RB-47 RADAR/VISUAL CASE

The RB-47 case is arguably the most important UFO incident in history, one that physicist Edward Condon, director of the Air Force's **University of Colorado UFO Project** (known informally as the Condon Committee), personally found "puzzling" and his project radar physicist called "most disturbing" (Gillmor, 1969). One former Condon committee scientist said it was "the most amazing case ever to confront the Project" (Saunders and Harkins, 1968). It is one of the top cases investigated by University of Arizona atmospheric physicist **James E. McDonald** and the **American Institute of Aeronautics and Astronautics** (AIAA). They stressed its unique features: a UFO simultaneously tracked visually, by radar, and by direction-finding and analysis of radio signals evidently transmitted by the UFO. And it was unquestionably the most impressive UFO case ever to be convincingly demolished by skeptics **Philip J. Klass** and Robert Sheaffer—until now.

New findings by aerospace researcher and UFO investigator Brad Sparks establish this case as the first scientific proof of the existence of UFOs, and it uses the first-ever calibrated electronic measurements of microwave signals which were emitted by the UFO and which correlate precisely with eyewitness visual observations and radar tracks. The correlations form an intricate web of mutually consistent evidence which coherently interlocks flight path data with direction-finding measurements and visual observations. Sparks's research is based on the complete Condon Committee file (previously thought destroyed) and the complete files of **Project Blue Book**, James McDonald, the **National Investigations Committee on Aerial Phenomena**, and the **Aerial Phenomena Research Organization**, as well as portions of Klass's files, plus scientific, technical, and historical data

from Boeing, General Electric, American Airlines, National Climatic Data Center, National Geophysical Data Center, Electromagnetic Compatibility Analysis Center, Naval Intelligence Command, Air Force Archives, Air Training Command, Aerospace Defense Command (formerly Air Defense Command), and other sources.

The incident

In the pre-dawn hours of July 17, 1957, the crew of a U.S. Air Force RB-47 jet reconnaissance aircraft on an electronic warfare training flight over Mississippi-Louisiana-Texas detected on its ELINT (Electronic Intelligence) equipment an evidently airborne radar source which mimicked some but not all of the signal characteristics of a common air defense ground radar.

(ELINT passively listens to radar signals from ground stations and does not transmit. Radar actively transmits radio signals which bounce off a target and return to the receiver —the timing of a return can give the distance to the object. Direction-finding ELINT equipment on board the RB-47 could determine the direction but not the distance to an object if it emitted a radarlike signal in a certain frequency range. The equipment was designed to detect and plot the location of high-powered megawatt-range ground radars typically in Soviet bloc nations during the Cold War.)

Aircraft normally could not carry such high-power radars. As the key ELINT officer on the RB-47 flight put it, "an antenna bigger than the airplane" itself would have been required to emit as strong a signal as he detected from the UFO (McDonald papers). Because the UFO signal appeared to have comparable or greater received signal strength than the one-megawatt ground radar beam and the UFO's distance was about five times closer than the ground radar, a crude estimate of the UFO radar power output using the inverse-square law would be about 40 kilowatts.

The UFO evidently emitted its own radar beam since the maneuvering signal coincided in location with a bright light (UFO) and at times the signal moved ahead of the RB-47, or "upscope" on the ELINT monitor, then circled around as if airborne, highly maneuverable, and flying faster than the RB-47. The 55th Strategic Reconnaissance Wing Intelligence report (hereafter called Wing Intelligence report) on the case states that the Wing's Director of Intelligence "has no doubt the electronic D/F's [direction-findings] coincided exactly with visual observations by a/c [aircraft commander] numerous times thus indicating positively the object [UFO] being the signal source." An air defense radar station near Dallas, Texas, repeatedly confirmed tracking a UFO at the same location reported by the RB-47 crew but later tried to deny it in an unclassified message to Project Blue Book perhaps because of general concern over compromising the security of a highly classified investigation in progress (see below).

The UFO was reportedly tracked by the RB-47's airborne navigation radar as well, according to the earliest official report that is available—ironically, from the ground radar site—though the air crew had differing recollections on the point (ground and air personnel later seemed to be trying to point fingers at each other as to which one had radar-tracked the UFO). Twice the UFO "blinked out" visually when pursued by the RB-47. At the same time the strange flying radarlike signal disappeared; either that, or the ground radar site and RB-47 onboard radar lost the object from their scopes. At least once the UFO suddenly reappeared visually at about the same time the ground radar regained tracking of the object.

The main part of the incident occupied about 30 minutes over the Fort Worth, Texas, area from 5:30 to about 6 A.M. (Central Daylight Savings Time or CDT, used hereafter to mesh with Klass's usage, unless otherwise noted). Some earlier ELINT and visual incidents were noted as early as about 4:30 A.M., but they caught the crew off guard, and consequently reports at the time and later recollections have had to be carefully reconstructed. The UFO may have trailed the RB-47 up to 6:40 A.M. following the main events, for a total duration of the incident of possibly more than 2.1 hours.

History of investigations

An ultra-secret compartmented investigation may have been conducted immediately after the flight by the National Security Agency (NSA) and/or its military subsidiary, the Air Force Security Service (AFSS). These SIGINT (Signals Intelligence) agencies may have been responsible for taking the flight communication recordings made by the SIGINT operator on the RB-47, as suggested by the fact that similar UFO occurrences involving RB-47s receiving radar jamming signals from unidentified aircraft over Canada in 1955 resulted in a highly classified investigation by the Air Force Special Security Office (AFSSO), which then forwarded the results to the AFSS and NSA. Nothing from the AFSSO investigation was sent to Project Blue Book. The 1955 reports were declassified only in 1989 in response to Freedom of Information Act (FOIA) requests and appeals by Clifford Stone (Stone, 1997) and came to light only because an unrelated 1955 incident disclosed in a CIA document under an FOIA lawsuit led to a paper trail with all of these 1955 cases in one document. Nothing further on the 1957 incident has been found or released as of yet, but additional efforts based on the 1955 precedent are underway.

RB-47 crew members reported undergoing a several-hour interrogation or flight debriefing on the UFO incident by base intelligence officers on their return, at about 7:30 A.M., to Forbes Air Force Base, Topeka, Kansas, where they were stationed. No such same-day debriefing reports have been found, which may have fallen into the classified jurisdiction of AFSSO, AFSS and NSA, though an undated Amplified

CIRVIS (Communications Instructions for Reporting Vital Intelligence Sightings) report by Wing intelligence officer Capt. Elwin T. Piwetz may have been dispatched that day based on the debriefings. Piwetz's report was intended to update an earlier CIRVIS report from the Dallas-area air defense radar site at Duncanville, Texas, sent at about 5:55 A.M. (The CIRVIS report has never been located.) The radar site also sent an unclassified AFR 200-2 (Air Force Regulation on UFOs) report at about 10:57 A.M.; Air Technical Intelligence Center (ATIC) received it at 1:57 P.M. local time that day (July 17), and it was forwarded to Blue Book, which did nothing for the next three months other than mark up the teletype sheet with scattered comments.

Piwetz's Wing Intelligence report specifically states that at 5:48 A.M. CDT on July 17, 1957, the RB-47's number three electronic countermeasures (ECM) officer (then-Capt. Walter A. Tuchscherer), who was the only one equipped for communications intelligence (COMINT), began recording the "interphone and command position [Duncanville radar control] conversations." The making of this wire recording of the RB-47 crew conversations and radio contacts with Duncanville radar was remembered by Tuchscherer in an interview with McDonald in 1969. The number one ECM officer, Maj. John J. Provenzano, also said there should have been a permanent magnetic tape recording made from the wire recording (which could then be erased) plus a written report (McDonald papers). No such recordings have ever been released or identified.

The most important extended account of the incident is Capt. Piwetz's Wing Intelligence report, and it will be quoted and discussed extensively here and below (reduced from all capitals for ease of reading). It contains the freshest recollections of the crew members very shortly following their return as Klass readily concedes (Klass, 1974), and it apparently reflects the extensive interrogation they received. The three and a quarter-page report is probably the same as the "two-page report" crew members years later recalled having made the morning they landed, and no other "two-page report" or anything close in length and authorship is known. The copilot and key ELINT officer said they didn't personally write it but they in effect helped to prepare it (Condon files).

Contrary to Klass, who suggested the Wing Intelligence report might be inaccurate because supposedly "Piwetz did not show his report to the RB-47 crew members to check its accuracy," Piwetz must have shown his report to them because they remembered the small detail concerning the report's approximate length when interviewed 10 years later and said they had helped prepare it. Moreover, at least the pilot saw Piwetz's report again before it was submitted to ADC when he attached a copy of the Piwetz report to his own sighting questionnaire on September 10, 1957, and he made reference to it in the questionnaire. (The pilot correctly recalled for the Condon committee a decade after the fact that the ADC questionnaire was more than 10 pages long; it was 12.) Presumably, the pilot would have corrected any major errors in the Piwetz report through comments he could make in his questionnaire, though relatively minor errors might have slipped by. He seems to have missed the error in locating the first strange signal at Meridian, Mississippi, instead of Gulfport; see below (Condon files; Klass, *op. cit.*).

The Air Defense Command (ADC) and Strategic Air Command (SAC) conducted an investigation sometime after the flight and sent two classified reports to Blue Book. One was the special sighting questionnaire filled out by the RB-47 pilot, and the other was an attached copy of Piwetz's Wing Intelligence report. The ADC-SAC reports were classified Secret but they may also have received a codeword classification for SIGINT (there is a long file stamp obliterated at the bottom of each page beginning with a "T" which is the only portion inadvertently not blacked out on the declassified copies). This would make it the only known higher-than Top Secret case in the Blue Book files. SIGINT is sensitive compartmented information (SCI) which always receives a Secret Codeword or Top Secret Codeword classification, all of which is "above" Top Secret, and codeword classifications are themselves classified.

The Electronics Branch of ATIC, Blue Book's parent organization, reviewed the case. (ATIC has gone through several name changes over the years and is now the National Air Intelligence Center or NAIC, Wright-Patterson AFB, Dayton, Ohio.) On October 30, 1957, V. D. Bryant writing for Capt. Edwin H. Mammen of the Electronics Branch, stated that the case was difficult to explain as anomalous radar propagation or "abnormal electronic indications." He concluded that "there is such a mass of evidence which tends to all tie in together to indicate the presence of a physical object or UFO" and that it is "difficult to conclude that nothing was present, in the face of the visual and other data presented." Blue Book did minimal follow-up on the case, despite the high classification, and in November 1957 it dismissed the incident as due to an American Airlines flight (an explanation Klass seized upon and vigorously augmented with others years later).

The case was first publicly disclosed by dissidents from the Condon Committee, one of whom mentioned it in a book published in December 1968 (David R. Saunders and R. Roger Harkins's *UFOs? Yes!*), followed by the official Condon Report treatment of the case, released on January 9, 1969, where it is discussed or mentioned in six different places. Radar physicist Gordon David Thayer was unable to explain it. Director Condon himself concluded, "If the report is accurate, it describes an unusual, intriguing and puzzling phenomenon which, in the absence of additional information, must be listed as unidentified" (Gillmor, *op. cit.*). Condon's

familiarity with the RB-47 case is a story in itself. The dissident staff members had to make Condon a "captive audience" at a plasma physics conference on October 27, 1967, where they played the tape interview of the RB-47 pilot in order to expose Condon to a high-caliber case instead of the crackpots he was so fond of indulging.

The Condon Committee first learned of the incident from the RB-47 pilot, Air Force Lt. Col. Lewis D. Chase, at a June 12-13, 1967, conference of air base UFO officers convened in Boulder, Colorado, by the committee. There Chase told committee associate Dusty Blades about it. Chase asked Blue Book chief Maj. Hector Quintanilla if he had a copy of his report on the case, but Quintanilla said he couldn't find anything (evidently because the date for the case was wrong). Committee investigator Roy Craig conducted a taped interview of Chase back at his base, Malmstrom AFB, Montana, on October 19, 1967, and subsequently taped interviews with two other key crew members, copilot Major James H. McCoid and ELINT monitor Major Frank B. McClure at Offutt AFB, Omaha, Nebraska. The other crew members were in Vietnam or otherwise not available. As a result of an error by Chase and copilot McCoid as to the date of the incident—checking their flight logs they misdated it as September 19, 1957—the documents in Blue Book files could not be located by the committee staff (Condon committee files; Saunders and Harkins, *op. cit.*; McDonald, 1971, 1972).

James E. McDonald, who interviewed all six crew members between January 30 and February 2, 1969, succeeded in locating the Blue Book files on the case in June 1970, enabling him to correct the date to July 17, 1957, and to substantiate many details of the case with contemporaneous records. The AIAA published McDonald's report of the case in July 1971 based on the newly found military records. A longer 15-page version of McDonald's study appeared in the UFO Symposium proceedings of the **American Association for the Advancement of Science** (McDonald, 1972). Researcher Brad Sparks initiated a comprehensive reinvestigation of the case in 1971 (Sparks, 1971), which he had to abandon in 1977 to follow other pursuits because of seemingly insoluble discrepancies in the flight track of the RB-47, now solved (see below).

Aviation journalist and UFO skeptic Philip J. Klass published an 18-page white paper on December 30, 1971, presenting a formidable case for explaining the incident as due to a faulty electrical relay, a meteor fireball, misidentified ground radar signals, and the landing lights and radar blip of a descending American airliner. Klass succeeded in convincing some of the RB-47 crew of the strength of his explanations (though the pilot Chase later clarified or retracted his endorsement in correspondence with Center for UFO Studies [CUFOS; *see* **J. Allen Hynek Center for UFO Studies**] director and former Blue Book astronomy consultant **J. Allen Hynek** in 1976). Klass expanded the paper into a 42-page treatise in his 1974 book as revised in 1976 (*UFOs Explained*), adding the stars Vega and Rigel to the list of misidentifications by the RB-47 flight crew, based on research by fellow skeptic Robert Sheaffer.

Aside from a valiant but unsuccessful effort by CUFOS in 1977 at undermining Klass's seemingly ironclad solutions (Herb, 1977), the case lay dormant for two decades until August 1997 when Sparks reopened it. Sparks solved the RB-47 ground track problem, and the results of his research from 26 years ago to date are presented below.

The proper understanding of this important case has been hampered by a number of serious errors in the basic facts of the sighting. These include incorrect RB-47 aircraft heading and ground track, wrong aircraft speed due to erroneous weather data, wrong flight turning points (supposedly at or near Meridian, Mississippi, and Mineral Wells, Texas), and the supposed misidentification of an airliner as a UFO when records prove it was in fact nowhere near the RB-47 and could not possibly have been involved. (Klass claimed that no relevant records existed; in reality, the airliner had just survived a near collision with another airliner, and many passengers were injured, so there certainly were traceable accident reports.) Another pervasive error has been the assumption that the UFO mimicked *all* of the signal characteristics of a commonly used air defense radar, called the CPS-6B (and its identically radiating successor FPS-10). In fact, the UFO signal was similar to only one of the six different beams emitted by the CPS-6B and FPS-10, namely the Vertical-Center (VC) Beam, and even then it imitated only 4 or 5 of its 8 distinguishing features, and one of them was definitely at variance from a normal VC Beam.

Some portions of Klass's published map of the incident seem to require the subsonic RB-47 to fly at impossibly supersonic speeds, such as more than 1,300 mph or almost Mach 2 from 5:57 to 5:58 A.M. (about 22 miles in one minute to place the UFO closest to a two o'clock position from the RB-47 on Klass's map). These confounding mistakes will be discussed in detail below.

Training flight

The crew and plane took off on a southerly heading from Forbes AFB, Kansas, at approximately 11 P.M. CDT on July 16, 1957, to conduct gunnery, celestial navigation and electronic warfare exercises. The aircraft was a model RB-47H-1-BW serial number 53-4305 based on the B-47 bomber airframe made by Boeing Aircraft Company ("R" is for reconnaissance) and designed for ECM and electronic and communications intelligence collection. It carried a crew of six—pilot, copilot, navigator, and three back-end "ravens" or ECM officers who were located in the converted bomb bay where they had no windows to look out (and thus could not confirm the cockpit crew's visual observations firsthand).

"H" series RB-47s went into service from 1955 to 1957 and were all retired by 1967, so at the time of the UFO incident it was a relatively new, late-model aircraft. The aircraft's callsign was "Lacy 17."

The pilot was 35-year-old Maj. (later Lt. Col.) Chase. The copilot was 1st Lt. McCoid, and the navigator was Capt. Thomas H. Hanley. The three ECM officers were ECM number one, Capt. Provenzano; ECM number two, Capt. McClure; and ECM number three, Capt. Tuchscherer (Chase's crew all later achieved the rank of major). They were assigned to the 38th Strategic Reconnaissance Squadron, 55th Strategic Reconnaissance Wing of SAC at Forbes AFB.

When the Condon Committee interviewed the pilot, copilot, and key ELINT officer 10 years later, they understandably could not recall the exact date of the flight but believed it was a shakedown cruise designed to test all systems a few days or weeks before being shipped to England (pilot Chase and copilot McCoid checked four different flights made in the month of September 1957 before Chase settled on the 18th-19th, though McCoid told McDonald he felt it was pinned down only to within a "few weeks"). They arbitrarily picked September 19 as the probable date because the aircraft and some of the crew left for England on September 20. It is likely, however, that their recollections were influenced by the fact that pilot Chase conferred with some of the crew in order to complete an Airborne Observer's Data Sheet, a detailed 12-page questionnaire requested by ADC, on September 10. Chase had been puzzled as to why there had been no further action or any feedback on the incident over the course of weeks. Then suddenly came the lengthy questionnaire which rekindled interest in the case again.

To all appearances it was this reliving of the UFO event, around September 10 just before the England tour of duty, that crew members remembered years later when the effort was made to try to recall the date of the UFO incident.

Since the date was in error and was not immediately prior to reassignment to England, but two months earlier, it was apparently not a shakedown flight but a training mission. Thus ECM/ELINT officer Maj. McClure's reasoning that a shakedown cruise would not carry recording film and wire must be rejected, since it was not such an equipment-checkout mission and the Wing Intelligence report contradicts him. An equipment test mission ought to have tested the recording equipment as well, so McClure's argument makes no sense in any case.

The other two ECM officers disagreed with McClure. ECM officer No. 1, Maj. Provenzano, specifically disputed this argument to McDonald, saying they "always" carried wire recorders and even if it was a shakedown mission it would not "make any difference." ECM officer No. 3, Maj. Tuchscherer, was reported in the Wing Intelligence report of 1957 as having made wire recordings of the cabin interphone/ground conversations, and he recalled for McDonald in 1969 having made them. Provenzano, who also recalled that Tuchscherer had made recordings, said the procedure was to make a tape recording from the wire after landing, and there should have been a written report. Pilot Col. Chase distinctly recalled that intelligence personnel retrieved the wire recording of their flight conversations after they landed (McDonald papers; Condon files).

Actual RB-47 flight path

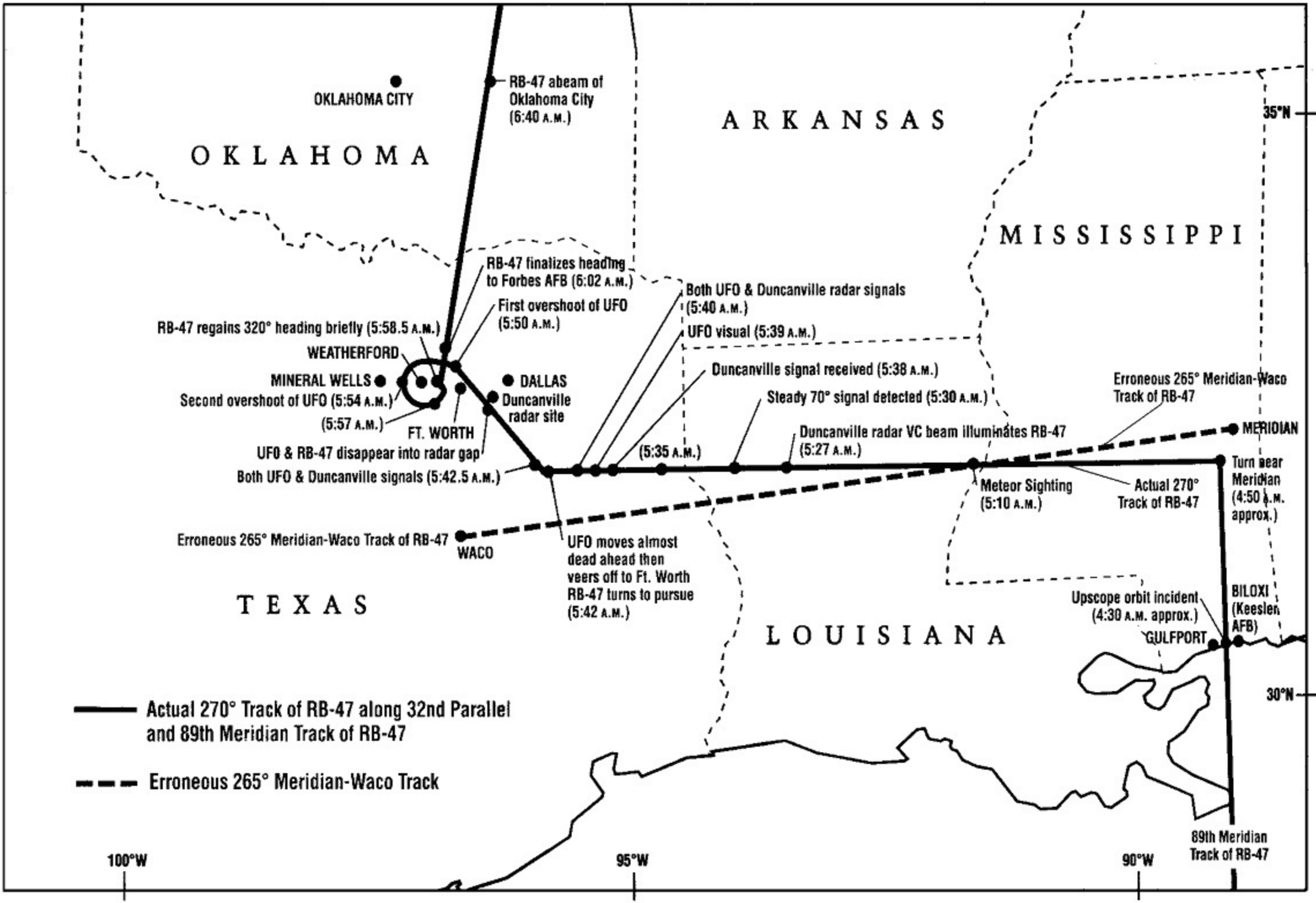
One of the most useful principles in dealing with this case is Sherlock Holmes's dictum, "When you have eliminated the impossible, whatever remains, however improbable, must be the truth." This is exemplified here by the fact that it was impossible for the RB-47 to fly on a track from Meridian, Mississippi, to Waco, Texas, at a heading of 265 degrees, then turn northwest to pursue and overfly the UFO in about eight to nine minutes to a point about 10 nautical miles (about 12 statute miles) northwest of Fort Worth. Yet this is the flight scenario seemingly reported by the crew and accepted without question by McDonald, Klass, Hynek, and Thayer. Simple corrections (see further on) resolve these two crucial impossibilities:

1. The Meridian-Waco track forces the RB-47 much too far south, so that it would have had to make the turn about 100 miles southeast of Fort Worth. Only a supersonic RB-47 traveling faster than 800 to 900 mph could have traveled from that turn point to the spot about twelve miles northwest of Fort Worth, or about 112 miles in 8-9 minutes—an impossibility since the RB-47 was not capable of sustained supersonic flight.

2. A true heading of 265 degrees fitted with a physically possible turn point only about 70 miles southeast of Fort Worth (calculated backwards from the UFO-overshoot point using the RB-47's maximum speed of about 600 mph) is still impossible to reconcile with the exact latitude-longitude coordinates the crew gave for the first visual sighting over Louisiana (32-00 N, 91-28 W), about 290 miles to the east. It is simple trigonometry if one notices the heading deviates from the due west-east line by exactly 5 degrees (so 290 miles X sin 5 degs. = 25 miles approx.). Hence, to fit with the turning point, such a 265 course would have started about 25 miles too far north in Louisiana (at about 32-22 instead of 32-00 N reported by the pilot). It's simply not possible.

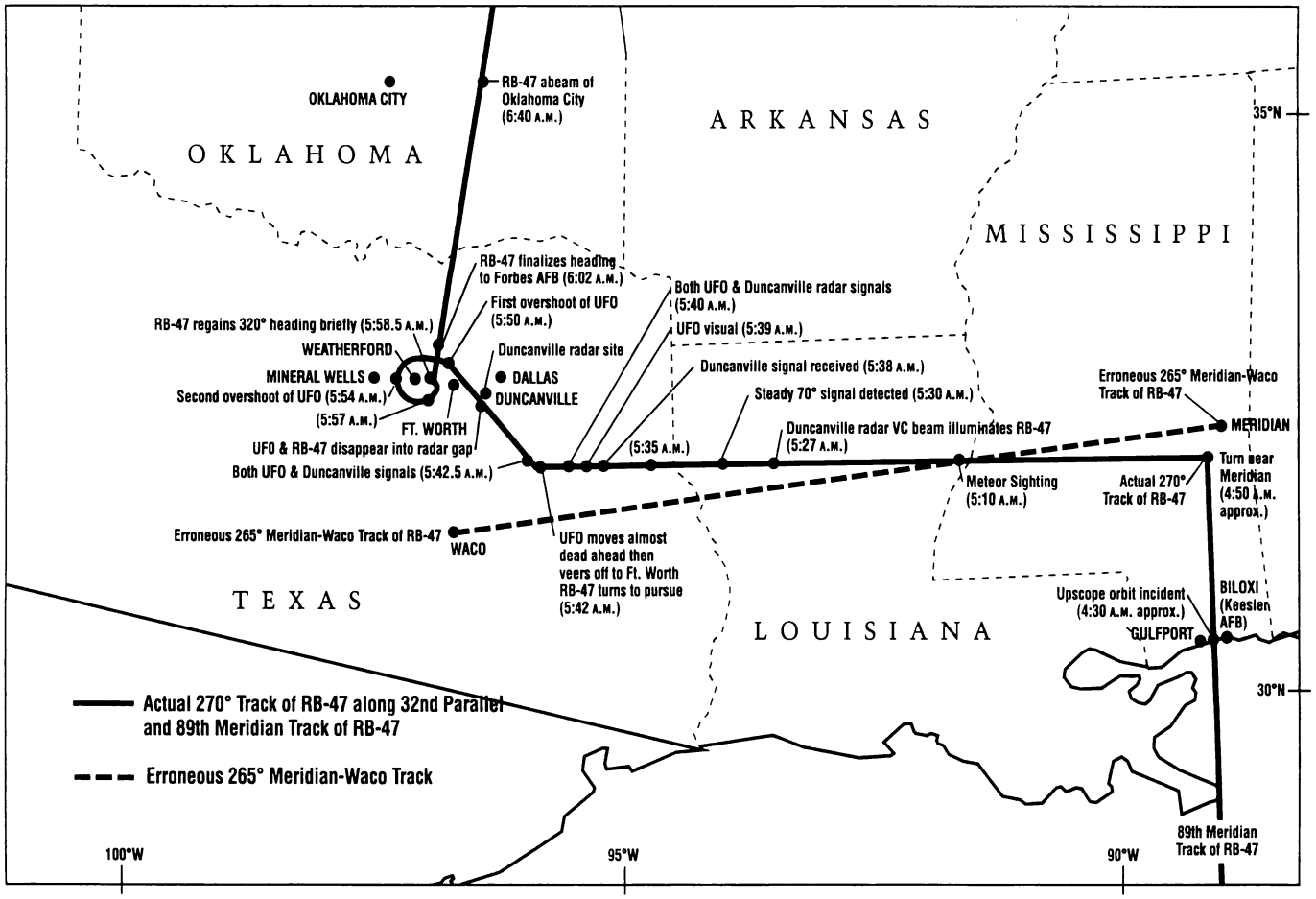
Intriguingly, the actual turn point at about 70 miles southeast of Fort Worth would also have been located at about 32-00 N latitude—the same latitude as the Louisiana sighting point. Thus it would have required a true heading of about 270 degrees to reach rather than the 265 heading reported. The magnetic declination or correction factor between mag-

RB-47 Flight Path and Sighting Circumstances



All locations and lines on this map are shown approximately. Refer to latitude, longitude, and other coordinates for exact positions.

RB-47 Flight Path and Sighting Circumstances



All locations and lines on this map are shown approximately. Refer to latitude, longitude, and other coordinates for exact positions.

netic and true compass bearings in northern Louisiana-Mississippi happened to be five-six degrees in July 1957 (National Geophysical Data Center, Boulder, Colorado, U.S. Historical Magnetic Declinations, Internet computations, Sept. 13, 20, 1997.) The solution is immediately evident:

The actual RB-47 aircraft heading from Mississippi through Louisiana into Texas was 270 degrees true, and the 265 figure was in reality the *magnetic* bearing—not "true" as mistakenly reported by the pilot on his sighting report to the ADC. This true heading from near Meridian, Mississippi, of 270 degrees, Sparks discovered in September 1997, was the only heading that could possibly be consistent with a turn to pursue the UFO about 70 miles southeast of Fort Worth and with the exact latitude-longitude given for the first visual over Louisiana. This solution fits perfectly to within the limits of the accuracy and precision of the reported data. (Further minor adjustments to fine-tune the flight path are made; for example, an approximately 0.7 degree correction must be included due to the seven-mph crosswind, but it turns out to make the true heading overall closer to exactly 270 degrees.)

Overlooked by all prior investigations is the curious fact that pilot Chase gives in his ADC sighting report form a heading of 260 degrees, not 265, at the moment before he started to turn toward Fort Worth to pursue the UFO, though he indicates he originally started the Meridian-Waco track from Mississippi on a 265 heading. No explanation is given for this change, which might easily be dismissed as merely a mistake of some sort. But there is a simple and decisive answer: At the end of the track near Waco, Texas, due to the variation in the direction of the north magnetic pole caused by the RB-47's change in geographic position, the magnetic declination would have increased to nine to 10 degrees (NGDC, *op. cit.*). Applying this enlarged correction to the 260-degree heading, as if magnetic, once again yields a true heading of about 270 degrees.

This repeated convergence on a 270-degree true heading indicates the RB-47 mission was flying on magnetic compass headings specifically adjusted at repeated intervals to maintain that 270 true heading so that the jet would fly due west along exactly the 32-degree parallel of North latitude. It also strongly suggests that the aircraft had likewise simply flown

straight north up from the Gulf of Mexico along the 89th longitude meridian into Mississippi before making the turn west near Meridian, since the crew reported passing near Gulfport, which was at about 89-05 W longitude or just five miles from the 89th meridian.

A very good intelligence-gathering rationale for maintaining these courses makes the plotting of the aircraft's position on a map easy. It enabled ELINT analysts quickly and easily to triangulate the locations of Soviet bloc radar installations from the directional readings registered at different points along the simple course lines. And since the RB-47 crew were carrying out navigational exercises as well as practice ELINT trackings of U.S. air defense radars on this flight, it makes perfect sense that they would have flown straight along the 89th meridian, then followed the 32nd parallel. Pilot Chase indicated to the Condon Committee in 1967 that he had less involvement with the navigational track of his plane than the rest of the crew, which may account for his later apparent confusion between true and magnetic bearings, and he alludes as well to the merits of simple flight courses: "This back-end crew was a pretty integral outfit—they worked very closely with the navigator [and] although the aircraft commander was commander of the crew, the coordination required was between this crew in the back-end and the navigator, because you can see you'd have to *hold a precise course in order for anything these guys were doing to have meaning* [emphasis added]" (Condon files).

On this corrected 32nd-parallel track starting from the 89th meridian, the RB-47 turn "near" Meridian actually occurred 31 miles to the south-southeast, and the track extended not to Waco but to a point projected 31 miles to the north of Waco.

This first-ever accurate reconstruction of the RB-47 flight path allows us at long last to make clear sense out of the case. It also helps, as we shall see, to refute Klass's misidentified ground radars as the main explanation for the strange airborne radar signal that was picked up.

Another major error concerns aircraft speed. The RB-47 cruise speed on its westward course was about 515 mph, not the approximately 460 mph assumed by Klass on the basis of the pilot's recollection of a jet-streamlike 50-knot (58 mph) head-wind. The strong head wind is disproved by National Climatic Data Center weather records found by Sparks (Sparks-Bob Jacobson, NCDC phone interview, April 21, 1976). Thayer had already noted in his report on the case in the Condon Report that with respect to the (erroneous) September 19, 1957, date for the incident the jet stream had been farther to the north, and it presumably was the same on July 17 as well, thus accounting for the lack of the strong head-wind (Gillmor, *op. cit.*). The upper air sounding from Carswell AFB, Texas, at 6:30 A.M. CDT on July 17, 1957, shows only a slight seven-mph crosswind from the south or southeast at about 34,500 feet (interpolated) and no head wind at all. McDonald used an almost correct 500 mph speed in his reconstruction, and he may have consulted the radiosonde data (his file notes don't say specifically but do indicate some consultation of meteorological data on January 4, 1971, the last note he wrote on the case).

The correct cruise speed of approximately 515 mph is based on the Mach 0.74 figure given in the Wing Intelligence report and Chase's sighting report form (confirmed by Boeing as standard) and on the more precise 258-knot Indicated Air Speed also given in the sighting form. (Speed of sound at 34,500 feet in July at 32 N latitude according to the *U.S. Standard Atmosphere Supplements, 1966*, is about 1,007 ft/sec or 687 mph. Therefore Mach 0.74 X 687 = 508 mph approximately, but at only two significant figures the Mach value could have been rounded from values between 0.735 and 0.745, or about 505 to 511 mph. The Indicated Air Speed was corrected to True Air Speed by taking the atmospheric density at home base, Forbes AFB, Kansas, at 39 N latitude where the air-flow speedometer was presumably calibrated on the ground, and comparing it with the atmospheric density at 34,500 feet at 32 N latitude (values are given in the 1966 *Standard Atmosphere Supplements*). The square root of the ratio of the densities gives a correction factor of about 1.72 X 258 knots = 444 knots = 511 mph approximately, at three significant figures. McDonald also obtained the same correction factor of 1.72 in his unpublished notes. The approximately 7.4 mph crosswind from approximately 149 degrees (interpolated) or roughly south-southeast would increase the speed in the due west direction with about a 4 mph vector component as a tail wind on the westward track of the RB-47, hence a westward speed of about 515 mph.

The seven-mph crosswind would become a more direct tail wind on the RB-47's northwest course to Fort Worth (and similarly on the northward leg in Mississippi), thus slightly increasing its cruise speed on that heading to about 520 mph and its top speed of Mach 0.86 to about 600 mph in round numbers (Sparks-Boeing phone interview, April 21, 1976.)

Gulfport "upscope" incident

The crew returned from the long flight out over the gunnery range at Matagorda Island AFB, Texas, and the Gulf of Mexico, before turning northward over Mississippi. "One of the purposes of these trips," Chase recalled for the Condon committee, "was a night celestial mission so that the navigator could fly out over the Gulf of Mexico with no reference to ground features and navigate by the stars" (Condon files).

The Wing Intelligence report states:

> ECM reconnaissance operator #nr 2 [Capt. Frank McClure] of Lacy 17, RB-47H aircraft, intercepted at approximately Meridian [sic], Mississippi, a signal with the following characteristics:

Frequency 2995 Mc to 3000 Mc;
Pulse width of 2.0 micro-seconds;
Pulse Repetition Frequency of 600 cps;
Sweep rate of 4RPM;
Vertical polarity.
Signal moved rapidly up the D/F [direction-finding] scope indicating a rapidly moving signal source; i.e. an airborne source. Signal was abandoned after observation.

McClure told the Condon committee in 1967:

I had a . . . radar receiver. . . . It had a DF [direction-finding] capability which can tell you the bearings from you to this object. . . . Any ground radar that you intercept has to go down your scope because the airplane is moving forward . . . it has to. . . . This particular signal I picked up, it was behind me and it moved forward which indicates it was either in the air or the aircraft was in a turn, and a fast turn because . . . I could see the bearing change rapidly. So I called the front [cockpit] and normally you can tell if you're in a turn. I don't know why I even bothered to call up front, because I asked them were they turning. He [the pilot] said, "No." They were flying straight and level. So I just ignored this thing because I figured that it's something that can't happen and I'll just forget about that. As I remember, I changed tuning units which involved a little manipulation. . . . [McClure describes the ensuing UFO events.]

The next day, I remember, we discussed all this. At the time, I remember so very very distinctly having this up-scope movement, and that can't happen—only if you have an object like an aircraft in the air with you that's moving faster than you, that's the only way you can get one or if . . . you make a turn, this would make it go up scope then. But this was a very rapid movement up scope. . . . I remember it went down on the left side quite a ways and then come off. . . . [Roy Craig: "It was circling around you?"] As I remember it went around us one complete cycle at least. It started out from behind me when I first saw it then came up the right side and then it got over on the left side . . . [Condon files].

Chase recalled the incident for the Condon Committee:

We have what we call a Raven One, a Raven Two and a Raven Three on the crew. Each man works a different frequency spectrum band and the number Two Raven at that time was working in the frequency band that a radar of the type of an [FPS-10 or CPS-6B] would operate. As we approached the coast, he picked up a signal that was equivalent to what he thought was a FPS-5 [sic]—now this is a very large ground installation type of radar signal. Our equipment is passive, we listen. However, there was one strange thing about it. The signal was moving up scope! Well, needless to say, . . . if it's a ground installation it moves down scope on you—this was moving up scope. He wasn't too seriously concerned about it, [because] he thought that, "Well, I've got 180 degree ambiguity in the equipment. . . ." This is what he told us later. So he changed his frequency band then and they do this by changing black boxes and he started to work in a different [radar frequency] area thinking that that piece of equipment was not operative.

At this stage it was purely an unexplained electronic signal of extraordinary behavior. There were no visual sightings until later. The strangely behaving airborne radar signals would also recur.

The Wing Intelligence report correctly states that ECM operator number 2, Maj. McClure, intercepted a strange signal over Mississippi. (The time is not given but can be estimated at roughly 4:30 A.M. CDT.) The location given, however, is "approximately Meridian" which was actually the approximate site of the RB-47's turn to the west. Possibly the intelligence officer confused "Gulfport" for "Meridian" since both were involved in the flight and both were in Mississippi. Chase and McClure told McDonald that the strange signal described by McClure occurred when the RB-47 flew towards and over "Gulfport." Only once did pilot Chase refer to the location as Biloxi (for the Condon Committee), and no one ever mentioned Meridian. Chase's UFO questionnaire for the ADC does not help here because it focuses on the main Louisiana-Texas portion of the incident and lets the attached Wing Intelligence report fill in other details.

After McClure's interview with McDonald in 1969 had firmly established his recollection of the location of the "upscope" incident as near "Gulfport," Klass succeeded in 1971 in getting McClure to change his story to locate it near Biloxi because it was closer in position for Klass's theory, which attributes the signal to the CPS-6B training radar near Biloxi, at Keesler AFB (Condon files; McDonald papers; Klass, *op. cit.*).

Klass theorized that a temporarily malfunctioning electrical relay switch in the RB-47's ELINT direction-finder or the antenna wiring caused a 180-degree ambiguity in direction, making a normal "downscope" motion plot of a ground radar look like an "upscope" move on the opposite side as if from an airborne source traveling faster than the RB-47. This was not an entirely new theory; at the time it happened, McClure himself thought it was possibly a 180-degree error due to equipment failure, and several persons back at Forbes AFB, including a Col. Raglen, also suggested the same thing, due to a possible "broken rotor" or "loose lead." No such equipment damage was actually discovered after landing and

the effect was never seen again on this specific plane or any other known to the crew (Gillmor, *op. cit.*; Condon files; McDonald, 1971, 1972; McDonald papers).

But aside from the UFO signals, "all the other signals moved down scope" on the flight, McClure told the Condon Committee, referring to other known ground radar sites tracked while the RB-47 was on a straight-line course before UFO observations resumed. McClure told Klass he had afterward detected a number of L-band (about 1,000 MHz) air defense ground radars on the Mississippi-Louisiana legs of the trip and their direction-finding bearings all behaved normally and were in agreement with their known locations (Klass, *op. cit.*). These were probably the MPS-7 radars at ADC sites in Alexandria, Louisiana (653rd Aircraft Control and Warning Radar Observation Network [ACWRON] Squadron), Texarkana, Arkansas (703rd ACWRON), and possibly Houma, Louisiana (657th ACWRON), transmitting at 1,215-1,365 MHz (ADC letter to Sparks, April 7, 1976; Electromagnetic Compatibility Analysis Center letter to Sparks, July 12, 1977).

McClure stressed that he flew the very same RB-47 aircraft involved in the UFO incident of July 1957 for four years and never once saw such an "upscope" effect either before or afterward. "In fact, as long as I flew in that airplane, which was about four years, that was the only signal I ever saw move up scope," McClure declared (Condon files). Fellow raven Maj. Provenzano, who was sitting next to McClure, said he looked over at McClure's monitors and could see they were functioning normally against the known ground radar installations on the flight, and he saw that McClure checked his equipment and "found everything working properly" (McDonald papers).

Klass wrongly asserts, "Because McClure did not notify any other crew members of the anomalous behavior of his equipment at the time, it is not possible to check other crew members for their recollections" of the RB-47's location in Mississippi during the upscoping (Klass, 1971). This is a non sequitur. In fact, several crew members (Chase, McCoid, and Provenzano) distinctly recalled hearing McClure tell of the upscope incident later in the same flight. Indeed, McClure himself recalled he did tell the pilot and copilot of a possible malfunction of his equipment at the time it happened, since one of the purposes of the flight was to determine if the equipment functioned; he didn't explain exactly what was anomalous about it until about three-quarters of an hour later, however. "I asked them if they were going straight and forward or if they were turning [the aircraft] and I said, 'I'll report this tomorrow, something's wrong here.' Things just don't go upscope," McClure told the Condon investigator (Condon files; McDonald papers). Klass himself was told the same thing by McClure, that he called the pilot on the intercom right after the upscoping to ask if the plane was maneuvering, and the pilot said no (Klass, 1971, 1974). Thus, other crew members were alerted to a problem at the time it occurred and could have had independent recollections of where the RB-47 was located when McClure notified them, as well as retrospective recall of what McClure told them a little later in the flight. Chase told McDonald it happened near "Gulfport" (McDonald papers).

As we have already seen, the reconstructed flight path of the RB-47 strongly indicates an 89th meridian course, which would have taken it nearer to Gulfport than Biloxi. Hence, this 89th meridian course supports the evidence of the crew testimony that identifies Gulfport as the locale of the "upscope" signal, not Biloxi. (McClure's changed testimony for Klass must be rejected as biased and his earlier original testimony left standing.) The Biloxi radar site was about five miles to the east of the RB-47's 89th meridian course. But the RB-47's location on the 89th meridian track is on the wrong side of the Biloxi radar for Klass's theory to work, inasmuch as it places the Biloxi radar on the right-hand side of the RB-47, the same side as the upscoping UFO signal.

Klass's theory of a 180-degree error in the direction of the signal requires the Biloxi radar to be located on the left side of the plane so that the signal is erroneously displayed 180 degrees away on the right (and the signal cannot possibly cross over from one side to the other, such as right to left, if it's from a fixed ground site to an aircraft in straight-line flight). McClure told McDonald and Klass that the upscope signal started at about the five o'clock position which was on the right side of the plane (McDonald, 1969, 1971; Klass, *op. cit.*). But if the RB-47 flew near Gulfport on the 89th meridian, then the Biloxi radar and the "upscope" signal were both on the right side, thus refuting Klass's theory of a 180-degree equipment error.

McClure's recollection of the "upscope" details for the Condon Committee, for McDonald, and even for Klass contradicts Klass's theory. As McClure told the committee and McDonald, the "upscope" signal did cross over from the right to the left side, making one almost complete "orbit" of the straight-flying RB-47—an impossibility for a ground radar with or without a 180-degree display error. He said it started at about five o'clock, went up to the 12 o'clock position straight ahead of the plane, then went downscope, disappearing between the nine and six o'clock positions ("port side aft" as McDonald noted it). The "orbit" maneuver contradicts the theory of a 180-degree error. Only a highly maneuverable airborne source could do that—a UFO—without any 180-degree error at all.

Klass's theory is also contradicted by a number of other recollections McClure related to both Klass and McDonald. McClure informed McDonald that the signal swept around at about the same rate (the same angular speed) (McDonald papers). But simple geometry shows that the direction displayed on the straight-course RB-47 for a ground radar signal

would have been moving at twice the angular rate at the three o'clock position (when perpendicular to the aircraft's due north flight track) as at one or five o'clock when the distance would have been twice as great. It took about five minutes, McClure told Klass, for the signal to move up the scope from five o'clock to one o'clock (Klass, *op. cit.*). However, this angular rate requires the 520 mph RB-47 to have been on a ground track that was entirely within the blind zone of the Biloxi radar's VC Beam. The RB-47 would have been 25 miles from the Biloxi radar at the farthest during this five to one o'clock move, passing to 12.5 miles to the east of the radar, whereas the VC Beam's blind zone extends out from 0 to about 30 miles for an aircraft at 34,500 feet.

The ground path of the RB-47 can be adjusted eastward by about 35-40 miles to avoid the gap in the Biloxi radar coverage and thus satisfy Klass's theory at least partially. But it absurdly places the RB-47 over the state of Alabama in total contradiction of every flight record and crew recollection, it throws out McClure's five-minute time estimate for the five-to-one-o'clock move (which would have to inflate to 12+ minutes), and of course it ruins the 89th meridian course already determined. Even if a course distortion so great as this could be allowed, it still runs afoul of the "orbit" and constant angular speed observations. And it also clashes with McClure's observation to the Condon Committee that the signal strength remained "about the same" throughout, it didn't weaken or strengthen noticeably; he told Klass it was "mighty strong" (Condon files; Klass, *op. cit.*), whereas the Biloxi radar signal would have weakened by a factor of roughly 160 as the aircraft approached the 30-mile limit of the VC Beam.

Klass stresses that the strange "upscope" signal was identical in every respect to the VC Beam of the CPS-6B radar, except possibly one characteristic. He is forced to admit that the pulse width or duration of 2.0 microseconds was twice too long for that radar at the recorded 600 pulses per second Pulse Repetition Frequency—it should have been 1.0 microsecond (Naval Intelligence Command letter to Sparks, June 20, 1977; Electromagnetic Compatibility Analysis Center letter to Sparks, July 12, 1977; Klass, *op. cit.*). Klass paraphrases someone as speculating that a "ground reflection" could "smear" the one microsecond pulses into two microseconds each, but he doesn't present the full context of the discussion and passes over the matter in a sentence or two as not "consequential."

Klass has failed to consider what the "ground smear" theory really means. It would be extraordinary indeed to double the width of the neat, almost square-wave shape of the pulse by random reflections from ground clutter and still maintain the neat shape. McClure would surely have noticed there was something wrong with the pulse shape and width and at least would have noted that it was spread over a range of, say, 1.5 to 2.5 microseconds or the like—but he didn't. Such a lengthening requires that part of a "ground" reflector be precision-placed almost exactly in the line of sight from the radar to the RB-47 so that there would be no gap between the direct pulse and the reflected pulse. To prevent a gap between direct and reflected pulses, the reflected pulse must trail immediately behind and smoothly connect up with the direct pulse so as to make it appear enlarged. Judging from the operating manual and the recorded data, the gap between the direct and reflected pulses could not be much greater than about 100 feet (or 0.1 microsecond duration) before the square-wave would be noticeably distorted (U.S. Air Force, 1971a).

If the "smear" was caused by ground clutter, then the first metallic building would therefore have to be within 100 feet or so of the Biloxi radar antenna (followed by a series of metallic buildings out to at least a mile), a rather unsafe distance from an extremely powerful microwave transmitter. For metallic buildings at a more reasonable distance from the radar, the beam would have to be at an extremely low angle to the horizon to maintain no larger than a 100-foot gap in total transit distance between direct and reflected pulses. The RB-47 would also need to be on the horizon (this was undoubtedly what ELINT specialist Rod Simons actually meant when he suggested a "ground smear" to Klass). But neither the RB-47 nor the center of the VC Beam of the CPS-6B radar was at the horizon. Metal roofs of buildings on or near the horizon would have to be slanted coincidentally at precisely half the five- to 10-degree elevation angle of the RB-47 to reflect up directly at the aircraft—an incredible feat. Because the VC Beam was centered about five to six degrees above the horizon, the signal power radiated at the horizon is about 100 times weaker, so that a reflected pulse from a ground reflector on the horizon would be even weaker still. Such an extremely weak reflected pulse could not compete in strength with a powerful direct pulse. Thus, the reflected pulse would not even have registered.

So the reflected pulse would not have registered on the ALA-5 pulse analyzer's scope display at the same time as the overwhelming direct pulse. (General Electric's signal propagation tests on the CPS-6B show the VC Beam's signal diminishing at the horizontal by about 20 dB or factor of 100 from the peak power higher up. See "Report on Pattern Measurements for AN/CPS-6 and AN/CPS-6B Vertical Radar Antenna" and other CPS-6B data supplied to Sparks by C. I. Robbins, Antenna Engineering, Electronic Systems Division, Heavy Military Equipment Department, General Electric, Sept. 15, 1977.)

If buildings on the horizon must be excluded as possible reflectors for the "smearing" of the radar pulse, now consider elevated buildings. The Keesler AFB radar site is right on the coast. But the Mississippi and Alabama coastline is flat and virtually at sea level. There are no mountains or plateaus for large metallic buildings to be perched on at a five- to 10-de-

gree elevation above the Biloxi radar, which would correspond to a height of about 5,000 to 10,000 feet at 11 miles, to give an arbitrary example. Any ground reflectors more than a few miles from the radar would limit the time the RB-47 is illuminated by the reflection to several seconds or less, hardly long enough to analyze the signal.

In fact, according to Klass the RB-47 (and thus any "ground" reflector) had to be far out to sea over the Gulf of Mexico when the "upscope" signal was first discovered—and still over the ocean during about the first half of the "upscoping"—which renders the "ground" reflector notion absurd (Klass, *op. cit.*). This is necessitated by his theory identifying the Biloxi ground radar as the upscope signal source and by the five o'clock initial position, which would place the RB-47 at least 25 to 60 miles out over the water of the Gulf of Mexico.

Thus the reflector actually had to be airborne high above the gulf and Mississippi and relatively close to the RB-47 in order to receive and reflect enough power from the middle of the Biloxi VC Beam to make at least partially viable Klass's "ground smear" theory of doubling the pulse length. A single metallic reflector would have to lengthen the path by 1000 feet (the approximate distance traveled by radar in an additional microsecond), so the reflector itself would have to be at least this size and shaped like a curved antenna so as to not reflect the radar beam away from the RB-47. The airborne reflector would have to coordinate its motion to keep oriented toward the RB-47 and to stay in the same direction as the ground radar so that the RB-47 ELINT monitors never see two signals at once, as "only one signal was present during initial observations" according to the Condon project's summary of McClure's testimony (Gillmor, *op. cit.*). Ironically, Klass's "ground reflector" must behave like a highly maneuverable metallic airborne UFO of tremendous size in order to work.

The most serious problem with Klass's explanation is that the Biloxi radar was used only for training purposes and evidently was not operating in the middle of the night in the middle of summer in 1957. Klass admits the CPS-6B radar was a training device under the Air Training Command (ATC) at Keesler AFB (Klass, *op. cit.*), and it was therefore not part of the 24-hour continuous operations of the ADC. The Keesler CPS-6B training radar would not be turned on in the middle of the night, at about 4:30 A.M. CDT, when the RB-47 was flying in that region on the night of the UFO incident. It would have been operated during the daytime training classes for radar repairmen. According to the ATC, in 1957 only one course operated the CPS-6B—the Training Course AB30332D, AC&W (Aircraft Control & Warning) Radar Repairman, consisting of 18 weeks of classroom teaching and 18 weeks of training on the various types of equipment (not just the CPS-6B but also the FPS-6 radar and two GPX-6 IFF radar sets, so that the CPS-6B portion of the equipment training undoubtedly covered less than 9 of the 18 weeks; ATC letter to Sparks, June 6, 1977.) Since it was a nine-month course it was apparently run during a normal academic term from September to June approximately. In other words, there would not have been a class in session to operate the CPS-6B even in the daytime, let alone nighttime, in the midst of summer vacation, on July 17, when the RB-47 incident took place.

In short, no existing or operational ground radar at Biloxi or elsewhere can account for the evidently airborne "upscope" UFO signal over Mississippi. Even assuming for the sake of argument that such a radar was transmitting the night of the RB-47 incident, the best skeptical explanation actually requires the involvement of an extremely large 1,000-foot, highly radar-reflective or metallic, precision-maneuvering airborne object: a UFO.

Meteor over Louisiana

The RB-47 headed north along the 89th meridian, then turned west at approximately 4:50 A.M. CDT, at 32-00 N latitude, according to Sparks's reconstructed flight path. The aircraft then flew along the 32nd parallel on a 270-degree true heading into northern Louisiana.

About 20 minutes later, a visual sighting occurred. The Wing Intelligence report states:

> At 1010Z [5:10 A.M. CDT] aircraft comdr [Maj. Lewis Chase] first observed a very intense white light with light blue tint at 11 o'clock from his aircraft, crossing in front to about 2:30 o'clock position, co-pilot [Lt. James McCoid] also observed passage of light to 2:30 o'clock where it apparently disappeared. A/c [aircraft commander] notified crew and ECM operator nr 2 [Capt. McClure] search[ed] for signal described above. . . .

Aircraft commander Chase recounted the dramatic details for the Condon Committee: "I saw this real bright light out ahead of us that looked as though it was coming towards us and also looked at about the same altitude." He thought from his years of experience as a pilot that it was not quite at the "critical" collision distance but it was "approaching . . . at an impossible closure rate." Chase continued: "So I called the crew and told them to stand by—that we might have to take violent evasive action—'make sure your seat belts are fastened 'cause I might have to go up or down in a hurry'."

Suddenly the light "flashed" across the sky from left to right:

> I didn't have any time to react at all—that's how fast it was and it went out to about the 2 o'clock position and all the lights go out on it. . . . I asked him [copilot McCoid], "Jim," I said, "Did you see that?" He gave

me some remark like, "Well, I did if you did." [Laughter] He wasn't going to admit to anything. . . . Then one of us made the remark, "Well, it must be a flying saucer," you know. We were laughing about this on interphone [Condon files].

Copilot McCoid confirmed the streaking portion of the sighting in his separate interview:

From the back seat of a tandem-type seating arrangement in a B-47, well, I had distortion through the curvature of the canopy and my forward visibility was probably—from the 12 o'clock position—probably 30 to 45 degrees either side—was somewhat limited [by the pilot's ejection seat] without moving my head. I still could confirm what he saw. He made the comment, "Did you see that?" and I said, "Well, I saw it if you saw it." [Roy Craig: "Did you see it before it came very close?"] Well—no I confirmed when he [Chase] first got my attention to look out and I couldn't get an estimate of distance. . . . As it passed, yes, I confirmed what he was seeing as it went skidding by. . . . My description would be something like [an after-burner] type on jet engine in flight, a torching type thing [Condon files; McDonald papers].

Chase described the light in his ADC sighting questionnaire as an "intense blue-white light," whose actual or apparent size could not be estimated. He estimated its distance at closest approach at two miles, though later admitted to the Condon Committee it is not possible to determine the distance to an unknown light in the sky [that is, when it is above the horizon at night, if there are no clouds to give reference points; weather was clear]. "Nothing but fast moving light was visible," so no drawing or sketch could be made, Chase reported on the questionnaire. Neither Chase nor McCoid was able to add any descriptive details such as angular speed or duration when questioned by the Condon investigator and by McDonald [*ibid.*]. Because it was at about the "same level" as the RB-47, it was above the horizon since the depression angle to the geometric visual horizon from the RB-47's altitude is 3.3 degrees [not including an additional 0.4 degree of standard atmospheric refraction from that altitude]. These are all classic descriptions of brilliant meteor fireballs reported by startled unprepared witnesses.

The streaking light apparently closed on the RB-47 nearly head-on for perhaps 10-15 seconds with little apparent side movement noticed, since there was enough time for Chase to alert the crew on the interphone. Sparks estimates this timing based on the approximate duration of Chase's warning comment to the crew.

The only element of strangeness that weighs in on this streaking light being a UFO is the coincidence of its disappearance at about the 2 to 2:30 o'clock position from the RB-47 [60 to 75 degrees' relative bearing], the approximate position of the steady radar-visual-electronic UFO a half hour later [60 to 70 degrees]. This is a weak and unreliable argument. All of the other details of this brief sighting can be accounted for by a spectacular meteor fireball on a straight-line trajectory. [Ironically, Klass's "careful" map of the incident mistakenly shows the "meteor" making about a 45-degree course change from a northeast heading to due north [Klass, *op. cit.*].

Klass correctly contends that oncoming meteor fireballs can cause experienced flight crews to take emergency evasive action to avoid a perceived collision, even though the meteor is dozens or hundreds of miles away and no collision is actually imminent or possible. In this case, the meteor initially appeared to be stationary because it was coming almost head-on at a descent angle equal to its elevation. Only as the meteor came considerably closer did its lateral velocity become apparent and it looked as if it had suddenly streaked off to the right while in fact maintaining the same course. It was an illusion of visual perspective. For example, a meteor traveling at 20 miles per second 300 miles away on a course almost directly at the RB-47 but offset by 30 miles to the right of the aircraft would be perceived at the RB-47's location as having an initial angular velocity of only 1/3-degree per second, hardly noticeable to the crew given the RB-47's forward motion with respect to reference points just below the horizon [the "moving moon illusion" in reverse]. After 10 seconds the angular speed would be one degree per second, and this lateral motion probably now would begin to be noticed. One can imagine at this point that Chase had just finished warning the crew he might have to take evasive action. This lateral angular motion would become considerable in just seconds. In the final two seconds of this 15-second event, the meteor would travel about 57 degrees, or most of the 90-degree apparent angular course of the meteor, essentially all at once.

Assuming a nominal three-degree descent angle on a reciprocal head-on course from 240 degrees true [11 o'clock position from the RB-47], the meteor's radiant or point of origin on the celestial sphere would have been roughly 285 degrees in Right Ascension [19 hrs.] and -23 degrees Declination [23 degs. South], near the constellation Sagittarius. These rough figures could easily be in error by 15-30 degrees especially since Chase later estimated the initial approach at 10 o'clock, or 30 degrees further south [210 degrees true], on his sighting report form two months after the event [though the Wing Intelligence report's 11 o'clock position is based on presumably better same-day recollections]. The descent angle also could have been steeper. There are several meteor showers concentrated in this general region of the sky in mid-July, various Sagittariids, Capricornids, and Ophiuchids, but sporadic meteors can come from any direction at any time without being associated with a particular shower.

This meteor fireball sighting is the only part of the RB-47 incident having a mundane explanation, in this case as a natural phenomenon.

RB-47 in the ground radar's beam — no UFO signals received

The Wing Intelligence report states: "At 1010Z [5:10 A.M. CDT] . . . . [after object] apparently disappeared. A/c [aircraft commander] notified crew and ECM operator nr 2 [Capt. McClure] search[ed] for signal described above, found same at approximately 1030Z."

None of the crew seemed to remember a long 20-minute delay in finding a radar signal corresponding to the "upscope" incident, not even under Klass's prodding (*ibid.*) In fact, McClure told the Condon Committee he thought he found the signal just "seconds" after conversing with the cockpit crew on their "flying saucer" sighting, but this may simply be a casual comment rather than a serious time estimate. McClure said he had had to replace the tuning unit "black box" from the Mississippi episode in order to see if the same signal reappeared, a procedure that "involved a little manipulation," according to McClure. Pilot Chase also remembered it as more of an extended period where McClure had to replace black boxes to retune the monitor and it was "pretty soon" after that (Condon files). This seems to be a better explanation for the delay than McDonald's theory that it was 20 minutes before McClure thought of the idea of searching for a signal and then he found it right away — or Klass's theory that McClure had to search for 20 minutes before finding and mistaking a normal ground radar for an "airborne UFO" signal.

Klass reasons that if the "UFO" signal was really just a misidentification of the Duncanville, Texas, FPS-10 air defense radar's VC Beam, then no signal could have been picked up until the RB-47 flew within the coverage pattern of the VC Beam. Klass figures the aircraft should have reached the VC Beam at about 5:29 A.M. (see Klass's map in *UFOs Explained*), just before the first "UFO" signal reading given in the Wing Intelligence report or perhaps even at the same time since the report says it was at "approximately" 5:30. Klass also argues that the "UFO" signal should have disappeared every time the RB-47 passed into a gap or blank zone in the Duncanville FPS-10 radar coverage, which he claims should have occurred at about 5:32 and 5:35. Sure enough, the next UFO signal reading is at 5:35, leading Klass to claim the signal must have disappeared as he predicted sometime after the 5:30 reading (at 5:32) and reappeared on-time at 5:35 (*ibid.*) — even though the Wing Intelligence report mentions no signal disappearance at this point and gives the impression of continuous reception of the signal from 5:30 to 5:35.

In any event, Klass's flight track for the RB-47 is in error, and so are his figures for the Duncanville radar coverage, not only from slight miscalculations but also from failure to take into account atmospheric refraction of radar waves. Normal refraction bends radio waves downward and thus extends the distance they travel over the earth literally by bending over the earth's horizon (Gillmor, *op. cit.*). The radar refractivity profile and ray-tracing by Sparks based on the Carswell AFB upper air data from 6:30 A.M. are close to normal refractivity. (Normal conditions would range from about 350 N-units at sea level to about 77 N-units at 34,500 feet, whereas the Carswell data indicate an extrapolated range from about 358 to 89 N-units.) Hence, the lower edge of the VC Beam at one-degree elevation should have reached the RB-47's 34,500-foot altitude at a ground distance of about 176 miles based on Sparks's ray-tracing calculations, not Klass's 165-mile figure (*ibid.*). Sparks's calculation incorporates the 730-foot elevation of Duncanville Air Force Station (AFS) which slightly helps Klass's figures by making the RB-47 effectively at an altitude of about 33,770 feet, but it is not enough to do more than slightly reduce or offset the increased range of the radar beam due to refraction.

Thus, if the UFO signal was in reality the VC Beam from Duncanville, the RB-47 should have detected it when the beam first illuminated the aircraft just before about 5:27 from a ground range of about 176 miles, according to Sparks's calculations. The Duncanville beam would actually have *disappeared* not *appeared*, at 5:30, due to the beginning of the gap in radar coverage from about 151 to 130 miles ground range (reappearing at about 5:32). This sequence of events confounds Klass's scenario.

McClure also told the Condon Committee that he never noticed a fading in the UFO signal strength at any time during the flight (except at the very end while over Oklahoma when McClure thought it was actually the ground radar anyway). Asked by Roy Craig "You never saw a weakening in the (UFO) signal?," McClure replied, "No sir. The signal stayed the same except when it would go off. It would come back on [and] it would be just about the same magnitude it was" (Condon files). That observation contradicts the notion that the RB-47 merely passed in and out of blind zones in Duncanville's radar beams, since the signal would have gradually faded in intensity for some minutes at the edges of the gaps rather than abruptly disappearing.

It is especially puzzling that the Duncanville radar VC Beam was not detected at 5:27 if it was in fact true that Capt. McClure had spent the preceding 17 minutes in "fruitless search" for a signal identical to the Mississippi "upscope" signal, as Klass insists had happened. But a signal wasn't even detected until 5:30 when the Duncanville VC Beam should actually have vanished. Implicit in all of this is Klass's theory that the odd signals detected by the RB-47 in

Mississippi and Texas came from radars at Biloxi and Duncanville sending out identical signals which were then misidentified by the flight crew.

The real question ought to be why Klass or anyone would expect the Duncanville radar beams to be tuned to exactly the same frequencies as the Biloxi radar beams. According to Klass, identically transmitting radars such as these would be tuned to slightly different frequencies in order to avoid mutual interference if they were close enough to cause a problem (Klass, *op. cit.*). Though the Duncanville and Biloxi sites were some 496 miles apart in ground range, under the commonly occurring "radar ducting" conditions prevalent over the Gulf Coast region, interference would have been a frequent problem unless each site's frequency settings were tuned away from each other (Gillmor, *op. cit.*).

A more reasonable explanation for why Duncanville's VC Beam might not have been picked up by McClure at about 5:27 is if it happened not to be tuned to exactly the 2,995-3,000 MHz frequency of the UFO radar beam, but perhaps to just below or just above it (for example, 3,000-3,005 MHz).

In fact, McClure stressed to the Condon Committee that later, when he was intercepting the UFO signal, he had narrowed down the UFO signal frequency range on his receiver so that he had deliberately tuned out the normal ground-based radars that were set to slightly different frequencies, particularly the one McClure knew about near Dallas (Duncanville). McClure said, "this [UFO] was a good strong signal. As I remember, I had to cut the dB down to get it down where I would normally work a signal. When I cut it down to where—I normally work a signal, there was nothing else on the scope. That was the only signal I had at that frequency. You see, we had a centering device where we can narrow down to the neighborhood of 1/2 a megacycle [sic], and so at that frequency range there was nothing else showing" (Condon files). The ALA-6 operating manual indicates the narrow band is about 2 MHz wide not 1/2 MHz (U.S. Air Force, 1971b).

McClure's testimony thus confirms that the UFO and the Duncanville radar were transmitting at noticeably different frequencies. Therefore, their signals could not possibly have been one and the same as Klass argues that they were.

The Duncanville VC Beam might still have been detected nonetheless if the RB-47 came within range of the strongest portion of the Duncanville VC Beam several minutes after 5:30 so that enough microwave radiation would spill into the neighboring frequency band of the UFO signal (at 2,995-3,000 MHz) to be detectable, despite McClure's possibly intermittent efforts to narrow the bandwidth to prevent that from happening. Then one or the other—or perhaps at the same time both the Duncanville and the UFO signals—might have been detected. As we shall see later, this is exactly what happened repeatedly. And if this is the case, then the 2,995-3,000 MHz UFO signal could not have been caused by the Duncanville radar at a measurably different frequency.

One might ask why Duncanville did not notify the RB-47 of the painting of a UFO nearby shortly after its lowest radar beam (the Vertical-Lower Beam) first lit up the aircraft and vicinity at 5:18 A.M. (at a maximum ground range of about 250 miles). The answer is simple: At Duncanville's chosen Pulse Repetition Frequency of 600 pulses per second, the maximum unambiguous range of the radar is 155 miles slant range which was not reached until about 5:30. In effect, the Duncanville radar site chose not to track the object beyond 155 miles' range. Chase stressed that he confirmed with Duncanville its skin tracks of the UFO at the RB-47's two o'clock position soon after the electronic signals from the UFO started at about 5:30 (see below).

Airborne UFO radar signals again

The Wing Intelligence report states (emphasis added):

> At 1010Z . . . a/c [aircraft commander Maj. Chase] notified crew and ECM operator nr 2 [Capt. McClure] search[ed] for *signal described above*, found *same* at approximately 1030Z [5:30] at a relative bearing of 070 degrees; 1035Z [5:35], relative bearing of 068 degrees; 1038Z [5:38], relative bearing 040 degrees.

The "same" "signal described above" is of course the one with the detailed electromagnetic signatures listed for the Mississippi upscope incident, including the 2,995-3,000 MHz frequency and 2.0 microsecond pulse length.

Chase related the following events after the meteor and the joking about it being a "flying saucer":

> We were laughing about this on interphone. The guy in the back end [McClure], when he heard this, he takes the piece of equipment that he was working and goes back to this frequency where he had picked this thing up moving up scope [in Mississippi]. So pretty soon he called me and he says, "Maj. Chase," he says, "It's out at your two o'clock position." Now he can take azimuth, you know, right down to—he can interpret the characteristics of the type of signal. Sure enough, he picked up the same thing that he had before, now at our two o'clock position. [Roy Craig: "Steady now . . .?"] Holding, holding on the same azimuth [direction] . . . he stays at this 2 o'clock position. . . . [Craig: "And you could still see it visually?] Oh, no. No, this was at night and all the lights are gone now [referring to the meteor]. The only thing that we have is this piece of equipment on him, in the back.

Thus Chase makes it clear that there was an extended period of receiving only a signal at two o'clock (about 60 degrees) before there was a visual sighting of a light. He describes an episode at the beginning, evidently within a few minutes after 5:30, when he briefly slowed the RB-47 down to minimum speed to try to shake the signal's two o'clock position, then went to maximum speed to try to do the same (the latter confirmed by copilot McCoid):

> So I thought well, I'll try something, you know, so I reached up and pulled the power back on the airplane, slowed way down. Oh, maybe, maybe [by] a 100 knots. Stayed at exactly the same azimuth—two o'clock! So then I speeded back up only this time I went to max. speed. Same thing—stayed there. So I called the [CAA] center then and I told them, "Something up here, but I'm not sure what's going on. I'd like to go over to ground control radar [at Duncanville] to see if we can get any confirmation on what we are picking up." Of course, we are on a flight clearance filed with the center and we've got to stick to that flight plan unless the center relieves us. . . . They said, "You're cleared over to the GCI [Ground Controlled Intercept] frequency to work with them; call us when you're done." So I went over to GCI and, of course, picked up the [communications] net from in the Fort Worth/Dallas area [Duncanville]. . . . I called them and they said, "Roger, we have you. We have both of you on the scope!". . . [Roy Craig: "By the both of you they mean you and the target?"] Yes. Myself and the [UFO] target and they gave me at this time ten [10] miles range [Condon files].

Sparks's reconstruction of the RB-47 flight path is approximately as follows (see table below). It incorporates the brief slow-down described by Chase, along with the recorded relative bearings received by McClure on the RB-47 and the actual relative bearings to the Duncanville ground radar. It is based on a cruise speed of about 515 mph until the UFO signal is picked up at 5:30, then 560 mph average speed for the next five minutes (representing a lowest speed of 300 mph reached at about 0.5 g in the slow-down averaged with maximum speed the remainder of the time), then going to maximum speed of 595 mph until the visual sighting at 5:39 and another brief slow-down to be described later.

It is quite apparent that there was a radar signal at 68 to 70 degrees relative bearing from the RB-47 and that it coincided with the UFO visually sighted at about 60 degrees, to within the limits of roundoff error and visually estimating its position by "eyeballing" it (two o'clock position could be from about 1:30 to 2:30, or 45 to 75 degrees). Indeed, the UFO evidently maintained a consistent 60- to 70-degree position throughout the first 10 minutes (from 5:30 to 5:40) despite the RB-47's efforts to gain on it at maximum speed, exactly as Chase reported. The UFO did not move "upscope" at this time (as McDonald mistakenly interpreted the data). It was not until around 5:42 that the UFO "started" to move upscope to the dead ahead 12 o'clock position (0 degrees relative bearing), though only making it to about 20 degrees evidently, when it suddenly "veered" off to the right to head towards Fort Worth-Dallas (McDonald papers; Condon files).

Sparks's reconstruction of the RB-47 flight path

RB-47 LOCATION			OBSERVED RELATIVE BEARINGS (degrees)				
Time A.M. (CDT)	Latitude North (degs-mins)	Longitude West (degs-mins)	Actual Relative Bearing to Duncanville	Duncanville Signal Rec'd by RB-47	UFO Signal Rec'd by RB-47	UFO Visual	Distance to Duncanville (statute miles)
5:27	32-00	94-01	16	—	—	—	175
5:29	32-00	94-19	17	—	—	—	158
5:30	32-00	94-28	18	—	70	—	150
5:32	32-00	94-47	20	—		—	132
5:35	32-00	95-15	25	—	68	—	107
5:38	32-00	95-46	34	40	—	—	81
5:39	32-00	95-56	38			60	73
5:40	32-00	96-04	43	40	70		66
5:42	32-00	96-24	57		20	0-15?	53

It is also obvious that this UFO radar signal could not possibly be the Duncanville radar which was at 18-25 degrees relative bearing, as the error would be 43 to 52 degrees on the first readings; McClure evidently had a full five minutes to verify that the UFO signal maintained exactly a position of 68-70 degrees. Even under Klass's theory, McClure should have had at least two to three minutes' time to verify the direction of the signal (from about 5:29 to 5:32, or when using the corrected beam coverage pattern, about 5:32 to 5:35). McClure also had up to two minutes to verify the 70-degree bearing at 5:40, when the difference from Duncanville's direction was 27 degrees. The 20-degree direction to the UFO at 5:42 after the sudden "pull ahead" maneuver represents a 37-degree discrepancy with Duncanville's direction. Again, the UFO signal could not possibly be one and the same as Duncanville's with such enormous errors, especially when the readings of the actual Duncanville signal separate from the UFO demonstrate very accurate tracking and that the two signal sources are not the same (more on this below). These readings of the Duncanville radar beam give us an extraordinary calibration and independent check on the overall accuracy of the electronic measurements of the UFO radar transmission.

Because of the nature of the direction-finding display on the ALA-6 equipment, the direction of a signal is found by noting where the top of a fan-shaped oscilloscope trace points to a circular azimuth grid showing the relative bearing to the aircraft's heading. Because the shape of the fan is broad, precision errors of up to five to seven degrees can easily be made, but certainly not 40 to 50 degrees. By narrowing the fan-shaped trace to almost a straight line, a precision within about two degrees can sometimes be obtained, and this may account for the 68-degree reading at 5:35 (U.S. Air Force, *op. cit.*). The 68-degree figure may not indicate a movement by two degrees, but only a more precise reading after a few minutes of adjusting the signal. If so, then the correct, most exact relative bearing angle to the UFO in its steady position would be 68 degrees whenever the "70 degree" reading is given on the RB-47's westward course (at 5:30 and 5:40).

It is clear that the UFO signal is the dominant signal. Only later was the Duncanville radar (at about 34-43 degrees' relative bearing) in fact picked up briefly as a 40-degree signal at 5:38 and 5:40 (errors only about three to six degrees) when the RB-47 reached the zone of maximum signal strength of Duncanville's VC Beam. The small measurement errors are in opposite directions from the true values (by about -6 and +3 degrees), thus indicating no systematic error and demonstrating again the coherence of the reconstructed RB-47 ground track which resulted in calculated true bearings to Duncanville that almost neatly split the signs and approximate magnitudes of the errors, minimizing residuals.

The first RB-47 detection of Duncanville's signal in this zone of maximum signal power was at a distance of about 81 miles, when the UFO signal must have temporarily faded and been briefly overcome by the Duncanville beam, or the UFO signal was turned away from the RB-47's direction or perhaps just turned off. Klass's radar coverage diagram shows the FPS-10/CPS-6B ground radar's signal maximum is at around 75-80 miles distance for an aircraft at 34,500 feet (Klass, *op. cit.*). The second Duncanville detection at 5:40 was also a simultaneous detection of both the UFO and the Duncanville radar beams, widely spaced 30 degrees apart (and repeated again at 5:42.5), thus conclusively proving that the UFO signal was not the same as the Duncanville signal.

Klass falsely insinuates that the two signals separated by 30 degrees in direction could have been caused merely by the Duncanville radar and, quoting the ALA-6 operating manual, "a reflection from some nearby object" close to the Duncanville radar. In this incident, the object obviously cannot be on the ground "nearby" to the radar; otherwise the direction would not be noticeably different. It must be an object or reflector "nearby" to the RB-47 aircraft carrying the ALA-6 equipment, close enough for the reflected signal to be approximately as strong as the direct signal and in a different direction from the ground radar, in this case 30 degrees different.

This was forcefully brought out by Condon investigator Roy Craig with ELINT operator McClure:

> *Craig*: If this had been a reflected signal from some ground source, would you have been aware of the direct signal from the ground?
>
> *McClure*: Should have been. . . . You see, if I had picked up a ground radar back here, at the time, and then it was reflecting off of an object . . . then I would have got[ten] a reading pointing towards this object and I would also [have] had one pointing back to the original signal from the ground radar. . . . I'd have had it as probably a smaller lobe here and the main lobe [on the screen display].
>
> *Craig*: But the direct signal would have been much stronger than any reflection?
>
> *McClure*: That's right, that's right [Condon files].

According to Craig's summary of McClure's account, "only one signal was present during initial observations" (Gillmor, *op. cit.*). But as the jet approached the Dallas-Fort Worth area, McClure thought he had gotten the UFO signal "mixed" up with the Duncanville radar, and that is of course exactly what happened:

> I was getting near the site of Dallas [Duncanville] which puts out signals in the same [frequency] area and I'm sure I was mixed up with the ground site sig-

> nal by then. So that I could no longer identify whether or not this was the [UFO] signal I had although I left it tuned right there. We did have some signals in there but we had several signals around [Condon files].

Duncanville's transmission was registered by McClure at 5:38, just before the UFO visually reappeared and Chase turned the aircraft to pursue it to Fort Worth.

Not only does Klass's ground-reflector theory have severe inverse-4th-power signal attenuation problems here due to distance—Duncanville radar was about 66 miles away—but it also confronts the problem of the lower power transmission of the Duncanville radar VC Beam at low grazing angles able to reach some hypothetical large ground reflector some 33 to 66 miles away from Duncanville (and then reflected through an additional 66 to 6 miles from the ground reflector to the RB-47, respectively). As noted previously, the VC Beam's signal fades at the horizontal by about a factor of 100 from the peak power at higher elevation angles (about 5-6 degrees), leaving little beam power to be reflected up to the RB-47 (General Electric, 1950). By contrast the RB-47 was almost perfectly positioned to receive the maximum strength of the direct Duncanville signal at 66 miles' distance (at about five degrees' elevation), and any highly attenuated reflected signal would not even show up on the ELINT monitors at the same time. This is especially a problem in the absence of any radar ducting conditions in the atmosphere to help trap some of the beam close to the horizon, according to the Carswell AFB radiosonde data for that date and approximate time (NCDC, *op. cit.*).

Once again as with the argument about the nonoperative Biloxi radar purportedly causing the Mississippi "upscope" signal, instead of proving a "prosaic" explanation, Klass's argument if at least partly true is tantamount to proving the existence of a large metallic radar-reflecting airborne UFO close to an aircraft flying over six miles above the ground—assuming that reflection is the correct explanation (and it isn't). That is because the only "nearby object" that could have reflected the Duncanville radar beam toward the RB-47 was a UFO. Only a large selectively "stealthy" UFO could have kept pace with the nearly 600 mph RB-47 for more than 10 minutes, close enough to the RB-47 and correctly angled enough (like a radar mirror) to bounce a "strong" reflection of the Duncanville radar beam to the RB-47, and yet not be seen by the RB-47 crew till the tail end of the interval. (But a reflection of the Duncanville beam cannot be the proper explanation for, as we have already seen, the electronic signatures of the UFO and Duncanville transmissions were not entirely the same, differing by a factor of 2x in the pulse duration and possibly by 5 MHz in frequency. Thus the UFO had to be emitting its own different radar signal and not reflecting Duncanville's.)

Klass also asserts that the 30-degree separation of the simultaneous signals is only "slightly different," and he sweeps aside the other even larger discrepancies which even his erroneous flight track still demonstrated (Klass, *op. cit.*) But discrepancies of 30 to 50+ degrees with the UFO signal position are too large to ascribe to confusion with the Duncanville radar, which Klass claims is the true origin of all of the signals detected in east Texas. Such staggering errors would have prevented the U.S. from ever even locating at all, let alone pinpointing, the position of Soviet radar sites and probing for their weaknesses so as to enable its bomber crews to get through enemy air defenses in time of war. To suggest that an RB-47 crew could make such mammoth errors again and again over the course of half an hour—not some fleeting signal that could not be accurately plotted because of its brevity—would make a mockery of the whole ELINT effort in which many RB-47 crew members lost their lives trying to map Soviet bloc air defenses. Klass takes care not to say that, but nonetheless fails to explain the insuperable discrepancies.

First steady UFO visual sighting

The Wing Intelligence report states:

> At 1039Z [5:39] a/c [aircraft commander Maj. Chase] sighted huge light which he estimated to be 5000 feet below aircraft at about 2 o'clock. Aircraft altitude was 34,500 feet, weather perfectly clear. Although a/c [aircraft commander] could not determine shape or size of object he had a definite impression light emanated from top of object. At 1040Z [5:40] ECM operator nr 2 [Capt. McClure] reported he then had two signals at relative bearings of 040 and 070 degrees. A/c and co-pilot [Lt. McCoid] saw these two objects [sic] at the same time with the same red color.

Neither Chase nor McCoid could add any further details to his description of this light in the interviews the two had with the Condon Committee, McDonald, and Klass evidently, and nothing substantial is added from Chase's ADC sighting questionnaire or the Duncanville teletype report (Gillmor, *op. cit.*; Condon files; McDonald papers; McDonald, 1971, 1972; Klass, *op. cit.*).

Chase flatly denied seeing two UFOs at the same time. "No, it was not a series of lights," he said. "It never was, it was always one light source" (Condon files). No other crew member mentioned two UFOs. There is only a reference to "2" as the number of objects sighted, according to Chase's sighting questionnaire, but this may simply refer to the flash of light (the meteor) and then the steady light (UFO). Apparently Wing Intelligence confused the references to an exact correspondence of the visual with the electronic signals as meaning that when there were two signals there were two visual

UFOs, when in actuality there was one UFO signal (with a visual) and one Duncanville radar signal.

Chase's recollection of the sequence of events for the Condon project in 1967 is a little different from what it was in the 1957 Wing Intelligence report, in that he thought the "light" came on after, instead of before, it moved to about the straight-ahead position in front of the RB-47. The contemporaneous Wing report must be preferred since it gives the actual clock times. (UFO "light" appeared first at 5:39; then the signal evidently moved to 20 degrees or towards dead ahead between 5:40 and 5:42. See below.)

Chase recounts: "So again I go through the procedure, when he [the Duncanville radar controller] calls the ten [10] mile range, of the slow up [of the RB-47], the speed up, and everything, and they keep calling 'ten mile range.' Regardless of what I do, it stays at ten miles" (Condon files).

Sparks's reconstruction therefore incorporates a brief slowdown of the jet between 5:39 and 5:40 from about 595 mph maximum speed to 495 mph average speed for the minute (representing a lowest speed of 300 mph reached at about 0.5 g), then resuming full speed of 595 mph.

Klass tentatively proposes the star Vega as a "possible candidate" to explain this steady visual light source, based on information from Robert Sheaffer that the bright star would have been at an elevation angle of about 27 degrees and at an azimuth of about 300 degrees (Klass, *op. cit.*). But this corresponds to a relative bearing of 30 degrees from the RB-47, whereas the UFO was at about 60 degrees (two o'clock position) and close to the horizon or some 38 degrees away from Vega's direction. The crew could hardly confuse a light near the horizon with a star high up in the sky, nor would a star have suddenly appeared at 5:39 in clear weather. When these large discrepancies in position with the star are considered with the close agreement of electronic direction-finding readings of the UFO's rapid movements of about 50 degrees or more at 5:40-5:42 (see below), the star Vega must be rejected as an explanation for the visual UFO.

UFO "upscopes" again, then veers off to Fort Worth-Dallas

Some minutes after the Duncanville radar began tracking the UFO (see above) and following the RB-47's visual sighting that began at 5:39, the Wing Intelligence report states:

> At 1040Z [5:40] ECM operator nr 2 [Capt. McClure] reported he then had two signals at relative bearings of 040 and 070 degrees. . . . A/c [aircraft commander Chase] received permission to ignore flight plan and pursue object. He notified ADC site Utah [at Duncanville] and requested all assistance possible. At 1042Z [5:42] ECM nr 2 had one object at 020 degrees relative bearing. A/c increased speed to Mach 0.83, turned to pursue, and object pulled ahead. At 1042-1/2Z [5:42.5] ECM nr 2 again had two signals at relative bearings of 040 and 070 degrees.

Chase told McDonald, "I'm sure that we were about 100 miles east of Fort Worth when I got a hold of GCI." At 5:39 and 5:40 the RB-47 was approximately 95 to 88 miles east of Fort Worth, in excellent agreement with Chase's recollection of the distance. "GCI" was the Ground Controlled Intercept radar station, in this case codenamed "Utah," which name was correctly recalled by crew members McClure and McCoid years later for the Condon Committee and McDonald. McClure also correctly remembered it was southwest of Dallas and it was called something like "Stevensville." The actual name was Duncanville Air Force Station (AFS), home of the FPS-10 air defense radar system making up the 745th ACWRON Squadron of the Air Defense Command (ADC). It was located on a hill about 730 feet above sea level about 10 miles southwest of the center of Dallas. Duncanville AFS's geodetic coordinates were approximately 32-38.8 N latitude, 96-54.3 W longitude.

It was at about 5:42 that the "upscope" maneuver appeared again for the first time since Mississippi. In fact, as Chase remarked to McDonald, it was McClure who "first alerted him to the fact that the Unknown was moving out of the two o'clock position to get ahead," before Chase happened to notice it visually and before Duncanville reported radar-tracking the maneuver (McDonald papers). The UFO "started" to move upscope to the dead ahead 12 o'clock position (0 degrees relative bearing ±15 degrees), though evidently only making it to about 20 degrees before it suddenly "veered" off to the right to head towards Fort Worth-Dallas, perhaps in response to the RB-47 turning to pursue it. Chase estimated for McDonald that the UFO changed position when it veered by roughly 10 to 20 degrees (McDonald papers; Condon files).

At this point, 5:42.5, the electronic signal was at 70 degrees relative bearing, but according to Sparks's analysis of the RB-47 flight path, the plane had already made about 25 degrees of its right turn. So the veering angle should be added to the RB-47's turn angle and then to the original 20-degree relative bearing, for a total new relative bearing of about 65 degrees—almost exactly the new 70-degree figure determined by McClure on his direction-finding scope. This is an excellent confirmation of the sighting circumstances and the close correlation between visual and electronic measurements.

Further confirmation of Sparks's reconstruction comes from the fact that the Duncanville radar also appeared briefly at 5:42.5 as the 40-degree signal and in very close agreement with the calculated position of Duncanville at 36 degrees'

relative bearing—well within the five- to seven-degree limit of precision of the ALA-6 scope display on the RB-47. As already mentioned, Sparks's reconstruction puts the RB-47 into about 25 degrees of its turn at this point, and this positions Duncanville at the 36-degree bearing that agrees closely with McClure's direction-finding measurement.

Maj. Provenzano, the ECM number one officer, recalled for McDonald in 1969 that he thought he "got *something*" (his emphasis) on his APD-4 monitor confirming McClure's observations, but it was "too long ago to be sure" (McDonald papers). The other crew members were absolutely positive, however, that Provenzano had told them after landing in 1957 that he had gotten an indication of the same "upscope" feature when McClure did. McDonald's notes of his phone interview with McClure state that after landing, when the "upscope" phenomenon was discussed with base personnel and a "loose lead" on the ALA-6 monitor was suggested as an explanation, "Provenzano asserted that he had seen the same phenomenon on his APD-4 monitor. . . . He didn't get into harangue on air, but said he'd seen it." This particular upscoping noticed by Provenzano on his equipment apparently occurred in east Texas, not back in Mississippi, at about 5:42 or later.

In their joint interview with the Condon Committee, McClure and copilot McCoid said they had discussions right after the post-flight debriefing on the UFO incident. According to McCoid, "He [Col. Raglen] made the statement, that he was an old ECM officer although he wasn't in this business then. He was the one that said to me maybe we've broken rotor leads back there which is [sic] giving us the faulty DF [direction-finding] information." McClure added, "And I remember Provenzano telling him that it was affecting his presentation on his scope too on the APD-4" (Condon files).

The Condon Committee transcripts record the following interview remarks by McClure, given in response to investigator Roy Craig's questions:

> *McClure*: Now we did have another radar receiver who observed this also. Operated by Maj. Provenzano, he was a captain [then]. . . .
>
> *Craig*: But he did view the object?
>
> *McClure*: Yes, he [Provenzano] did view the object.
>
> *Craig*: On his [APD-4] scope? Did he operate at that same frequency?
>
> *McClure*: His encompasses the whole frequency range. So he could see what I could see also.
>
> *Craig*: But #3 Raven [Capt. Tuchscherer] could not, is that right?
>
> *McClure*: That's right. He [Tuchscherer] was at a lower frequency range [30 to 1,000 MHz]. He was actually searching around hunting for something to tie up with us after we finally started looking for things. . . .
>
> *Craig*: Were you and Provenzano discussing this at the time?
>
> *McClure*: Oh yes. Everybody was talking about it you know, because—We were tied in with the [interphone] hook up.
>
> *Craig*: Provenzano got nothing different than you got?
>
> *McClure*: No, sir. He saw the same type thing that I saw displayed. . . . [Condon files].

Klass asserts that Duncanville did not track the UFO until 5:48 and was not in contact with the RB-47 until 5:50. However, Chase and other crew members clearly recalled an extended period of ground radar tracking of the UFO on the westward leg in which the UFO maintained a steady position of about two o'clock (about 60 degrees), which had to be in the 5:30 to 5:40 period. The Wing Intelligence's report does not mention the specific tracking and may have assumed these details would be covered in a separate report by ADC. It does indicate that at 5:40 Chase "notified" Duncanville of his change in flight plan, but it does *not* say that this was his first contact. It actually implies he had already been in communication some time before and that this was merely an update in status of the RB-47's course.

RB-47 turns to pursue UFO

Following the RB-47's visual sighting which began at 5:39 and the double radar signals it detected at 5:40, the Wing Intelligence report states:

> A/c [aircraft commander Chase] received permission to ignore flight plan and pursue object. He notified ADC site Utah [at Duncanville] and requested all assistance possible. At 1042Z [5:42] ECM nr 2 had one object at 020 degrees relative bearing. A/c increased speed to Mach 0.83, turned to pursue, and object pulled ahead. At 1042-1/2Z [5:42.5] ECM nr 2 again had two signals.

The first turn of the RB-47 in pursuit of the UFO occurred approximately 73 miles southeast of Fort Worth, not 105 miles southeast as plotted by Klass or similar distances mapped by McDonald and CUFOS which are due to forcing the path of the aircraft to fit the impossible Meridian-Waco track. This shortened distance is based in part on the correct aircraft pursuit speed of about 575-600 mph, not the 630 mph assumed by CUFOS or the supersonic 700 mph speed used by Klass to plot the course on a map—an impossibility for the subsonic RB-47 in sustained level flight (Klass shows

the RB-47 covering about 117 miles from 5:42 to 5:52, approximately 702 mph).

Chase independently confirmed this as the correct location when he recalled for the Condon Committee that he was "approximately 75 miles" from the Fort Worth/Dallas area just before he made the turn to chase the UFO (Condon files). Chase recalled:

> [Duncanville] GCI's tracking him [the UFO], I'm tracking him on my [ELINT] equipment, and they're ranging him for us at ten [10] miles. So then we floorboard the thing again up to the max. and take off after him. Well, as he got north, just north of Fort Worth, we went through at an angle in a north-west direction.... Now a light at night, this was just a huge red glow, was all it was at this time.

According to Boeing aerodynamicist James Woodward, the recommended radius of turn is about five miles at the maximum turn speed of about 575-580 mph (including the small tail wind) at 34,500 feet for a B-47 roughly half empty of fuel, as the RB-47 would have been at this time approximately (Sparks-Boeing phone interview, April 21, 1976). At that speed the 50-degree turn could be completed in about one minute. Sparks's reconstruction puts the turn from 5:42.0 to 5:43.0.

UFO and RB-47 disappear into radar gap over Duncanville

The Wing Intelligence report states:

> At 1044Z [5:44] he [Capt. McClure] had a single signal at 050 degrees relative bearing. At 1048Z [5:48] ECM nr 3 [Capt. Tuchscherer] was recording interphone and command position conversations. ADC site requested aircraft to go to IFF Mode III for positive identification then requested position of object. Crew reported position of object as 10NM [nautical miles] North West of Ft Worth, Texas, and ADC site Utah [Duncanville] immediately confirmed presence of object on their scopes.

Klass found it troubling that the Duncanville radar site should have asked the RB-47 crew at 5:48 to turn on its radar transponder to IFF Mode III "for positive identification," then requested the crew to report the UFO's location. Klass says:

> This seems curious because the air defense radar personnel should have been able to identify the RB-47 some minutes earlier when assistance was first requested, considering the typically light traffic in the pre-dawn hours. The radar had height-finder beams so it should have been quite easy for experienced operators to identify the RB-47 from the pilot's estimated position and reported altitude.... Again, it seems curious that an air defense radar station had overlooked an unidentified craft until the RB-47 called attention to it. This almost suggests an inexperienced or inattentive radar station crew" [Klass, *op. cit.*].

There is a powerful and cogent reason why Duncanville radar would ask for positive identification and the RB-47 crew's help at 5:48: The reconstructed ground path for the RB-47 shows that if the UFO led the jet by about 12 miles off to the right side and gradually came over to straight ahead of the RB-47 by about 5:49, then both the UFO and the RB-47 would have disappeared into the gap or "blind spot" in Duncanville's radar coverage shortly before or at the time of the so-called "curious" request. Even Klass's reconstruction of the RB-47 flight path shows it coming to within about 11 miles of the Duncanville radar, or within the gap in coverage.

(See Klass's radar coverage patterns for the CPS-6B and FPS-10 radars in his monograph *The RB-47 UFO Case* and his book *UFOs Explained*, showing a gap from directly above the radar site out to about nine to 10 nautical or 10 to 12 statute miles depending on the target's altitude in the 30,000- to 35,000-foot range, respectively. This is based on the highest elevation angle coverage of any of the radar beams, which would be approximately 31 degrees from the Vertical-Upper or VU Beam of the radar, transmitting between 2,740 and 2,780 MHz. The VU Beam is not to be confused with the Vertical-Center or VC Beam which was at a lower angle, 12 degrees and lower, and operated at a different frequency range—2,992 to 3,019 MHz. The VC Beam is the exclusive subject of possible confusion with the UFO signal because apparently the UFO transmitted in that frequency band and not in the band of the VU Beam.)

Interestingly, the rate of the UFO's gradual upscope movement to a dead ahead position in front of the RB-47 can be extrapolated from the earlier direction-finding measurements at 5:42½ and 5:44 (could be up to 5:44.5) when the signal moved forward from 70 to 50 degrees. This 10- to 13-degree per minute upscoping would put the UFO directly in front by about 5:49, in close agreement with crew reports of the visual sighting and the overshoot at about 5:50. The UFO signal at 50 degrees obviously cannot possibly be a misidentification of the Duncanville radar at about 17 degrees relative bearing.

By flying almost directly over the Duncanville radar station where there are no radar beams the UFO would have been lost to the air defense radar crew from about 5:45 to 5:47. Then the RB-47 would have likewise vanished from about 5:47 to 5:48 farther off to the west (at a more grazing angle through the blind zone). Because these times and the exact ground tracks could easily have varied over, say, a minute and perhaps several miles due to difficulties in reconstruct-

ing and fitting all of the details and resolving ambiguities, it is possible that both the aircraft and the unknown were lost concurrently, at the same time, for a brief period around 5:47. It is also possible the RB-47 flew within several miles of Duncanville and that the UFO flew directly overhead of the site, which might have been rather alarming to the military radar crew given that the UFO could have been some kind of hostile intruder whose intentions were unknown. Once one or both of the blips emerged from the blind zone the radar crew would naturally have asked the RB-47, acting as its controlled interceptor, for help in positively identifying which was which, especially since time was of the essence as the "bogey" was literally seconds away from reaching major population centers—Fort Worth and Dallas. Fighter interceptors might have to be scrambled in a matter of seconds depending on whether the RB-47 was successful in closing in on and identifying the UFO so as to obviate the need for fighters. (Several minutes later, after the RB-47 failed to identify or successfully intercept the UFO, Duncanville told the RB-47 crew that fighters were being scrambled. See below.)

Instead of casting aspersions about the ADC radar controllers' competence, they should be applauded for their care and attention. They can't be blamed for any omissions or inadequacies in the Wing Intelligence report which came under an entirely different command (SAC not ADC), which didn't benefit from their direct input, and especially when the "interphone and command position conversations" being recorded on the RB-47 should have enabled a more exact and complete chronology of events by the agency that took control of the recording.

One also detects just a hint of the implication in the Duncanville request for the RB-47 to go to IFF Mode III that possibly the IFF Mode I was not working on the RB-47 or was perhaps being interfered with or jammed. (IFF, Identification Friend or Foe, is a radar transponder system aboard aircraft such as the RB-47 that allows ground radar stations to send encoded interrogation signals to the plane. These signals trigger an automatic encoded reply by the transponder positively identifying the aircraft as "friendly." The NSA develops and controls the codes for IFF systems.)

There may be a parallel here with the strange September 20, 1957, UFO radar-tracking incident that triggered White House concern and a high-level conference of intelligence agencies. Jamming of the FPS-3 anti-aircraft artillery radar in Pittsburgh, Pennsylvania, was reported, and it seemed to be connected with the time and track of a 2300-mph bogey at 50,000 feet. An attempt was made to connect the jamming to B-47s (probably RB-47Hs) on an ECM mission near Chicago but the distance was too great (CIA documents: Undated sanitized minutes of September 20?, 1957, high-level intelligence conference of CIA, Air Force, Army, and Navy officials; Assistant Director for Scientific Intelligence Herbert Scoville, Jr., memo for Director of Central Intelligence Allen W. Dulles, September 21, 1957).

UFO suddenly stops—RB-47 overshoots near Fort Worth

The Wing Intelligence report states:

> Crew reported position of object as 10NM [nautical miles] North West of Ft Worth, Texas, and ADC site Utah [Duncanville] immediately confirmed presence of object on their scopes. At approximately 1050Z [5:50] object appeared to stop; and aircraft overshot. Utah reported they lost object from scopes at this time and ECM nr 2 also lost signal. Aircraft began turning.

Here is the first simultaneous disappearance of the UFO off of both the Duncanville radar scopes and the RB-47's signal monitors, and it visually "blinked out" (the Wing report implies a visual loss of contact here when it states in the next sentence that the RB-47 "regained visual contact" shortly after).

Chase recalled, "So it appeared to me that he'd stopped dead. Now, of course, I'm going just as fast as that B-47 will go . . . but all of a sudden the closure rate is tremendous—just as I got almost over him the light goes out, GCI [Duncanville] loses him on the ground, and I lose him on my [ELINT] equipment" (Condon files).

Later in the same interview, Chase said, "[There] was an exact correlation between me losing visual [contact with the UFO] and my boy in the back [McClure] losing him, and GCI losing him all at the same time."

According to McDonald, the RB-47 overshot the UFO at very approximately a 45-degree depression angle and the "blink out" occurred over to the left front side of the aircraft (McDonald, 1969, 1971).

The nonexistent "American" Airlines flight

Klass claimed no records could possibly be found so many years after the event to prove whether the "American" Airlines Flight 966 had been "on time" and thus in the right location on the morning of July 17, 1957, to account for the radar-visual "UFO" contacts. These contacts were at around 5:48 to 5:56 A.M. near Fort Worth-Dallas, at the same time the airliner supposedly would have been on landing approach in the same area. Klass had claimed the airliner "should have been on schedule" to land at Dallas airport a few minutes later, at six CDT that morning because the weather was "good" and "pre-dawn traffic is light"—as if nothing unusual had happened on the flight indicating any disruption of its normal schedule, such as perhaps a near midair collision with supposedly scarce or nonexistent "predawn traffic" (Klass, *op. cit.*).

But because (unmentioned by Klass) Flight 966 had in fact just been involved in a near collision with another airliner—that was how Klass even knew of the existence of the flight—Sparks was easily able to find records of it. American Airlines records, contemporary news reports, and an extract in the Blue Book file (the latter extract published by McDonald in 1971 and 1972) all clearly locate the airliner near El Paso in west Texas at the exact time of the main UFO sighting events more than 600 miles away in east Texas so it could not possibly have been involved. The main leads were in Klass's own copy of the Blue Book file.

Early on the morning of July 17, 1957, Flight 966 had been involved in a near collision with another airliner, American Airlines Flight 655, which suddenly swerved, causing 10 passengers to be injured in the latter and forcing the pilot to made an unscheduled landing at El Paso so that two could be hospitalized. There was an American Airlines internal hearing with testimony from both flight crews, and inquiries and reports by the CAA (Civil Aeronautics Administration) and CAB (Civil Aeronautics Board), all reported in the press or reflected in Blue Book files at the time in 1957. Thus, there was no question that traceable documents would be found on such an incident even years after the fact.

Flight 966 was not actually an American flight but a National Airlines flight flown by an American crew, according to American Airlines Director of Operations Larry L. Strain, interviewed by Sparks over the phone on February 3, 1976, after Strain checked his records. According to Strain both captains of the flights, T. E. Bachner and T. A. Hinson, agreed in their written reports on file with American Airlines that the near collision occurred at 0329 MST at four miles east of Salt Flat, Texas, at 14,000 feet altitude on July 17, 1957.

At Sparks's request Strain double-checked and reconfirmed the 3:29 A.M. time and "MST" time zone standard and the location as four miles east rather than west of Salt Flat. Newspaper reports were reasonably accurate in reporting the time and time zone of the aircraft accident at "3:30 A.M. (M.S.T.)" (Associated Press, El Paso, July 17, *Newark Star-Ledger*, July 18, 1957) near Salt Flat, or more precisely "four miles west of Salt Flat" (*El Paso Times*, November 5, 1957). But there was a minor error in calling it "west" instead of "east" of Salt Flat, which the American Airlines files corrected. Salt Flat is 76 miles east of El Paso airport.

The near-collision site four miles further east is therefore 80 miles east of El Paso airport (as noted by APRO in 1957) and 485 miles from Dallas airport (Love Field). Blue Book attached a statement to the back of a November 8, 1957, letter from the CAA indicating the encounter occurred at "50 miles E. of El Paso, Tex—3:30 A.M. (MST)," representing a relatively insignificant error in the location of Salt Flat at least for our purposes, but it reconfirms the west Texas location and crucial MST time and time zone information. Blue Book had been in contact with the CAA about the accident because it theorized a relationship to the RB-47 case and because the press called the accident a case of a near miss with a "mystery aircraft" without realizing at first that it was another airliner. UFO groups such as NICAP and APRO had seized on this as a possible UFO case ("Scientists Say," 1957, copy in Blue Book file; Lorenzen and Lorenzen, 1969).

The exact 3:29 A.M. MST time in American Airlines records, when converted into the time zone chosen by Klass and used here, becomes 5:29 A.M. CDT. This is essentially the exact minute ("approximately" 5:30 A.M. CDT) that, about 630 miles to the east of the Flight 966 airliner undergoing near collision, the RB-47 detected an apparently airborne radar signal moving upscope. The RB-47 and Flight 966 would have been well below the horizon to each other and thus completely out of view even assuming it was possible to see landing lights at that extreme distance (it's not).

The RB-47 reported flying almost directly over the UFO at about 5:50 A.M. CDT. It was obviously impossible for the subsonic RB-47 and subsonic DC-6B airliner to reach each other at such a great distance of 630 miles in 21 minutes from 5:29. The piston-engine airliner alone would literally have had to play the role of a "UFO" to streak out at more than 1,400 mph or Mach 2 and break the sound barrier to get from Salt Flat to the Dallas-Fort Worth area in time.

But there is still one more check, a quadruple-check on the time, time zone and location already confirmed by three sources—(1) American Airlines records, (2) news reports, and (3) Blue Book/CAA data: (4) The press reported that the westbound DC-6 airliner with the injured passengers stopped in El Paso for two hours and 15 minutes to let off injured passengers and then proceeded non-stop to Los Angeles where it landed at 9 A.M. (*El Paso Times*, November 5, 1957; July 18, 1957, clip in NICAP files). Since the Dallas-bound Flight 966 reported it was just reaching its 15,000-foot cruising altitude (and thus its cruising speed as well) when the near collision occurred near Salt Flat 80 miles out from El Paso airport, it is easily calculated that this eastbound DC-6B took approximately 30 minutes to reach its cruise speed from takeoff, given a cruise speed of about 320 mph approximately averaged from zero. It is readily calculated that a similar-performing westbound DC-6, Flight 655, even at 360 mph maximum speed would land in El Paso with the injured passengers at about 4 A.M. MST. With the reported two-hour-fifteen-minute layover, the airliner would take off for Los Angeles at about 6:15, reach cruise speed and altitude at about 6:45, level off at a DC-6's slightly slower 310 mph cruise speed to cover the approximately 555 miles' cruise distance, begin landing descent at about 8:32, and land at LAX at approximately 9:02 A.M. MST—almost exactly the reported time.

This mutually reinforces and helps again to confirm the approximate flight performance characteristics, flight patterns, and arrival-departure-flight times of the two airliners that day. With these data it is obvious that the eastbound airliner, Flight 966, cruising at about 320 mph from the 5:29 A.M. CDT accident site while crossing about 405 miles of cruising distance and descending to Dallas airport in the final half hour, would have landed there at about 7:15 A.M. That is almost one and a half hours after the RB-47 overflew the UFO at 5:50 A.M. Klass claims the overflown UFO was actually this airliner—a clear impossibility.

RB-47 turns again to pursue UFO

The Wing Intelligence report states:

> Crew reported position of object as 10NM [nautical miles] North West of Ft Worth, Texas. . . . At approximately 1050Z [5:50] object appeared to stop; and aircraft [RB-47] overshot. . . . Aircraft began turning, ECM nr 2 picked up signal at 160 degrees relative bearing, Utah regained [radar] scope contact and a/c [aircraft commander Chase] regained visual contact. At 1052Z [5:52] ECM nr 2 had signal at 200 degrees relative bearing, moving up his D/F scope.

Chase related, "I started to turn immediately to the left but it takes you thirty miles to turn that thing when you're wide open [full speed]" (Condon files).

According to the Wing Intelligence report, the turn was started right after the overpassing of the UFO, at "approximately" 5:50, which was roughly 12 statute miles or 10 nautical miles "North West" of Fort Worth. Chase recalled for the Condon Committee and McDonald that it was "north" of Fort Worth rather than northwest. Since GCI radar sites would use magnetic not true bearings to vector aircraft onto intercept courses because the aircraft use onboard magnetic compasses, a "northwest" direction would be magnetic and the true bearing about 10 degrees further north (NGDC, *op. cit.*). Thus Sparks's reconstruction places the UFO approximately to the north-northwest of Fort Worth.

Chase put the RB-47 into what was evidently intended to be a 360-degree turn to try to circle around and pursue the UFO again. According to Boeing aerodynamicist James Woodward, at the maximum turn speed of about 570 mph at 34,500 feet for a B-47 about half empty of fuel (as the RB-47 would have been at this time approximately), the minimum radius of turn is about 60,000 feet or more (about 11.5 miles+) and at that speed the 360-turn could be completed in about seven and a half minutes (Sparks-Boeing phone interview, April 21, 1976). Chase recalled the turn required something like 15-20 miles (McDonald notes), a lower estimate than that given to the Condon project but more in accord with Boeing's aircraft performance data. A 15-mile turn radius was adopted by Sparks for the flight path reconstruction, with a 360-turn able to be completed in about 9.4 minutes (38 degs./min.), because that made a best fit with the other sighting circumstances and flight track.

This second turn of the RB-47 in pursuit of the UFO was supposedly near Mineral Wells, Texas, west of Fort Worth, according to McDonald's classic AIAA and **American Association for the Advancement of Science** (AAAS) publications on the case. This is in fact an error that crept into McDonald's reporting of the case between May and August 1969. None of McDonald's notes of interviews with the crew from January to February 1969 say anything about starting this turn near Mineral Wells. McDonald's notes on his interview with Chase state that when the "sudden stop" of the UFO occurred they were "not near Mineral Wells." In his printed lecture of May 28, 1969, McDonald referred to Mineral Wells as the point "about halfway through the turn (by then the aircraft had reached the vicinity of Mineral Wells, Texas, Chase said)." (McDonald, 1969; parenthetical remarks McDonald's.) Only later did McDonald mistakenly refer to this as starting the turn near Mineral Wells. McDonald confused or conflated aspects of the two UFO-overshoots. Shortly after the second overshoot, the RB-47 went into a tighter turn near a town the pilot confused with Mineral Wells.

Chase apparently really meant "Weatherford" when he said "Mineral Wells" due to a proven confusion of geography on Chase's part. Chase told the Condon Committee that it was "Mineral Wells—I think that's the name of the little town, that's oh, maybe ten to fifteen [10-15] miles west of Fort Worth," when in fact it is almost 50 miles west of Fort Worth. He evidently confused Mineral Wells with Weatherford, located about 28 miles west of Fort Worth, since ELINT operator McClure distinctly recalled for the Condon committee that Weatherford was a key landmark in the incident. Weatherford was where McClure heard over the radio that the ground radar site said it last painted the UFO before the RB-47 returned home. This ties in with Chase's recollection for McDonald that the "last spot" given for the UFO was "Mineral Wells" (meaning Weatherford). Weatherford was approximately halfway through the turn of the RB-47 at about the westernmost point in its long sweep around to try to pick up the UFO after attempting to close on it, according to Sparks's reconstruction of the RB-47 flight.

In actuality the second UFO-pursuit turn *started* within about a mile of the UFO's stationary position about 12 miles north-northwest of Fort Worth. This location almost exactly fits the correct reconstruction of the flight path based on the reported flight speed (maximum with two slow-downs) times, corrected heading and the first visual at 32-00/91-28. In Sparks's reconstruction the UFO suddenly stops at about 5:49 to 5:49.5 (consistent with "approximately" 5:50 in the Wing Intelligence report), the RB-47 then rapidly closes the

12-mile distance to the UFO to one mile. The RB-47 is positioned in the reconstructed flight track about one mile east of the UFO when it starts the turn at about 5:50.5, in order to make the optimum fit with the other portions of the RB-47 flight path (though the turn could be delayed up to about half a minute). This one-mile distance is consistent with the UFO being overshot by the RB-47 at about 5000 feet below the aircraft at roughly a 45-degree depression angle, perhaps at around the 9 or 10 o'clock position since Chase described passing to the right of the UFO rather than directly over it (McDonald, 1969, 1971; McDonald papers).

The regaining of a radar signal at a relative bearing of 160 degrees (behind the RB-47 and a little to the right at about the five o'clock position) apparently occurred immediately after the turn began, at say 5:50.5, when the RB-47 flew back into the radiation pattern of the VC Beam from the Duncanville radar, in the VC's Upper Lobe, which was now about 32 miles away. This 160-signal evidently represents a brief pickup of the Duncanville radar transmission just before it disappeared in the gap between the Upper Lobe and Main Beam of the VC Beam, to reappear again a minute or so later. Since the UFO signal had just disappeared, McClure would have had the opportunity to turn up the gain on his receiver to try to reacquire it, thus inadvertently picking up Duncanville until the UFO signal actually returned (which was apparently not until about 5:55-5:57). That explains why the relatively lower powered VC Upper Lobe could be detected at this stage.

This first UFO overshoot is evidently the time when the RB-47 navigator, Maj. Thomas Hanley, briefly detected the UFO on his aircraft navigation radar, APS-23, after apparently spending quite some time attempting to do so. This radar is designed only to track nearby aircraft with its antenna tilted up in "altitude hold" in order to facilitate flying in formation. Normally any target farther than the aircraft height of, say, six miles would be lost in the ground clutter of the terrain below, which of course begins at that distance range. Even so, Hanley told McDonald that a large KC-97 tanker aircraft could only be picked up out to about four miles with the RB-47's radar. Since the UFO almost always maintained a distance of about 12 miles, if the UFO had a radar cross section comparable to a KC-97, it would never be detectable unless it came closer than about four miles. The only known close approach like that was at this very point, the first UFO overshoot, when the distance to the UFO was as little as about one mile (the closest approach in the second UFO overshoot a few minutes later was about six miles, or just out of range).

McClure's description of the simultaneous UFO blink-out in the first overshoot is precisely when he recounts Hanley's radar tracking of the UFO. The tracking was most likely no more than about 15 to 20 seconds (the time it took for the 600 mph RB-47 to close from four miles to one mile). In comparison with the more dramatic action taking place elsewhere in the plane, the brief contact may have receded in significance and relevance in his mind to the point that he no longer mentioned it, or forgot it, or became confused about what had happened (Chase's sighting form two months after the incident rather inconsistently reports no onboard radar contact was successful yet states that "radar scope pictures [were] taken"). Perhaps Hanley was personally reluctant in 1957 to get involved in controversy over just seconds of direct connection with a "flying saucer" sighting, especially when the radar scope photographs presumably would provide better data than his own memory. McDonald accepted Hanley's 1969 statement that "he had photographic gear on hand and that he would have photographed the scope if he had ever had it [the UFO]" on the scope, since he did not then know about the document reporting that scope photos had been taken (so the UFO must have been tracked, according to Hanley's own logic). Thus McDonald concluded that the Condon Committee was in error in reporting that Hanley had indeed radar tracked the UFO (McDonald papers; McDonald, 1969). But the earliest official document available on the case, the Duncanville site's teletype report of the morning of July 17, 1957, states explicitly, "Airborne radar was being used on B-47 to track object. Aircraft stated that they had object in good contact."

McClure described Hanley's radar tracking of the UFO for the Condon committee as follows:

> [A]t the time that I got in on it, the navigator [Hanley] was actually tracking it with radar which he has the capability of tilting his antenna up. . . . All the facilities of [the navigation] radar are generally pointed towards the ground; you can move the antenna so that you can look around. . . . He had it [the UFO] on his radar and the ground site [Duncanville] had it on their radar. Col. Chase and Major McCoid were visually tracking this thing and I was able to get DF [direction-finding] readings from it. Now as I remember, the ground site would say, "We've lost the target." You two people [pilot and copilot] would say "It's out," they couldn't see the light that they saw before. Hanley—all this happened simultaneously—he would remark, "I've lost my target." And my signal would go out in back, all like that. Just like you threw a switch and it all went off. Then it would appear at another place, just seconds later. . . . Two different people were tracking on radar sets [Hanley and the Duncanville site], two people were watching it visually [pilot and copilot], and I was watching it electronically. And this would all happen simultaneously. Whenever we'd lose it, we'd all lose it. . . . I heard them [Duncanville radar] say, they lost the target and at the same

time Han [Hanley] would come in and they both said it was off and my signal was off and this happened as I said, simultaneously. . . . That was the most impressive thing about the whole thing, that the fact four or five different people were looking at it through three different medias [sic] and they were all going on and off at the same time [Condon files; Gillmor, *op. cit.*].

RB-47 again overshoots UFO

The Wing Intelligence report states:

> At 1052Z [5:52] ECM nr 2 [Capt. McClure] had signal at 200 degrees relative bearing, moving up his D/F [direction-finding] scope. Aircraft began closing on object until the estimated range was 5NM [nautical miles]. At this time object appeared to drop to approximately 15,000 feet altitude and a/c [aircraft commander Chase] lost visual contact. Utah also lost object from [radar] scopes. At 1055Z [5:55] in the area of Mineral Wells [sic], crew notified Utah they must depart.

Chase recounted:

> Just about that time as we got about half way around the turn, my boy in the back [McClure] called me and says, "I have him again". . . . From our position he should be just west of Fort Worth around Mineral Wells [sic; Weatherford]—I think that's the name of the little town, that's oh, maybe ten to fifteen miles west of Fort Worth. . . . So, I called GCI [Duncanville] and they said, "Roger, we have him. We have him on the scope again." So as I came around . . . we picked him [the UFO] up with the lights on again. Only now down at a lower altitude. I told GCI that I estimate him to be at about 15,000 feet. I said, "I'd like to [dive] down on him [the UFO]," and they said, "Roger, we have the traffic in the Fort Worth area cleared out. It's clear to go down." They were talking with the center [Air Defense Direction Center] at the same time—I didn't know this at the time but they were trying to get fighters off. So I started to dive down at max air speed and it looked to me as though he was stationary. Again, I can't tell because my speed is so high. . . . I estimate that I got down . . . to about 15,000 feet, and as a guess—looking at the ground and looking at him at about five nautical miles, the lights go out, he goes off my [ELINT] scope, and he goes off the GCI. He's completely gone [Condon files].

Notice that 10 years after the event Chase correctly remembered the details of the 15,000-foot altitude of the UFO, the five-nautical-mile distance, the simultaneous radar-visual disappearance, and even the fact this second close-approach was about halfway through the turn (see below).

The 200-degree signal detected at 5:52 was evidently Duncanville's radar not the UFO. Since the RB-47 was turning to the left toward the direction of the Duncanville radar on the left, the signal moved upscope merely due to the turning motion. The RB-47 was about one to one and a half minutes into its left turn and was headed almost due west at this point on the turn circle. The UFO was probably roughly at its standard 12-mile distance initially, since it is reported to soon close in to about six statute miles (five nautical miles). The UFO was evidently on an intercept course with the RB-47, cutting across the circle of the RB-47's turn, since it would rapidly move to straight ahead of the aircraft. The UFO was evidently heading west and positioned to the left or south of the RB-47.

The Main Beam of Duncanville's VC radar beam, which extends from about 45 to 176 miles ground range for an aircraft at 34,500 feet, was apparently picked up after the RB-47 passed through a gap in coverage. The signal at 200 degrees was detected when the aircraft was at a distance of roughly 47 miles from Duncanville, and in about the same direction, depending on the exact time (since the signal would have been moving almost 10 degrees per 15-second sweep the bearing reported might be considerably less accurate than other readings with longer time baselines for careful measurement; the time was not reported to a decimal minute or in seconds so it easily could be ±½ minute). This signal was to the left rear of the RB-47, whereas the earlier 160-signal was on the other side, the right rear. This is probably when McClure describes a signal that appeared on one side, then disappeared, then reappeared on the other side with nothing tracked in between: "We'd lose it and it would be on the other side of the aircraft and then it would come on again rather than seeing the movement of it" (Condon files). This jumping effect was simply caused by the Duncanville signal disappearing and reappearing over a gap in coverage, not by some dazzling performance of the UFO.

McClure could not see anything but his electronic monitors, having no windows, so he could not independently check on whether a particular signal on his scope matched the direction to a visual UFO target. He could not tell Duncanville's signal apart from the UFO's signal at times, except when he had both signals at the same time and the pilot or copilot could tell him the visual bearing to the UFO. Presumably because he had Duncanville only briefly at times and didn't know it was Duncanville, McClure did not do a signal analysis at those exact moments which might have revealed a difference in pulse duration or radio frequency and thus identified it as Duncanville's and not the UFO's signal.

Years later, McClure came to believe that he was mixing up both the UFO and the Duncanville signals in the Fort Worth-Dallas area. McClure said to the Condon investigator, "I was getting near the site of Dallas [Duncanville] which puts out signals in the same [frequency] area and I'm

sure I was mixed up with the ground site signal by then" (Condon files; McDonald papers).

During the rapid sweep forward of the UFO on its intercept course with the RB-47 it was picked up again visually by Maj. Chase (and on Duncanville's radar), thus vitiating Klass's argument that the pilot could not have seen the UFO almost directly behind him because the aircraft body would have blocked his view (Klass, 1971). Perhaps halfway through this maneuver at, say, 5:52.5 in Sparks's analysis, the UFO would have been off to the RB-47's left side at roughly nine o'clock and easily visible.

Once the UFO was about dead ahead at approximately 5:53, the RB-47 then reduced the distance to the UFO by six miles in about 40 to 45 seconds at its full throttle maximum speed (about 600 mph) as it dived down on the object. Thus, the UFO "blink out" occurred sometime in this interval, and the RB-47 would have passed over that spot about a half minute later, at roughly 5:54 to 5:54.5.

The location of this second overshooting of the UFO would have been roughly several miles west of Weatherford, Texas, or some 15 miles east of Mineral Wells, according to Sparks's analysis. As noted earlier, Weatherford was confused as Mineral Wells in pilot Chase's mind but there was some reason for it as the events of the UFO pursuit were carried out in between the two towns, though closer to Weatherford. The RB-47 was headed almost due south on its turn at this point.

Low on fuel, RB-47 to head home

The Wing Intelligence report states:

> At 1055Z [5:55] in the area of Mineral Wells [sic], Texas, crew notified Utah [Duncanville radar] they must depart for home station because of fuel supply. Crew queried Utah whether a CIRVUS [CIRVIS] report had been submitted and Utah replied the report had been transmitted.

Apparently, Chase continued the "long sweeping turn" of roughly 15 miles radius but reduced speed to conserve fuel, as he came up to 20,000 feet following his dive on the UFO.

According to Chase (see below), McClure regained the UFO signal "behind" them at about this time or soon after, and fighters were promised by Duncanville. The UFO signal evidently moved "upscope" due to the RB-47's continuing left turn.

One last pursuit of visual UFO, jets promised

The Wing Intelligence report states:

> At 1057Z [5:57] ECM nr 2 [McClure] had signal at 300 degrees relative bearing but Utah had no scope contact. At 1058Z [5:58] a/c [aircraft commander Chase] regained visual contact of object [UFO] approximately 20NM northwest of Ft Worth, Texas, estimated altitude 20,000 feet, at 2 o'clock from aircraft.

Assuming the UFO remained fairly stationary near Weatherford (actually about 10 to 15 miles to the north-northeast of the town), the rapid change from a 300-degree relative bearing to a 60-degree (two o'clock) bearing in about one minute from 5:57 to 5:58 was accomplished by the RB-47 pilot's tightening his turn radius to the left and north for one last partial attempted intercept of the UFO, but at below cruise speed for reasons of minimizing fuel consumption. This tightening of the turn could be considered a new turn and was most likely the origin of the idea of a turn near Mineral Wells, though it was actually closer to Weatherford. Copilot McCoid called all these turns of the RB-47 "gyrations" (Condon files). The tightest turn possible according to Boeing was approximately 3.4 miles in radius, which means about 110 degrees of turn per minute at around 400 mph, or 80 degrees per minute at 300 mph (Sparks-Boeing phone interview, *op. cit.*). Within the precision of the reported times and other data, the approximate 120-degree change in direction to the UFO is entirely accounted for by the RB-47's motion in, say, 1.1 minutes at 400 mph or 1.5 minutes at 300 mph.

At 5:57 the RB-47 would have been headed roughly east in Sparks's analysis. The relative bearing to the Duncanville radar would have been very roughly 0 degrees, not 300 degrees, an approximately 60-degree error; thus it is impossible to accept the Duncanville radar as the cause for the signal.

Chase apparently completed the turn at 5:58 to 5:58.5 on about the same 320-degree true heading he had started from at 5:50.5 so as to make it a full 360-degree turn. This would put the UFO at about the two o'clock position from the RB-47, as reported. The RB-47 itself passed almost directly over Weatherford, Texas, at this point. Though Chase could guess the approximate heading back toward home base, Forbes AFB, to the north-northeast (or more precisely about 16 degrees true), and presumably turned the aircraft in that direction, he probably waited a few minutes until his navigator plotted an exact course to finalize an exact heading. The crew may have had Duncanville radar give them an exact fix of the aircraft's position in order to help with the navigation.

Klass once again suggests this visual sighting was due to a star, this time Rigel, based on Robert Sheaffer's data. Klass claims mistakenly that the RB-47 was "heading southeast" when the light was spotted, and that it must have been Rigel at azimuth 105 degrees (and near the horizon), which is 30 degrees to the left of southeast (Klass, 1974). However, he omits the recorded fact that the UFO was at two o'clock position or 60 degrees to the *right*, not left, of its supposed southeast course heading, a discrepancy of 90 degrees with

Rigel. In actuality, Klass's flight path reconstruction is greatly in error and as mentioned above, the RB-47 was headed northwest, not southeast, when the light was spotted at an azimuth of very roughly 20 degrees true—a discrepancy of 85 degrees with Rigel. Again, the misidentified star explanation must be rejected.

Sparks's reconstruction puts the UFO's position about 23 miles west-northwest of Fort Worth, based on such a bearing falling within the precision range of "northwest," which is ±22.5 degrees. McClure told the Condon Committee that he recalled that the Duncanville site last painted the UFO near Weatherford (which is 28 miles west of Fort Worth) as they headed for home (Condon files). At reduced speed, probably 300 mph, the RB-47 on a northerly heading would come closest to the UFO (to the right of the aircraft) at about 6:00 A.M.

Chase recalled:

> Now at this point, I've been out for a while now—playing around with the jet, it's been eating the fuel pretty fast. So I look down at the gas gauges and I figure, "Okay, I've got to start back for Forbes [AFB] if I'm going to get back there." So using the excess speed that I had, I pulled up to 20,000 feet and started north of Fort Worth towards OK [Oklahoma] City . . . and asked the center for that altitude and they said, "Roger, you can use that altitude." Well, I hadn't any more than leveled off when my boy in the back [McClure] calls me and he says, "Lew, we've got company, behind us this time—behind us." So again GCI [Duncanville] confirmed this. Well, they told me that they were trying to launch fighters in the area. . . .
>
> I knew I had to start to Forbes if I was going to have a reasonable reserve when I got back over the field. So I called them and told them I had to pull off, "I can't continue to chase this thing around because I'm getting low on fuel." This is when they told me, "Roger, we are trying to get fighters in the air at the present time." So where from, Dr. Craig, I couldn't answer [Condon files].

Copilot McCoid recalled that they had gradually given up the chase as they became concerned about having sufficient fuel to get home and not wanting to "commit" themselves to finding a closer landing base: "We gave up to a degree. We couldn't find out anything more by chasing this thing around. It was sort of a lost cause. Our [fuel situation] was going to deteriorate if we stayed around there to accomplish what appeared to be nothing. We were spinning our wheels so to speak so we went ahead and headed north" (Condon files). McClure recalled contact only with the Duncanville site, but he was not so directly involved with the ground-to-air communications as were Chase and McCoid (Condon files; McDonald papers).

UFO and radar signals follow RB-47 to Oklahoma

The Wing Intelligence report states:

> At 1102Z [6:02] aircraft took up heading for home station. This placed area of object [UFO] off the tail of aircraft. ECM nr 2 [McClure] continued to D/F [direction-find] signal of object [UFO] between 180 and 190 degrees relative bearing until 1140Z [6:40] when aircraft was approximately abeam Oklahoma City, Oklahoma. At this time signal faded rather abruptly.

Chase told the Condon investigator, "Well, they passed me off from one GCI site to another as we went up the line and he [the UFO] stayed, according to their scopes and my azimuth [on the ELINT monitor], directly behind us at ten miles." Asked by Roy Craig, "So he [the UFO] liked that ten mile range!," Chase replied, "Yes. So we went on up, we crossed OK City and just as we got to OK City, my boy in the back tells me, 'His signal is fading out.' And they lost him on GCI" (Condon files). Navigator Maj. Thomas Hanley also "definitely recalled the [Duncanville] ground radar was painting it [the UFO] as behind them" and that it followed them up into Oklahoma, but he thought contact was broken near Red River (McDonald papers). The discrepancy between Chase and Hanley on where the ground radar lost the UFO may be accounted for by the fact that if the UFO maintained a 20,000-foot altitude, it would be lost by the 730-foot Duncanville radar at a range of approximately 125 miles, just north of Red River, perhaps then to be picked up by the Oklahoma City FPS-10 radar site.

McClure said the signal remained at about 180 degrees relative bearing as they flew north from Fort Worth (McDonald papers), but did not recall further ground radar contact after the last reported position near Weatherford evidently because he was not responsible for the ground-to-air communications and missed the reporting (Condon files).

All of these details are in good agreement with the contemporaneous 1957 document, the Wing Intelligence report, except the belated disagreement over where in Oklahoma the radar tracking of the UFO was lost.

According to McDonald, Chase said he and McCoid looked but could not spot the UFO visually to the rear of the aircraft, where the body of the aircraft would block their view of an object that was below them—if the UFO was still at 15,000 feet and the RB-47 was at 20,000 feet (McDonald papers; McDonald, 1969, 1971).

Klass asserts that if a UFO emitted a strong S-band radar-like signal from Texas into Oklahoma that it would have caused "severe interference" with the FPS-10 radars at Duncanville, Houston (Ellington AFB) and Oklahoma City. Since he knows of no reports of such interference, it must

not have occurred, and no such airborne signal could have been transmitted (Klass, 1971, 1974). Aside from the fact that the available documentation is provably incomplete and thus interference and jamming might have been reported, there are two simple technical reasons why no interference would have occurred. First, if the UFO kept transmitting its VC Beam-like signal level with the horizon, little or no microwave radiation would have leaked *below* the horizon to the ground radars. Second, the FPS-10 radars would have been tuned to different frequencies to avoid their own mutual interference, and if the UFO signal was close to but not at the same frequency as Duncanville's VC Beam, then only Duncanville might have had a potential problem of interference and only if a significant amount of the UFO signal could spill over into the Duncanville receiver's bandwidth and leak at an angle well below the horizon (at some points Duncanville was 45 to 90 degrees below the UFO).

At 6:02, in Sparks's analysis, the RB-47 headed directly toward Forbes AFB on a bearing of about 15 degrees true at minimum speed of about 290-300 mph to conserve fuel. Duncanville radar would have been at about roughly 100 degrees relative bearing which could not possibly account for the 180- to 190-degree signal, with an error of 80-90 degrees. Klass changes the time to 6:20, claiming typographical error by the intelligence officer, but there is no evidence for such an error; it would not take 20+ minutes to navigate a new course for home. The motivation for Klass's alteration of the recorded time is that by 6:20 the RB-47 would be much farther north and would put Duncanville closer towards 180-190 degrees (directly behind the aircraft, a little to the left). But this stratagem doesn't go far enough as it still only puts Duncanville at roughly 160 degrees relative bearing to the RB-47's heading (behind on the right), which is 20-30 degrees off.

Klass claims that when the UFO signal faded out at 6:40 as the RB-47 came due east of Oklahoma City, this was because in reality it was only the Duncanville radar signal misidentified as a UFO signal and that the RB-47 had just passed out of range of the Duncanville VC Beam at a distance of about 165 miles (Klass's map actually shows it not quite out of the beam, at about 160 miles). Klass's figure for the radar coverage is wrong, as previously noted, but here the error is much greater because he has mistakenly applied figures calculated for an aircraft at 34,500 feet when in fact the RB-47 flew home at 20,000 feet. Thus the RB-47 would pass out of Duncanville's VC Beam much sooner, at a shorter range of roughly 125 miles (Klass, *op. cit.*). The distance from Duncanville to the "abeam" point east of Oklahoma City is greater than Klass assumes; it is more than 190 miles and thus well beyond range even for an aircraft at 34,500 feet. Hence, the signal should have faded at about 6:25 not at 6:40. The Duncanville VC Beam could not possibly have remained detectable till 6:40 at the RB-47's altitude of only 20,000 feet and thus could not possibly have been misidentified as the UFO signal.

Similar 1955 RB-47 radar-transmitting UFO cases

The declassified AFSSO-AFSS-NSA documents report a series of UFO or "unknown aircraft" incidents involving RB-47s over northern Canada on June 1, 2, 4, 7 and 8, 1955. In several instances the onboard APG-32 gun-control radars detected an object at ranges of two to five miles, sweeps by an airborne radar beam and/or radar jamming were reported several times (paralleling the 1957 case), and in the June 4 incident, the object was visually sighted as "glistening silver metallic" and "obscured by contrails." In the latter case near Melville Sound, a radar-visual-photographic case, the UFO stayed "low and to the rear of the RB-47" as often occurred in the 1957 incident. The UFO was photographed with the gun camera, though unfortunately the pictures were described as "such poor quality that no information can be obtained from them." It was tracked by onboard gun-control radar at 7,000 yards range (four miles) apparently for nine minutes from 0030 to 0039 Z (Greenwich Mean Time [GMT] or Universal Time [UT]) until the UFO "broke off contact to the north with an increase in speed."

In the June 8 incident south of Bathurst Island, the UFO was detected briefly on the gun-control radar, visual contact was made for 20 minutes from 2044 to 2104 Z (GMT or UT) and the object was estimated to be trailing behind the RB-47 at about 5-10 miles range (similar to the distances in the 1957 case). A second RB-47 some 80 miles behind the first spotted the contrail left behind as the UFO disappeared (Stone, 1997). Needless to say, there were no Soviet ground installations within range, and in 1955 no Soviet ECM aircraft were capable of reaching northern Canada to play ECM games with our RB-47s.

Copilot McCoid may have referred to these cases in his interview with the Condon Committee in 1967. Committee investigator Roy Craig asked him if he had ever heard of any similar incidents, and he replied: "Yeah, I'd heard of one. It was out of Thule, Greenland. . . . Was it Campbell and Jerravis? Said they saw this cigar shaped thing. . . . It might have been in '55 or '57" (Condon files). McCoid apparently mentioned it and a "Milky Way effect" in its appearance to McDonald who dismissed it as merely a satellite re-entry, without realizing this was before Sputnik (McDonald papers). These sighting details sound like the "contrail" effect noticed in the June 4 and 8, 1955, incidents, especially the former, in which the object itself was "obscured" by the "contrails."

Conclusions

The RB-47 incident is the first conclusive scientific proof for the existence of UFOs. Calibrations of the RB-47's electronic measurements provide an irrefutable case. By comparing the measurements of the airborne UFO microwave emissions against a known microwave source (the Duncanville, Texas, air defense radar), with both signals compared simultaneously, the accuracy of the UFO measurements becomes scientifically unassailable. Since both signals were accurately measured at the same time as 30 degrees apart, this proves that it was impossible for the UFO signal to have been a misidentification of the Duncanville radar signal. The UFO signal was the dominant signal since the Duncanville signal was not detected until the RB-47 flew into the strongest part of the Duncanville radar beam.

This nighttime radar-visual-electronic detection case contradicts the best and most elaborate skeptical explanations ever devised, first by the U.S. Air Force, then years later by an avionics expert with the help of numerous specialists in radar, electronic warfare, astronomy, and UFO investigations. The explanations and the results of the most recent investigations overturning them include the following:

The RB-47 flew up the 89th meridian, near Gulfport, Mississippi, some 35+ miles west of where it would have to be (over the Alabama border) in order to avoid the Biloxi ground radar's blind spot and have a 180-degree equipment malfunction cause the Biloxi radar signal appear to go "upscope." But the Biloxi daytime training radar was not even transmitting in the middle of the night during the summer vacation, and thus could not have caused the "upscope" UFO-like signal, in any case. The "orbit" maneuver of first upscope, then downscope, would also contradict the Biloxi-180-error theory, as do many other observational facts reported (impossible pulse duration for Biloxi's CPS-6B radar, the failure to pass through even a fade region of the Biloxi radar, no variation in angular "upscope" rate despite a twofold change in distance). The "upscope" incident indicates a highly maneuverable airborne vehicle carrying an S-band radar transmitter and capable of circling an RB-47 jet aircraft flying at about 520 mph.

The visual sighting of the streaking light was a meteor fireball, not a UFO.

The subsequent electronic detections of a maneuvering signal were quite evidently due to a visual UFO in the same position as the signal. They were obviously not due to the Duncanville air defense radar, which had a different pulse duration and most likely a different radio frequency, and which radar the ELINT operator deliberately tuned out in order to concentrate solely on the UFO signal. The Duncanville radar could still be picked up intermittently when the strongest part of its VC Beam illuminated the RB-47—the most important instances being when both the UFO and the Duncanville signals happened to be detected at the same time—plotted as coming from different directions 30 degrees apart, thus conclusively proving that the Duncanville radar did not cause the UFO signal. In fact, the separate tracks of the Duncanville signal prove the direction-finding accuracy (to within three to six degrees) and thus give unexpected independent calibration of the trackings of the UFO signal.

The Duncanville radar tracked the UFO at a distance of about 12 miles from the RB-47 during much of the incident, indicating the object must be large and metallic or radar-reflective. The crew's observation of the UFO's maneuver of first pulling almost directly ahead of the RB-47, then suddenly veering off to the right toward Fort Worth-Dallas was independently tracked electronically on the RB-47's ELINT direction-finder through the radarlike signal emitted by the UFO, strikingly confirming the crew's sighting data. The UFO was repeatedly pursued by the RB-47 and dived upon, but it would suddenly stop moving and "blink out" visually at the same time its electronic signal stopped and/or it disappeared from the Duncanville ground radar's scopes and evidently from the RB-47's onboard navigation radar.

Investigation shows that the "American" Airlines Flight 966 that allegedly could account for the radar-visual UFO—because it supposedly landed at Dallas airport at the same time—did not exist. The actually existing National Airlines Flight 966 was located by records of a near-collision accident investigation in west Texas some 630 miles from the RB-47 in east Texas where the latter aircraft was then detecting a UFO signal. The airliner landed at Dallas nearly one and a half hours *after* the radar-visual UFO tracking in that vicinity ended. Flight 966 could have had no connection to the UFO events in east Texas.

It is regrettable that the University of Colorado project under Air Force contract did not pursue this one case aggressively and to the very end. Had it done so, it might have recovered now almost certainly irretrievable data (such as interviews with the Duncanville radar site crew), the disclosure of the highly classified Air Force-NSA documentation on the case, and the establishment of this incident as the landmark case in UFO history. The fact that this case is even on the map is a tribute to the dedication, energy, and drive of the late James McDonald. Without his recovery of the Blue Book documentation this calibrated scientific proof would be impossible. And without Philip Klass's determined efforts to investigate and explain this complex case possibly no one would ever have realized that the Duncanville radar had been detected on the RB-47 radar receivers, which has now provided the crucial data for scientific calibration.

This case certainly now ranks as the best documented unexplained UFO incident in history, and it holds the potential for further revealing disclosures if records of a highly classified investigation can be found and released. All of the UFO observations by multiple visual observers, multiple ELINT

receivers, and multiple radar sets, as well as the serendipitous calibrations of the UFO signals against the separately identifiable Duncanville radar signals, provide a unique tight interlocking web of intricately fitted evidence. This mass of strikingly self-consistent data demonstrates the existence of a large metallic rapidly maneuvering airborne source of powerful S-band radarlike signals and visible light—a UFO—that played tag with an Air Force intelligence-gathering jet for more than two hours on the night of July 17, 1957, across four states in the southern United States. This evidence does not prove what UFOs are or where they come from. But mimicry of an air defense radar is a technological effect hardly compatible with, say, a nonsentient natural "plasma."

— Brad Sparks

Sources:

Condon files. Condon Committee interview transcripts—Roy Craig with Lt. Col. Lewis D. Chase (October 19, 1967) and with Majors James McCoid and Frank McClure (undated, circa November 1967); miscellaneous correspondence; unpublished papers of Edward U. Condon (courtesy David M. Jacobs, Coral E. Lorenzen and Stanton T. Friedman; files of American Philosophical Society, Philadelphia, Pennsylvania).

General Electric Company. "Report on Pattern Measurements for AN/CPS-6 and AN/CPS-6B Vertical Radar Antenna," April 1950.

Gillmor, Daniel S., ed. *Scientific Study of Unidentified Flying Objects.* New York: Bantam Books, 1969 [see pages 56-58,136-39,175,260-66,750,877-93].

Herb, Gert. "A Rebuttal to Philip J. Klass's Analysis of the RB-47 Incident of July 17, 1957." *CUFOS Bulletin* (Summer 1977): 3-10.

Klass, Philip J. *The RB-47 UFO Case—A New Explanation.* Washington, DC: The Author, December 30, 1971.

———. *UFOs Explained.* New York: Random House, 1974.

Lorenzen, Coral, and Jim Lorenzen. *UFOs: The Whole Story.* New York: New American Library, 1969.

McDonald, James E. *A Very Creditable Effort!* Tucson, AZ: The Author, 1969.

———. "UFO Encounter I: Sample Case Selected by the UFO Subcommittee of the AIAA." *Astronautics and Aeronautics* 9,7 (July 1971): 66-70.

———. "Science in Default: Twenty-two Years of Inadequate UFO Investigations." In Carl Sagan and Thornton Page, eds. *UFOs—A Scientific Debate,* 52-122. Ithaca, NY: Cornell University Press, 1972.

McDonald papers. James E. McDonald's typed and handwritten notes of telephone interviews with Lt. Col. Lewis D. Chase (January 30, February 1, 1969), Maj. Frank B. McClure (February 1, 1969), Maj. Walter A. Tuchscherer (February 2, 1969), Maj. John J. Provenzano (February 2, 1969), Maj. Thomas H. Hanley, Jr. (February 2, 1969), Maj. Kenneth D. Sparks* (January 31, February 1, 1969), Maj. James H. McCoid (February 2, 1969); miscellaneous notes (February 19, 1969-January 4, 1971), unpublished papers (courtesy Betsy McDonald, J. Richard Greenwell, Coral E. Lorenzen; collection now at University of Arizona, Tucson). [*Maj. Sparks, no relation to Brad Sparks, was an advisor on electronic warfare consulted by McDonald, not a crew member of the RB-47 flight in 1957.]

Saunders, David R., and R. Roger Harkins. *UFOs? Yes! Where the Condon Committee Went Wrong.* New York: World Publishing Company, 1968 [see pages 126-27,231-32].

"Scientists Say Near Collisions May Involve Space Vehicles: Congressmen Investigate Cases." *The U.F.O. Investigator* (August/September 1957): 9.

Sparks, Brad. "UFO Details." *Astronautics and Aeronautics* 9,12 (December 1971): 4.

Steinmetz, Ken, ed. *Science and the UFO: A Supplement to the Proceedings of the Third National Amateur Astronomers Convention.* Denver, CO: National Amateur Astronomers, August 22, 1969.

Stone, Clifford E. *UFOs Are Real.* New York: SPI Books, 1997.

Thayer, Gordon David. "RB-47 Radar/Visual Sighting." In Ronald D. Story, ed. *The Encyclopedia of UFOs,* 297-98. Garden City, NY: Doubleday and Company, 1980.

U.S. Air Force. "Electrical Pulse Analyzer IP-223/ALA-5." Handbook Operating Instructions Tech. Order 12P3-2ALA5-1, May 15, 1953, revised April 7, 1971a.

———. "Direction Finder Group AN/ALA-6." Handbook Operating Instructions Tech. Order 12P3-2ALA6-1, May 1, 1954, revised April 7, 1971b.