; however, the Air Force radar estimated their altitude at anywhere from 11,000 to 80,000 feet with large altitude variations between returns. Many of the altitudes were recorded as 102,000 feet, which is an undefined altitude. For these reasons, the radar altitude information provided by the RIV radar for these unidentified returns must be disregarded.

It is reported (although no written documentation has been provided) that the Navy radar facility receives its feed from the Air Force RIV antenna; however, it processes the data in a different manner than ARTCC facilities or the Air Force. The Boston ARTCC receives radar data from several antennas. Primary, secondary, and tertiary antennas are identified for each Sort Box within the Boston area of coverage. For the Sort Boxes that covered the end of the route for Egypt Air 990, the primary antenna was RIV. If the above antenna assignment logic is correct, all of the information on these unidentified returns originated at the RIV antenna.

It has been suggested that these returns actually strobing caused by interference between the RIV antenna and another antenna. No documentation of this interference has been provided except for some email communication between the RIV antenna and a Canadian facility. In a draft of the NTSB Factual Report, the strobing is attributed to interference between the RIV antenna and an antenna in Maine. It is also suggested that a solution to this strobing is being coordinated

between the Air Force, the FAA, and the Canadian authorities. If that is true, one would expect some correspondence between he three organizations; however, none has been provided. With no support, the suggestion that the unidentified returns are the result of strobing is just that, a suggestion.

NANTUCKET ASR

The Nantucket CDR Report defines three types of radar returns. The first type is an "RB" return, which means hat is a radar reinforced beacon returns. In other words, there is a secondary return from the transponder that is backed up b a primary return. It is possible for a return to be of type "BT" which is a beacon only return. This type of return is one in which the primary return is too weak for the processor to identify it as a valid return, but the aircraft transponder sends a signal that is received by the radar facility. Finally, returns that are strong enough to be identified by the professor as a target but do not have an associated beacon return are labeled as "RT" returns.

Data recorded by the Nantucket ASR shows 9 "RB" returns for Egypt Air 990. There are several "RT" returns before and after the 9 "RB" returns that follow the same path as Egypt Air 990. There were no "BT" returns that could possible be identified as coming from Egypt Air 990. The fact that there were no "BT" returns for Egypt Air 990 is consistent with a strong primary return being present before and after the "RB" returns.

The question that remains is why the returns prior to the first "RB" return did not have transponder signals with them. The Egypt Air 990 transponder was being successfully interrogated by several other radar stations at the time that Nantucket was only recording a primary return. It has been suggested that the Nantucket AST processor eliminates any transponder returns from a distance greater than 60 nautical miles, although no documentation has been provided to support that position. In addition, several of the "RT" returns prior to the 9 "RB" returns were recorded at a distance less than 60 nautical miles from the antenna. If the processor recognizes transponder returns inside of 60 nautical miles, it should have recorded these as "RB" returns. If the station recognizes transponder returns with 60 nautical miles, there must be some other explanation for why the transponder could not be interrogated. One possible explanation is that there was interference from another airplane that was in the same location as Egypt Air 990, but at a different altitude.

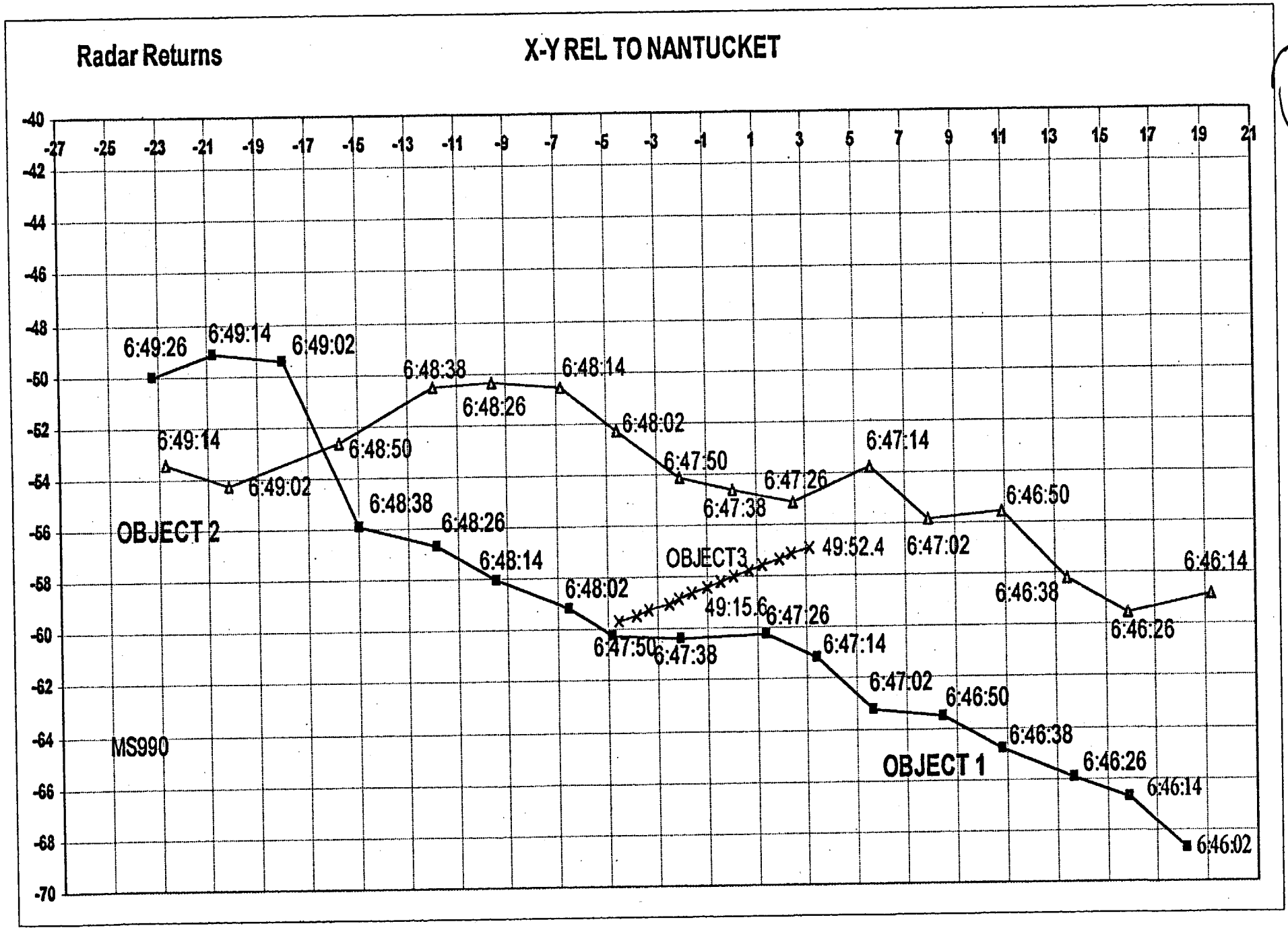
If the lack of beacon returns is due to a distance limit imposed in the radar data processing, the documentation that supports that position should be included in the Factual Report. If that documentation is not provided, then the returns prior to the 9 "RB" returns should not be identified as coming form Egypt Air 990.

CONCLUSIONS

1. The unidentified returns that crossed the path of Egypt Air 990 can not be dismissed as real objects without any supporting documents explaining the strobing (interference) phenomena at the timing in this location.

2. According to the suggestion that there is a 60 nautical mile limit for reporting transponder returns, the primary returns prior to the 9 "RB" returns recorded by the Nantucket ASR should have had a transponder signal as well. Without documentation supporting something other than a 60 nautical mile limit, it must be considered possible that the transponder signal from Egypt Air 990 was interfered with by another airplane at a different altitude.

Attachment:
- Three charts for radar returns
- Egyptian civil Aviation letter to FAA.


Radar Returns
X-Y REL TO NANTUCKET
-40
-42
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6:49:26
6:49:14
6:49:02
6:48:38
6:48:26
6:48:14
6:48:02
6:47:50
6:47:38
6:47:26
6:47:14
6:47:02
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6:47:38
6:47:26
6:47:14
6:47:02
6:46:50
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6:46:26
6:46:14
OBJECT 2
OBJECT3
49:52.4
49:15.6
OBJECT 1
MS990

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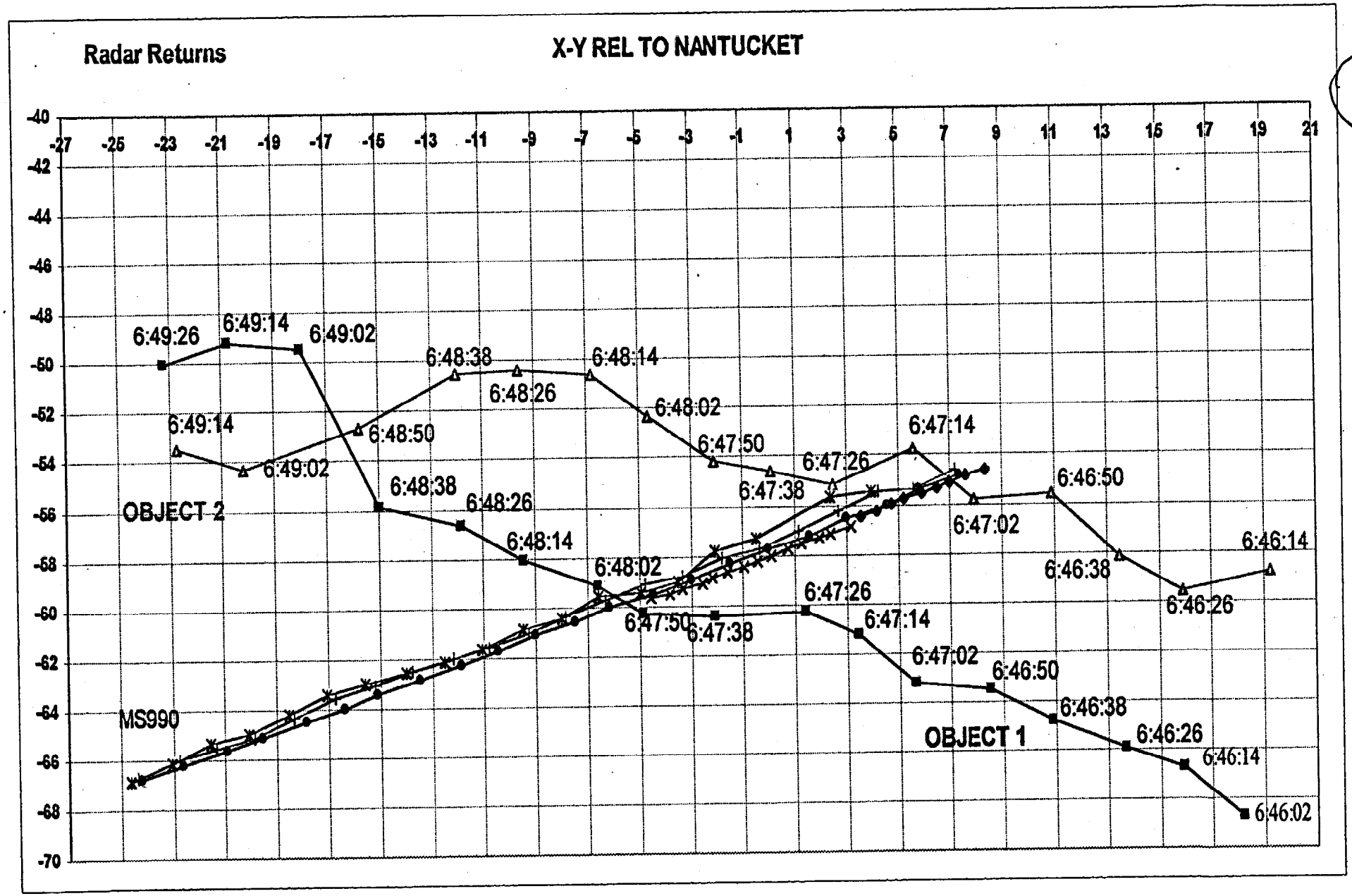
Radar Returns
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6:49:26
6:49:14
6:49:02
6:48:38
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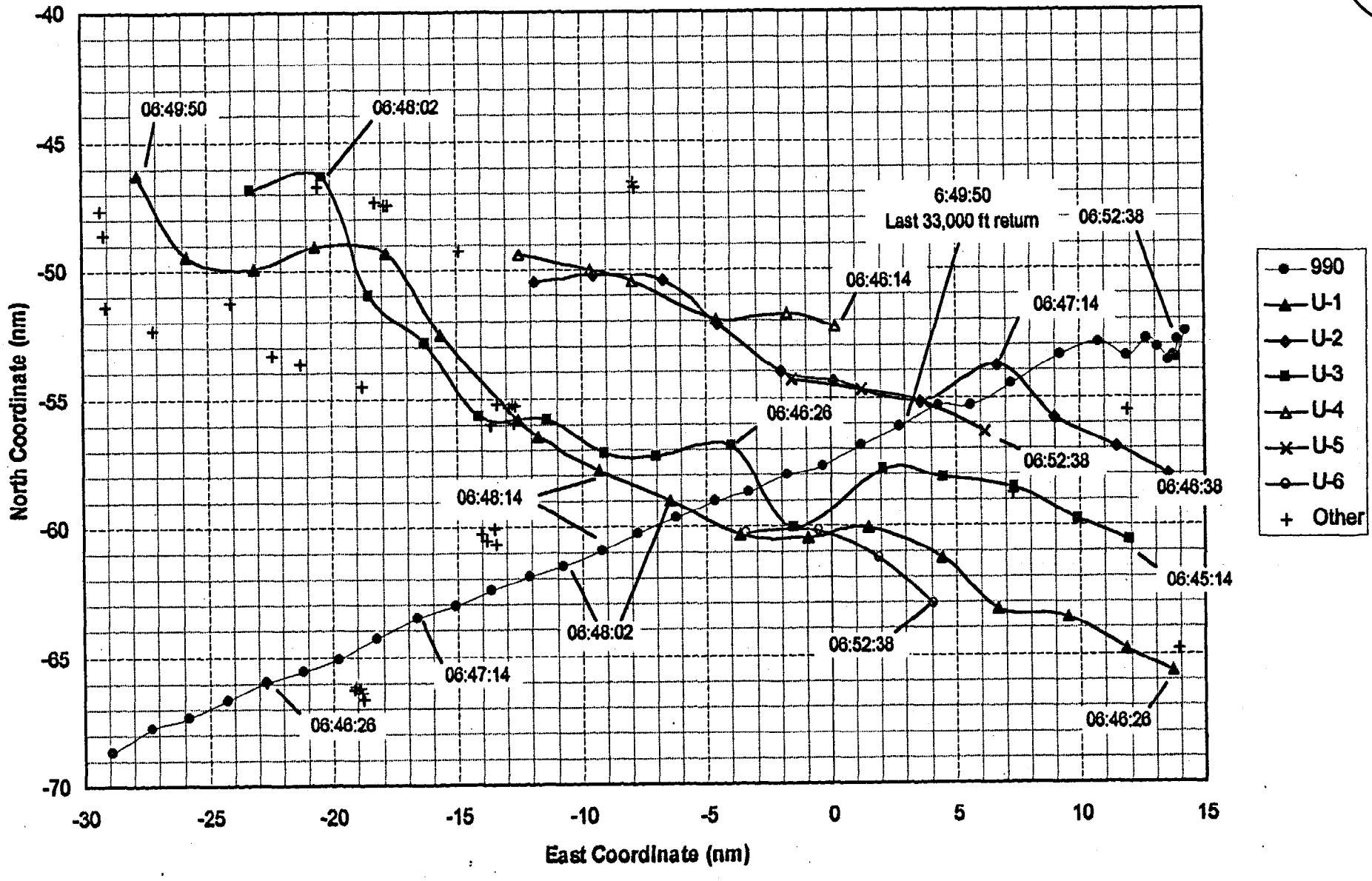
6:46:14
OBJECT 2
OBJECT 1
MS990

26

Egypt Air 990
Track Plots



June 18, 2000

BY HAND DELIVERY

The Honorable Jane F. Garvey
Administrator
Federal Aviation Administration
U.S Department of Transportation
Room 1010, AOA-1
800 Independence Avenue, S. W.
Washington, D.C. 20591

Dear Ms. Garvey:

I am writing to request your assistance in gathering additional data relating to the air traffic control system in connection with the crash of EgyptAir Flight 990. As you may already know, the investigation of this accident has produced radar data showing three high-speed returns in the area of, and along the flight path of, Flight 990. The data shows these returns crossing Flight 990's path just before the airplane began its dive.

Unfortunately, we have not been provided with sufficient reliable data to be able to determine whether these returns are real, or whether they are the products of what the NTSB has called "strobing". The need to investigate fully what the Flight 990 crew might have seen is important not only because of the existing radar data, but also because it is apparent from the ATC transcript that no FAA controller was actually watching Flight 990 at the time of the accident and for several minutes thereafter. Although Flight 990's original flight plan took it outside of the adjacent military Warning Areas, the controller clear the flight direct to the Dovey intersection, through Warning Areas 506 and 105A just prior to the accident.

In addition, the radar data that has been provided so far appears to be both incomplete and inconsistent. For example:

- The ATC transcript shows that ARISE 57 is radar contact, yet the radar data fails to show this aircraft.
- El Al Flight 2812 (squawk 3002) was cleared to depart JFK, but does not appear in the radar data.
- An unknown aircraft (squawk 2655) was detected at FL330 until 0619:25 UTC, but has no data thereafter.
- Unknown aircraft (squawk 5606, 1216, 3635 and 6757) appear in Navy data, but not in Air Force data.

- NOR radar data terminates at 0652:04 UTC, while RIV data continues until 0659:02 UTC.

In spite of the high-speed returns observed in the area of Flight 990 and the inconsistencies in the data, the NTSB has advised us that the additional information needed to make a thorough analysis of these important issues "is classified and restricted Air Force data and cannot be provided by the Safety Board."It is difficult to understand why data concerning the characteristics of radar used in connection with United states civil aviation is classified and why it is unavailable to analyze apparent targets that were in the vicinity of flight 990. Therefor, I am asking for your assistance to obtain the following:

1. The clutter and interference studies for the radar sites, RIV, ZNY, and NOR.
2. Multiple radar coverage charts for New York and Boston Centers at FL 50, 100, 200, and 300.
3. The antenna radiation Pattern for the ASR 9 and ARSR radar
4. Available technical data to analyze any interference affecting RIV.

We also have had some difficulty determining with certainty the active ("hot") periods for Warning Area along and adjacent to Flight 990's path during the late hours of October 30 and the early hours of October 31,2000, and obtaining sufficient additional data to account fully for the aircraft whose squawk codes are known, but which not appear on radar. Your help in obtaining this information is requested as well.

The ECAA greatly appreciates your assistance in this matter. Please let me know if you require any further information.

Sincerely,

A. KAT 18-6-2000

A.V.M Abdelfattah Kato
Chairman
Egyptian Civil Aviation
Authority

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