

RESOURCE NOTES ON JET CONTRAILS AND ASSOCIATED ITEMS
Influence on Astronomical Observing Conditions

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... and by [US Air Force](#)
- * Contrails of concern to [FAA Ombudsman](#)
- * ICAO Journal March 2001 with contrail on [its cover](#)
- * US climate control: [USA Today](#) (July 16, 01) and [BBC](#) (Aug 1, 01)
- * [Fewer contrails seen from Space Shuttle after September 11:](#)
- * [Contrail forecast over USA developed by Langley.](#)
- * [Front cover of British think tank report portrays contrail cirrus.](#)
- * [Bjorn Lomborg, author of the "The Sceptical Environmentalist", portrayed with contrails \(from "Politiken"\).](#)

Last revised: April 4, 2003 --- Send your suggestions to: 

ASTRONAUT & TOP NOTCH OPINIONS [... top of document](#)

Space Shuttle astronaut Dr. Fred W. Leslie:

"I remember seeing contrails stretched across the planet": <http://www.ssl.msfc.nasa.gov/...>

International Space Station astronaut Umberto Guidoni

... told EU Commission Chairman Romano Prodi that "the space station gave a perfect view of the effect of human damage to the [atmospheric] environment":
<http://www.cnn.com/...>

Astronaut Dr. Andy Thomas:

"One of the most readily visible signs of human presence, is the occurrence of contrails from aircraft in the upper atmosphere. These are crystals of ice formed from water, a byproduct of the combustion process in the aircraft engines, and which is collected into the wake vortices of the aircraft. They are very long lasting, and can be seen over virtually all parts of the world as white streaks across the sky. They can be striking around cities that are major air traffic hubs, and can oftentimes be seen radiating out from these cities, like spokes in a wheel" (From an account of visual observations from his 141 day stay onboard Space Shuttle / MIR, STS-91, in 1998):
<http://shuttle.nasa.gov/history/...>

Astronaut Guy Gardner:

"... Guy Gardner, associate FAA administrator for regulation and certification, agreed. The former astronaut said that from space, 'you look down and don't see boundaries. What you do see is contrails of airplanes, especially on the North Atlantic.'" (Aviation Week and Space Technology September 12, 1998): <http://www.awgnet.com/...>

Shuttle-MIR astronaut Jerry Linenger:

- wrote to his son, who was en route Russia: "I'll be looking for the contrail of your jet as you head across the ocean (usually, easily seen from space...)":
<http://spaceflight.nasa.gov/history/...>

Astronaut Dr. George D. Nelson:

"It is striking that everywhere you look out the windows of the Space Shuttle you can see some evidence of human activity. Ships with wakes, airplanes with contrails, fires, electric lights, agriculture and engineering": <http://www.scimathmn.org/...pdf>

President Clinton

takes a balanced view on contrails: "... The real test of this new airport is not simply whether the skies are streaked with the contrails of jet planes. The real test of this new airport is the growth it generates, the jobs it creates, and the hope it inspires. It is found in the eyes of the children living on farms, and in these mountains, children who look skyward and imagine the places they will go": <http://www.dot.gov/affairs/...>

Former Senator Wendell Ford:

"In the early part of this century, a community was hard pressed to survive without a railroad station. Today, our airports have replaced the railroad station and the train's tracks across the countryside have been replaced by the plane's contrails across the open skies. Just as railroads played a critical role in the economy of yesterday, so too do airplanes and airports play an important role in today's economy" (statement Before the U.S. House of Representatives): <http://www.nata-online.org/...>

United States Environmental Protection Agency:

"Currently, there are no regulations addressing contrails and their atmospheric effects" (September 2000): <http://www.epa.gov/...pdf> from [click](#)

Dr. Cheryl E. Merritt, Yale University:

"The jet airplane has revolutionized travel since about 1960. It has brought people and cultures closer together. It has created environmental problems. Harmful chemicals sift down from the smoky trails of low-flying jets. The scream of jet engines is constantly heard by people who live near big-city airports. Jet aircraft, particularly the supersonic transport (SST) could engender stratospheric air pollution with consequent changes in climate. Jet exhaust contains water, CO₂, oxides of nitrogen, and particulate matter. It is speculative just how harmful these pollutants can be": <http://www.yale.edu/...>

Paul R. Ehrlich (1968):

"The causal chain of the deterioration [of the environment] is easily followed to its source. Too many cars, too many factories, too much detergent, too much pesticide, multiplying contrails, inadequate sewage treatment plants, too little water, too much carbon dioxide-all can be traced easily to too many people" (quoted by Adil Najam in Population Research and Policy Review, Vol. 15 No. 1, p.1-17): <http://www.mit.edu/...>

Dr. Richard Witt, The International Association 'Cosmos & Philosophy':

'... environmentally, the modern aeroplane is a bloody nuisance. [...] Briefly, emissions from aircraft make a more than trivial contribution to the chemical degeneration of the atmosphere, and perhaps assist actively in the process of climate modification. // We can start with an unfamiliar technical term, but one to keep in mind: contrails': <http://www.uek.cas.cz/11thIACP/witt1.htm>

THE EYE-SORE, IN PHOTOS AND WORDS ... [top of document](#)

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[Contrail Photos from Ground and Space](#)

[Contrails in Words](#)

CONTRAIL PHOTOS FROM GROUND AND SPACE ...

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1. At least 80 contrails over the ocean near Newfoundland (3 Mb picture in PNG-format, not all browsers may display it): <http://visibleearth.nasa.gov/...>
2. Contrails over Karlsruhe, Germany: <http://www.wolkenatlas.de/...> - and - [click](#) - and - [click](#) - and over Texas - [click](#) - and - [click](#)
3. Contrails over the French National Parc at Vanoise: <http://mesola.obsppm.fr:80/...>
4. Contrails near Luke Air Force Base, USA: <http://www.homestead.com/...>
5. Contrails in artistic photos are rare, here is one (with kind permission from Steve Berlin): <http://www.photoscene.com/...> from [click](#)
6. Contrails in Dutch Weather Pictures: <http://www.geocities.com/...>
7. Contrails seen from an airplane: <http://australiasevereweather.com/...>
8. Sky over Half Dome, Yosemite, contaminated by contrails: <http://hawley.interspeed.net/...> - and - [click](#)
9. Contrails in scenic photography: <http://www.spruance.com/...>
10. Photograph of contrail casting shadow on lower cloud deck which is also a contrail: <http://www.bact.wisc.edu/...>
11. Superb contrail photo: <http://www.atmos.washington.edu/...>
12. Satellite image (NOAA) of Europe, processed by DLR, Oberpfaffenhofen: <http://imkpcdemo.fzk.de/...> ... with automatically recognized contrails: <http://www.dfd.dlr.de/...>
13. TIROS satellite photo of contrails near Anticosti Island: <http://24.229.44.109/...>
14. Contrails over California, seen in Terra spacecraft imaging: <http://www.seaspace.com/...>

- and many more photos in section [The Evidence](#)

CONTRAILS IN WORDS ... [up](#)

1. You cannot escape from the contrails: "Wenn man nach einem langen und erlebnisreichen Tag vor seinem Zelt sitzt und die untergehende Sonne betrachtet, wie sie die Felsen in ein tiefes Rot taucht, und einem nichts anderes als Stille umgibt, könnte man fast die Zivilisation vergessen, wären da nicht die Kondensstreifen der Flugzeuge in 10.000 Meter Höhe": <http://www.proteus.at/...>
2. The Asheville Tribune, June 7, 1999: "Not a cloud in the sky. When is the last time you can remember repeating that phrase?": <http://www.ecotoday.com/>
3. "Airlines steal the sun for profit: on a typical blue-sky day in South-East England, up to 20 jet contrails crisscross the sky and spread into a haze" (by an action group against Manchester Airport extension): <http://www.mfoe.u-net.com/...>
4. "Contrails are changing Earth's skies. In terms of Earth's history, they are a new kind of cloud. Jet fuel exhaust. What once were clear nights are now clear nights with contrails. Where on the planet can one go and not see a contrail?": <http://www.spacestar.net/...>
5. Photography: "I can't tell you how many times I have set up to photograph a sunrise or sunset and while waiting for the best color, have a jet plane fly right through my picture leaving an ugly contrail behind": <http://www.apogeephoto.com/...>
6. Scenic photographer bothered by contrails: "After dodging rattlesnakes, climbing to the point of my exhaustion, we reached a point up the valley and opposite Halfdome. The elevation we judged at about 1500 feet above the valley floor. It was risky photographically. In the morning, the mountain was solidly clouding over, but very often at this time of the year, the weather changes produced the most opportunity for photography. By late afternoon, however, the sky had cleared. Except for the business of the jet contrails, the opportunity seemed perfect": <http://www.spessart.com/...>
7. Outdoor photography problems: "Jet contrails, those annoying 'linear clouds' that seem to appear just after you've set up your tripod and composed, are a problem with no real solution. Sometimes you're immediately aware of contrails, sometimes you hear the plane and search the sky, and sometimes, well, I've gotten film back and am convinced that my lab put that contrail into the picture because I sure didn't see it": <http://www.outdoorphotographer.com/...>
8. Grand Canyon and contrails: "But today, artists say the air and noise pollution at the Grand Canyon are bad and getting worse. Some artists won't go to the crowded South Rim anymore during the busy summer months, and others won't go to the canyon at all. Gordon Hempton, a sound designer for Microsoft Corp. best known as the "Sound Tracker" for his recordings of the world's quietest places, said, "The quiet places are really vanishing. The Grand Canyon is a waste of time for nature sound recordists." Jack Dykinga, a Tucson photographer who has taken nearly 6,000 shots of the canyon, said he won't even try to take photos during the busy summer months. He said there are days when whole rolls of film are useless because jet vapor trails mar the sky. "You can't see that far. That's the most notable change. It's definitely hazier," he said.": <http://www.nonoise.org/...>
9. Wilderness Lost: "Most of us who live in the Outback know the feeling of being able to look on a big scope of country that seems relatively unchanged by humans. There remain, for many of us, places where we can sit on a ridge and look across a vista that seems untouched by civilization. Frequently, though, that feeling is broken, or at least badly bruised, by the sight of an aircraft contrail, or by the sound of an internal combustion engine": <http://www.americanoutback.com/...>
10. An amateur astronomer laments contrails (12/03/1999): "Once again we had crystal clear skies on Wednesday night only to find Friday night that the air had a ton of moisture at the upper level. Jet contrails went across the entire sky. Oh well... I night of learning!": <http://216.59.71.3/...>
11. Death Valley: "Here one finds a pristine stillness, marred only by traces of jet trails": <http://www.gorp.com/gorp/...>

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- [Gulf War](#)
- [Middle East Conflict](#)
- [Kosovo Conflict](#)

SPANISH CIVIL WAR ...up

1. Spanish Civil War, September 21, 1938, text only: "The Messerschmitts are mixing it with No 4, judging by the contrails and the lines of tracer left behind in the high, cold air. - and - "The one hundred and fifty aircraft weave and unravel an enormous pattern of white trails in the air": [http://www.aire.org/...](http://www.aire.org/)

WORLD WAR II ...up

Pictures

1. WWII picture: [http://www.geocities.com/...](http://www.geocities.com/)
2. The famous TIME MAGAZINE photograph from January (June?) 1944 showing B-17 and P-47 contrails: [http://members.tripod.com/...](http://members.tripod.com/) - and - same picture in another location: [http://www.457thbombgroup.org/...](http://www.457thbombgroup.org/) - and on the photo's history: [http://www.390th.org/...](http://www.390th.org/)
3. More WWII contrail pictures from these sites: [click](#) - and - same picture in another location: [http://www.fscwv.edu/...](http://www.fscwv.edu/) ... and more contrail pictures from one of these sites site: [click](#)
4. WWII Photo of seven planes with contrails: [http://www.457thbombgroup.org/...](http://www.457thbombgroup.org/)
5. WWII (picture): [http://www.457thbombgroup.org/...](http://www.457thbombgroup.org/)
6. Contrails from falling WWII plane: [http://www.acs.oakland.edu/...](http://www.acs.oakland.edu/)
7. Contrails en masse over St. Pauls Cathedral during Battle of Britain: [http://www.parlier.com/...](http://www.parlier.com/)
8. WW-II photo of contrail over St.Pauls Cathedral [http://www.accessweb.com/...](http://www.accessweb.com/)
9. Contrails in wall art at Smithsonian's Air and Space Museum: [http://www.fscwv.edu/...](http://www.fscwv.edu/)
10. Formation flying in contrail cirrus: [http://www.web-birds.com/...](http://www.web-birds.com/) - and - [click](#) - and - [click](#) - and - [click](#) - and - [click](#) - all described on [click](#)
11. B-17 and B-24 contrails seen on WWII photographs: [http://w3.tvi.cc.nm.us/...](http://w3.tvi.cc.nm.us/)
12. Photograph of contrails in formation flying: [http://www.fix.net/...](http://www.fix.net/)
13. "Crewmen of an American ship watch the contrails as American and Japanese planes fight it out above Task Force 58": [http://www.worldwar2.com/...](http://www.worldwar2.com/)
14. WWII contrail photo: [http://www.worldwar2pilots.com/...](http://www.worldwar2pilots.com/) from [click](#) - and - [click](#) from [click](#) - and - [click](#) from [click](#)
15. WWII contrails (excellent photo): [http://home.att.net/...](http://home.att.net/) - with text on: [click](#)

Text (mostly with no assurance of authenticity)

1. G.A.Paulikas: "Spring 1945 ... Up to 300 US bombers at a time ... forming clouds that looked like thick cirrus ... covering a good fraction of the sky", Letter to the Editor of Science, 1997, July 4, p.TBD
2. "Meyer, now a lieutenant colonel, was awarded an oak leaf cluster to the Silver Star for downing three Bf-109s and one FW-190 on Nov. 11, 1944. Ten days later, he earned his second DSC for leading 11 P-51s in an air battle east of Leipzig, against more than 40 enemy fighters. Meyer maneuvered his formation into position for a surprise attack, himself shooting down three FW-190s. In one case, he used the contrail of an FW-190 for cover, firing at the unseen enemy until he could see strike flashes through the contrail, then breaking off just before ramming the burning enemy plane": [http://www.westnet.com/...](http://www.westnet.com/) - and also on [http://www.afa.org/...](http://www.afa.org/)
3. WWII: "The morning of 23 December 1944, hp) broke clear and cold. "Visibility unlimited," the air-control posts happily reported all the way from the United Kingdom to the foxholes on the Ardennes front. To most of the American soldiery this would be a red-letter day-long remembered-because of the bombers and fighter-bombers once more streaming overhead like shoals of silver minnows in the bright winter sun, their sharply etched contrails making a wake behind them in the cold air.": [http://www.3ad.org/...](http://www.3ad.org/)
4. Russians chasing high-flying German reconnaissance planes, recognizing them only by their roaring and their contrails: [http://hits1.infoart.ru/...](http://hits1.infoart.ru/)
5. [date?] March 1944: "Strategic Operations (Eighth Air Force): Mission 246: 555 B-17s and 193 B-24s are dispatched to industrial areas and aviation industry plants at Berlin, Erkner and Oranienburg but deteriorating weather and dense contrails force the formations to abort or seek targets of opportunity": [http://www.lts.aetc.af.mil:80/...](http://www.lts.aetc.af.mil:80/) - also on [http://paul.rutgers.edu/...](http://paul.rutgers.edu/)
6. "The spectacle of seeing hundreds of aircraft trailing formations was an extraordinary sight," said Freeman, who was a base rat at Boxted near Colchester. "On one cold and freezing day, early in 1945, when I was 15, I saw the contrails of a thousand bombers forming in the sky at one time. I didn't count a thousand, but there were 28 groups, and I knew that each group had 30 to 40 in each formation": [http://www.af.mil/...](http://www.af.mil/)
7. "To Fly and Fight: Memoirs of a Triple Ace" by Col C. E. Anderson with Joseph P. Hamelin "You knew how it was up ahead, and you knew it would be like that for you any minute now, the German single-seat Fw 190s and Me 109s coming straight through the bombers, mixing it up with the Mustangs, the hundreds of four-engined heavies and the hundreds of fighters scoring the crystal blue sky with their persistent white contrails": [http://www.cebudanderson.com/...](http://www.cebudanderson.com/)
8. Finnish-Soviet air fight, [date?] February 1940: "We completed both our missions successfully. We had a well thought out plan which had worked in that we approached our targets over Ladoga, through enemy airspace, took the photographs from the altitude of 7500 metres as fast as we could and gave a farewell bombing. All went according to the plan. We did not spot any enemy fighters. I was concerned about one detail though. I tried to alternate our height to get rid of the contrails we were making, but that was not possible on that day, humidity and cold air made my efforts in vain. I told the other crewmembers to give a more alert lookout because I knew Soviet fighters would be drawing contrails too": [http://www.dalnet.se/...](http://www.dalnet.se/)
9. WWII (February 20, 1944; text only; also on other URLs): European Theater of Operations: "... dense contrails and frost prevent most aircraft from attacking": [http://www.lts.aetc.af.mil/...](http://www.lts.aetc.af.mil/)
10. February 6, 1945, Mission #25: "The contrails were dense, persistent - really hard to even see our own squadron. Our Air Leader really got worried about us being by ourselves": [http://www.geocities.com/...](http://www.geocities.com/)
11. WWII (text only, 26 August 1944) [http://chasntx.home.texas.net/...](http://chasntx.home.texas.net/)
12. 467th Bombardment Group (Heavy): "Twenty-two aircraft, each carrying 6x1000lb general purpose bombs took off starting at 0850. Two returned early. One was unable to find the formation because of clouds and contrails, and the other experienced an oil leak" (May 19, 1944): [http://www.siscom.net/...](http://www.siscom.net/)
13. "The p-47's would be zig-zagging over us at 45000 feet leaving contrails, and shortly after crossing the coastline we picked up German fighter planes, Me-109's and Me 190's": [http://aafo.com/library/...](http://aafo.com/library/) -- "We were making large contrails, and a Focke Wulf got in our contrail about a mile out and flew in it until he was one hundred feet away. He then climbed until he broke out of our contrail": [click](#)
14. "On the 16th of July, 1944, we climbed to 30,200 feet to stay above the contrail-spawned clouds over Munich. The only time that I ever experienced real vertigo was when leading a low squadron of B-17s and looking up at planes that were generating serious contrails. Each prop on every plane in the formation made a huge swirl that continued to rotate as we passed underneath. I had the sensation that the entire formation had gradually turned into a 90 degree bank. When flying close formation one can't concentrate on flight instruments to get oriented. I asked my copilot if he was OK and could he take over and he said, fine. All was well in a few moments after I could look away from those rotating contrails and get my bearings": [http://www.381st.org/...](http://www.381st.org/)
15. [date?] "I saw almost nothing today except friendly planes and vapor trails (contrails). There was a little flak, but it didn't bother our group. Over the top of the clouds I could see four wings of B17s going over the target ahead of us. Everybody was making contrails. It looked like a series of twisted bowling alleys. P47s, P38s and P51s played tag around us all the time": [http://metalab.unc.edu/pub/...](http://metalab.unc.edu/pub/)
16. "Am 12. Mai 1944 findet, wie in dieser Zeit fast täglich, ein Luftangriff auf Frankfurt statt. Die Bomberverbände überfliegen meinen Heimatort im Taunus. Das ist nicht, ungewöhnlich Man sieht zu den Kondensstreifen hinauf und fühlt sich sicher. Dann steigen deutsche Jäger auf und es gibt einen heftigen, lang dauernden Luftkampf": [http://www.koblentz.de/...](http://www.koblentz.de/)
17. "In the early evening of the 16th August 1943, three Messerschmitt 109Gs were on a reconnaissance mission over Portsmouth, southern England. They were at around 36,000 feet and considered themselves so invincible at that height, that once they had turned for their base, they maintained a steady, straight course and speed. Their sunlit contrails were clearly visible against a clear summer sky": [http://www.warbirdart.demon.co.uk/...](http://www.warbirdart.demon.co.uk/) - and - (where the artist got the contrail wrong) [click](#)
18. [date?] "I set the throttle to 100% and also engaged the methanol injection so as to obtain maximum power from the Daimler Benz engine. I trimmed for climb and riding just above stall speed gained altitude rapidly. I could see contrails in the distance and I headed toward them. At 23,000 feet I leveled off and began my pursuit. Off to my left at 11 o'clock was a badly damaged B-17 trailing alot of smoke. I closed in but before I could apply the coup de grace the crew bailed out of their flying coffin": [http://js27.org/...](http://js27.org/)

19. "Convinced that the Polish forces were doomed and, consequently, no longer a danger to Moscow's plans for communist domination of Central Europe, the Soviets finally acceded to pressure from Washington and agreed to permit a single flight of American planes to land on Russian airfields. On a bright sunny day, on September 18 [year?], the contrails of a large group of planes appeared over the beleaguered city and the white parachutes started dropping like petals from trees. It was too late, the area in our possession had been so reduced in size, and the drop was made from such a high altitude, that most of the supplies fell into German hands. This was the only attempt to provide large scale air-drops -- too little -- too late...": [http://www.espressobiega.com/...](http://www.espressobiega.com/)
20. "On [date?] Nuremberg, you could see everyone - the plumes of smoke, the contrails from your engines. Poof! They started shooting us down like geese": [http://www.valourandhorror.com/...](http://www.valourandhorror.com/)
21. "Eben werden wieder durch den Drahtfunk Einflüge starker Verbände gemeldet. Die beiden letzten Tagesangriffe auf Berlin waren von hier aus z. T. ganz gut zu beobachten. Man sah über den wolkenlosen Himmel größere Formationen mit ihren Kondensstreifen fliegen bei z. T. recht erheblichem Flakbeschuß": [http://www.joyma.com/...](http://www.joyma.com/)
22. (date??) "The takeoff was uneventful in spite of the snow on the field. Assembly into the formation was routine, if assembly can be considered a routine matter. The mission was uneventful until we reached the IP. Here and in the target area there were 2-3/10ths middle clouds, tops 16,000 feet, and 8-10/10ths thin cirrus clouds with dense persistent contrails. The conditions made formation flying and bombing difficult": [http://www.303rdbg.com/...](http://www.303rdbg.com/) ... and "The contrails were terrific and two B-17s blew up in the confusion. It certainly made a big explosion. They must have been loaded with demolition bombs. We were carrying incendiaries": [click ...](#) and (February 3, 1944, over Wilhelmshaven): "The weather on this mission was the worst (as far as flying was concerned) I have ever seen. Very dense and persistent vapor trails ("contrails" or condensation trails) were encountered at all altitudes above 18,000 feet. These vapor trails plus the dense clouds made flying formation very difficult. In fact, formation flying was practically impossible. On top of this, our group followed another group and got in its "prop wash" and con-trails": [click](#)
23. An Australian account: "I'm glad you haven't asked me for technical details of the PR spits but they were stripped of guns, ammunition and radio, the weight being replaced by additional fuel tanks and cameras. They were normally flown at full throttle at around 30-32,000 feet, depending upon the tropopause as it was essential not to leave a persistent contrail": [http://www.pnc.com.au/...](http://www.pnc.com.au/)
24. 06/28/1944: Nearly 300 HBs [heavy bombers?] abort because of heavy cloud and dense contrails at operational level. [http://www.airforcehistory.hq.af.mil/...](http://www.airforcehistory.hq.af.mil/)
25. "Near the end of our tour several of us thought we sighted German fighters, but it was impossible to be sure. For all that we actually saw were long white contrails, almost perfectly straight, as though the planes that made them were incapable of turning. But the impressive aspect of these sightings was their "impossible" altitude. We flew often at about 30,000 feet, near our ceiling. And yet the contrails we sighted were so far above us that we could not make out the craft that caused them. Sometime later we heard of the new German jets and realized these were what we must have seen, flying at perhaps 60,000 feet or more": [http://users.rcn.com/...](http://users.rcn.com/)
26. WWII history, text only [date?]: "Williams' last mission was to Hanover, Germany. He flew much of the mission at 35,000 feet but descended to 22,000 feet to eliminate the contrail that gave away his position. [http://www.1.drive.net/...](http://www.1.drive.net/)
27. WWII history, text only: "I could as well tell about my easiest victory on the 28th of May 1944. I was basing at Malmi. Suursaari sent us a report: buzzing to the west. I was sent to identify. The coastline was covered by a thin veil of cloud, having climbed above it I saw a contrail. I began to climb to it, and when I reached the same altitude the contrail stopped. I kept a sharp lookout and saw a Pe-2": [http://www.elknet.pl/...](http://www.elknet.pl/) and, from the same site: (May 27, 1944) "You knew how it was up ahead, and you knew it would be like that for you any minute now, the German single-seat Fw 190s and Me 109s coming straight through the bombers, mixing it up with the Mustangs, the hundreds of four-engined heavies and the hundreds of fighters scoring the crystal blue sky with their persistent white contrails": [click](#)
28. WWII history (Thursday 7-13-44): "Back to Saarbrücken and this time it was a snap. Carried 3 - 2000. Supposed to fly right wing in low left, but our lead got lost in contrails and headed for base": [http://members.home.net/...](http://members.home.net/)
29. WWII contrails (text only) mentioned for October 8, 1942: ""We turned our aircraft out to sea in an attempt to get out of range of the German fighters and out of the heavy flak, but it wasn't our day, as some long range ME-110's must have picked up our con-trail and hit our other two engines less than two hours later, north of Holland and near Terschelling Island, a part of the Frisian Island chain": [http://www.ip-services.com/...](http://www.ip-services.com/)
30. WWII contrails (text only) mentioned for February 8, February 14, and March 18, 1944: [http://www.net1plus.com/...](http://www.net1plus.com/)
31. WWII history (text only): Contrails leading to the downing of Messerschmitt Me 262: "On 7 April 1945, Major Robin Olds was leading the 479th Fighter Group on a mission over Germany in his North American P-51 Mustang "Scat VI." Escorting a formation of bombers, Olds noticed contrails popping up over clouds at his nine o'clock position. Turning toward the contrails, he got "Tally-ho" on a group of 12 Messerschmitt Me 262 jets diving in on the bombers. After an engagement with one of the jets, Olds looked back at the bombers and saw an Me 109 attacking the formation. He followed the enemy through the middle of the bombers, opened fire and scored direct hits. The pilot bailed out and his airplane went straight in!": [http://www.au.af.mil/...](http://www.au.af.mil/)
32. WWII history (text only, with original flight-log): "May 5, 1944 [...] Place - Cherbourg, France [...] Remarks - Bad weather again - no mission credit - flew at 24000 ft. but clouds & contrails up to 28,000 - couldn't top them - B-24 you know. No losses." [http://www.ctol.net/...](http://www.ctol.net/)
33. WWII, text only: Mar 15, 1944 Brunswick: "Just enough breaks in the clouds to pick up a pinpoint now and then. Intense flak at target but not too accurate. Got 3 hits forward of R. waist window. - FW190 sneaked in D. Millers contrails and shot him down in flames. Eight chutes & 1 burning chute observed": [http://www.b24.net/...](http://www.b24.net/)
34. WWII: Memories of contrails quoted by a Japanese family: [http://members.aol.com/...](http://members.aol.com/)
35. WWII: J.Reynolds inquiry of contrail observations during WWII http://www.ecotoday.com/read_eco.html
36. WWII text: on the use of contrails, on November 21, 1944: [http://www.westnet.com/...](http://www.westnet.com/)
37. WW-II (1943, no date given): "Weather conditions were as forecast with heavy contrails over England and crossing into France. I looked out my astro hatch at quite an amazing sight for me - the largest array of B-17s that I could ever imagine. What a glorious feeling": [http://www.lakenheath.af.mil/...](http://www.lakenheath.af.mil/)
38. WW-II contrails on August 26, 1944 [http://chasntx.home.texas.net/...](http://chasntx.home.texas.net/)
39. WWII: May 17, 1942: Several RAF squadrons conducted a feint toward Holland trying to draw the Luftwaffe northwards. 303 RAF, the Eagle Squadrons, 352nd FG. 44th SOS and 416 RCAF left contrails as they passed high over Occupied Europe. This allowed the 305th HBG to conduct their secret mission ...": [http://www.fourthfightergroup.com/...](http://www.fourthfightergroup.com/)
40. WWII, second hand account, text only: "Dad described the power and beauty of an armada of hundreds of gleaming aluminum B-17s streaming four contrails (which unfortunately made them more visible to the flak batteries and fighters)": [http://res3.geocities.com/...](http://res3.geocities.com/)
41. WWII: Text only: Contrails observed on October 9, 1944 over Koblenz: [http://www.446bg.com/...](http://www.446bg.com/)
42. WWII (text only; 7 April 1945 near Hamburg): "At about 1240 hours we observed numerous contrails high above the bombers approaching from various directions. They started making high overhead passes on the bombers at about 1250 hours": [http://www.web-birds.com/...](http://www.web-birds.com/)
43. WWII accounts, verbal: 303rd BG experience near Hamburg, on June 25, 1943: "As I recall we were in bad soup shortly after take-off, which was compounded by serious contrails as we got higher. Then we began to lose visual contact with others": [http://www.chez.com/...](http://www.chez.com/)
44. November 21, 1944: On numerous contrails from B-17 and P-51 Mustangs over the North Sea (is this history or fiction?): [http://www.tankbooks.com/...](http://www.tankbooks.com/)
45. WWII (text only): "Feb. 21, 1945 Wednesday. NURNBERG-Industrial Area. First mission after being grounded for ten days. Good feeling to fly again. Also our first mission with Burrington as our Pilot. Roberts flew Co-pilot. Lot of flak going in near the present front lines. P-51 escort looked like a bomber stream. Lot of contrails. Burrington-Pilot. 8 hrs. 20 min.": [http://www.geocities.com/...](http://www.geocities.com/)
46. "On March 18,1945, the McCaldin aircraft was hit by a ME 262 fighter over Berlin. The ME 262 had come in under the heavy contrails, both generated by aircraft under certain weather conditions": [http://www.khosla.com/...](http://www.khosla.com/)
47. B17 contrails in low resolution thumbnail photo (redundant?): [http://sites.netscape.net/...](http://sites.netscape.net/)
48. WWII (text only): "The day was March 18, 1945, the target was Berlin, where approximately 1300 heavy bombers of the 8th AiR Force were to drop bombs. On that day our scheduled bombing altitude was to be 21,000 for my Bomb Squadron, the 391st BS of the 34th BG. As we neared Berlin at that altitude we began to stream contrails from the wing tips, the tips of the tail assemblage, and the tips of the propellers on each of the 4 engines. We were, in effect, clouding the sky over Germany . In an effort to eliminate this phenom we were told to go to "Angels5" which meant that we were to add 5 hundred feet to our scheduled bombing altitude. So we went to 21,000 +500 or 21,500 feet and the problem did not resolve. If anything it got worse! We kept adding 500 foot increments to our scheduled altitude until our aircraft reached 27,500 feet, still trailing contrails." -Hal Province 34th Bomb Group": [http://www.newsmax.com/...](http://www.newsmax.com/)
49. WWII (text only): Contrails on January 30, 1944: [http://hometown.aol.com/...](http://hometown.aol.com/)
50. REDUNDANT TEXT [http://members.nbci.com/...](http://members.nbci.com/)
51. WWII (September 7, 1940, Battle of Britain): "But as the man-made thunder grew closer and louder, and the black curtains spread and thickened in the east, they looked up and saw the sky filling with tiny silhouettes sharp and clear against the blanket of contrails spun by the scores of circling fighters": [http://www.dynotech.com/...](http://www.dynotech.com/)
52. WWII (Christmas 1944, text only): "This holiday it was our crew's turn. The heavens were still moist. At fighting altitude our planes left long, thick, and lasting contrails. We created the clouds we had to fly back through": [http://www.metro.net/...](http://www.metro.net/)
53. WWII photo (redundant?): [http://store4.yimg.com/...](http://store4.yimg.com/)
54. WWII photos of contrails (redundant?): [http://freepages.military.rootweb.com/...](http://freepages.military.rootweb.com/)
55. WWII contrail account of unknown date, 1944: " As we climbed up to our altitude of 25,000 feet, the clear sky was turning into solid contrails. The only ship I could see was the ship on which I was flying formation ": [http://www.southernoregonwarbirds.org/...](http://www.southernoregonwarbirds.org/)
56. SAME STORY? WWII (October 10, 1943?): "We had a max effort heading out to Germany, and the sky was clear as a bell. Really a CAVU day (ceiling and visibility unlimited). Climbing out on course, as we approached 20,000 feet the lead ship began to develop contrails. As we climbed up to our altitude of 25,000 feet, the clear sky was turning into solid contrails. The only ship I could see was the ship on which I was flying formation. As I checked my position on this ship and then checked my instruments I developed VERTIGO (an unbalance of the inner ear). I thought for sure I was flying left wing straight down, yet my instruments all said I was flying straight and level. So I would glance at my instruments and glance at my leader till we flew out of that super-contrail layer": [http://www.southernoregonwarbirds.org/...](http://www.southernoregonwarbirds.org/)

57. Various WWII B17 contrail photos (redundant?): [http://www.nmia.com/...](http://www.nmia.com/)
58. Plauen Mission, March 19th, 1945: "We continued to climb slowly, but we were flying in light cirrus and now we were pulling contrails, visibility seemed to vary from one to two miles horizontally, flying conditions were marginal": [http://wejones.ftdata.com/...](http://wejones.ftdata.com/)
59. WWII (March 4, 1945, text only): The bombing of Zurich: "The weather as it appeared to the weather scouts was not insurmountable but . . . the contrails created by the First and Third Divisions plus the initial units of the Second Division created a cloud layer which units could not climb over nor descend below, for they created their own weather. It is unbelievable that so many units could fly so long in such conditions, turn around and withdraw without heavy losses from collision" ... and ... "Meanwhile, wing assembly had been raised to 18,000, then 20,000, and finally to 23,000 feet, an altitude at which the Liberators began to handle sluggishly and formation flying became all the more difficult. The thick, twisting contrails still prevented any visual sightings" ... and ... "Both Lieutenant Sincok and Major Keilman struggled to keep in contact with that lead as the continuing contrails and increasing cloud coverage reduced visibility": [http://www.airpower.maxwell.af.mil/...](http://www.airpower.maxwell.af.mil/)
60. Contrails mentioned in a WWII report: "At these heights they had to carefully avoid getting so high that condensation trails were formed, as ground control had reported 20-plus bandits in the area" (August 9, 1941; I.Wedge, pers.info.): [http://www.redtwo.demon.co.uk/...](http://www.redtwo.demon.co.uk/)
61. WWII (text only; no date, but the text surely allows identification of the fight): "I carefully search the sky for enemy escorts but I can make out only three or four condensation trails above the bombers": [http://ww2f.dogfighter.com/...](http://ww2f.dogfighter.com/)
62. WWII (text only, probably September 26, 1943): "Our formation of bombers, marked by condensation trails progressed across the sky unmolested": [http://members.aol.com/...](http://members.aol.com/)
63. WWII: daterail contrail: <http://www.redtwo.demon.co.uk>
64. WWII: contrails (text only) observed April 5 1945: "Unterschlaersbach (10 miles W of Nurnburg) 5 April, jet airfield shocked by our 2 ship formation. Very bad weather, 25,000 ft clouds, dense persistent contrails, assembly impossible. Back over Belgium at 800 ft 7 1/2 hrs, 900 miles": [http://www.jccc.net/...](http://www.jccc.net/)
65. WWII (text only, November 1944): "Eight B-29s of the 45th Bomb Squadron launched a strike in November 1944 from our advanced base at Hsinching, China, against a Nippon Air Depot at Mukden, Manchuria. [...] The sky was clear and all aircraft were leaving thick contrails behind them. West of the target, and above our altitude, I could see a short contrail behind a plane so far away that I could not identify it. [...] I could make out a tiny dot whose contrail was turning toward our formation": [http://www.40thbombgroup.org/...](http://www.40thbombgroup.org/)
66. WWII (text only, 28 May 1944, over the British Coast): "Contrails were encountered at 22,000 feet and upon request, the Wing leader let down a thousand feet": [click](#) and (March 18, 1944) "The time then was about 1500 hours when an estimated 60-75 ME-109 and FW-190 fighters swept in on the Group out of the contrails, five and six line-abreast, and attacked through the formation. Enemy fighters attacked twice more in the same fashion before ": [click](#)
67. Several contrail reports in the WWII account, redundant? [click](#)
68. WWII (text only, March 18, 1945): "We were in the #3 position slightly behind and below the element lead. As we neared our target of Berlin, the sky was clear but we were leaving heavy contrails. There had been no warning of bandits when our tail gunner opened fire. Four ME-262s came in hidden by the contrails and hit four of us" (crash landing follows): [http://www.100thbg.com/...](http://www.100thbg.com/) and "SUNDAY, JANUARY 30, 1944: TARGET: BRUNSWICK, GERMANY--6 HOURS--(-40 DEGREES)--MEDIUM FLAK--HEAVY OVERCAST--GOOD ESCORT-- CONTRAILS VERY HEAVY, HAZARDOUS FLYING CONDITIONS--BOMBED AT 28000 FEET": [click](#)
69. WWII (text only, September 7, 1940): As the fighters strove to break through the massive escort, bombers faltered and broke away with blazing engines, twisting streaks of pale tracer patterned the air, condensation trails from the fighters high above wheeled and curved, parachutes drifted down towards the green world below, and columns of smoke rolled darkly up to meet them from the first funeral pyres. [http://www.dyno-tech.com/...](http://www.dyno-tech.com/)
70. WWII (text only, December 23, 1940): "To most of the American soldiery this would be a red-letter day-long remembered--because of the bombers and fighter-bombers once more streaming overhead like shoals of silver minnows in the bright winter sun, their sharply etched contrails making a wake behind them in the cold air": [http://www.shsu.edu/...](http://www.shsu.edu/)
71. WWII (text only): Ken Blowers for The Evening Star (redundant?): "On a frosty morning in January 1945 I once counted more than 1,000 bombers forming into battle formations high above Ipswich, each leaving its brilliant stream of four white condensation trails across the blue of the winter sky": [http://www.suffolk-now.co.uk/...](http://www.suffolk-now.co.uk/)
72. WWII (text only, September 23, 1940) "An area from Dartford to Margate became a mass of twisting, whirling white vapour trails as the fighters from both sides weaved and spiraled against the backdrop of now bright blue sky": [click](#)
73. [http://www.wallowa.com/...](http://www.wallowa.com/)
74. WWII (text only, March 1, 1944): "Weather clear and sunny. We were quite interested in watching the P-38 and the British Spitfires play around in the skies those above 25000 feet was leaving the most picturesque vapor trails": [http://www.150th.com/...](http://www.150th.com/)
75. WWII (photo, March 22, 1945): "A little bit of beauty during a war; vapor trails made by a formation on the way to an airfield at Kitzingen, Germany": [http://www.446bg.com/...](http://www.446bg.com/)
76. WWII (text only, 1 November 1944) "The primary target for the first mission in November was the South Ordnance Depot at Vienna, Austria. The thick layers of clouds which had been encountered over Italy and over the Adriatic practically dissipated over Yugoslavia. Atmospheric conditions were such over the alps, however, that extreme haze and vapor trails reduced visibility to one mile. Under these conditions the third alternate, the Marshalling Yard at Graz, Austria, was selected for the attack": [http://www.461st.com/...](http://www.461st.com/)
77. WWII (photo, no date): "B-17Fs at altitude": [http://ww2f.dogfighter.com/...](http://ww2f.dogfighter.com/)
78. WWII (photo, no date) (redundant): "B-17Fs contrails": [http://ww2f.dogfighter.com/...](http://ww2f.dogfighter.com/)
79. WWII (text only, spring 1944): "When we started our turn to south toward Berlin, we found that though the bombing altitude had been briefed for 30,000 ft. our bombardier couldn't see downward because of the contrails left by the proceeding groups": [http://www.gulfcoastwing.org/...](http://www.gulfcoastwing.org/)
80. WWII (text only) "Jan 24th 1943: Briefed for Frankfurt, Germany. Took off in dark at 7 a.m. -- Heavy contrails at 15,000 ft. had difficult time grouping formations. Were 150 miles over enemy territory when we were recalled to base. -- Came out across Holland so did not drop bombs. -- Salvaged in Channel" - and - "Feb 22nd 1944 Briefed for Schwienfurt, Germany.-- Bomb load, ten 500 lb Demos.-- Took off in snow flurries, climbed to 22,000 ft. Heavy contrails made grouping difficult. Visibility almost zero at times. We headed out across Channel badly formed.--Recalled.-- Landed at base with full bomb load ": [http://209.25.250.72/...](http://209.25.250.72/)
81. "Vapor trails mark the path of 759th Squadron, 459th Bomb Group B-24 Liberators on the way to Germany from their base, Giulia Airfield, a former Axis base near Cerignola, Italy. Excerpted by permission from WWII War Eagles, p. 210. (James Wilson via 459th Bomb Group Association) [but is the blue color added to a b/w photo?]" : [http://www.ethell.com/...](http://www.ethell.com/)
82. WWII (photo): "Vapor trails of 322nd Bomb Group B-26s on bombing mission deep inside Germany, Winter 1944-45, taken from my pilots seat.": [http://www.fastlane.net/...](http://www.fastlane.net/)
83. WWII (text only, December 24, 1943): "Thousands of planes in the sky, so many vapor trails that a clear, cold sky actually became cloudy": <http://www.tuttle2000.com/history/sweatingitout.asp>
84. WWII (text only, 23. or 24. December 1944): "The weather had cleared and it looked like all the Allied Air Force came out. The sky was filled with planes and vapor trails all over. Some P-38s and Mustangs strafed the German lines down below us": [http://www.99div.com/...](http://www.99div.com/)
85. WWII (text only, January 28 1945): "Weather - clear and cold. No Church services were conducted in the Bn. this morning. In the early afternoon flights of heavy bombers were seen and heard overhead - their vapour trails showing snow-white against the clear blue sky. From their direction we would hazard that COLOGNE will be the recipient of their loads": [http://victorian.fortunecity.com/...](http://victorian.fortunecity.com/)
86. WWII British Civil Defence (with modern photo): "Watching the skies for jet contrails was the mission of every member of the observer corps": [http://home.att.net/...](http://home.att.net/)
87. WWII (Text only, april 8, 1945): "Hundreds of B-17 Bombers flew overhead toward the German lines. Their engines made an almost constant drone and the sky was almost white with the many vapor trails": [http://www.google.com/...](http://www.google.com/)
88. WWII (text only, April 17, 1945): "We were flying in as close formation as possible to leave a good bomb pattern in the strike area. Flak had just begun to explode as the anti-aircraft gunners searched for our range. We were easy for them to spot, as our contrails were heavy that day, pointing like fingers in the sky toward our squadron as it flew straight and level on its bomb run. [http://www.91stbombgroup.com/...](http://www.91stbombgroup.com/)
89. WWII (text only, June 4, and June 10, 1944): "Forming trouble was again experienced on this mission when assembly was attempted above 24,000 feet with contrails. "The formation was all screwed up and then, when we reached the target, we made three distinct runs without dropping. The PFF ship messed up the mission unforgivably..." and "Weather kept the entire Eighth on the ground on 9 June, but the following day the 491st went to Conches Air Field in France after another futile attempt to effect an orderly assembly at 25,000 feet with contrails. ": [http://www.jps.net/...](http://www.jps.net/)
90. WWII (text only, July 21, 1944): "Loss number three was 41-28987, here described by the pilot, 2nd Lt. Earl W. Newton. "We flew into contrails and overcast near Stuttgart": [http://www.jps.net/...](http://www.jps.net/)

=== not fully sorted according to conflict

1. WWII (text only): Contrail observed in Asian air-space, on April 7, year uncertain: [http://glorene.com/...](http://glorene.com/)
2. First movie called VAPOR TRAILS, 07/18/1947: showing US B-17 flying in circles leaving round rings of vapor trails. 3) US B-17 in flight leaving long line of vapor. 4) US Same as sc 2. 5) US Same as sc 3. Reel 3: 1) US Series of shots of vapor trails. Good From NARA THE JET STORY, 10/04/1941. BOMBING BREMEN & WILHELMSHAVEN, 07/26/1943.

SHUTTLE MISSION TO REGENSBURG,08/17/1943.
 THE THUNDERBOLTS: RAMROD TO EMDEN, 10/02/1943.
 WILHELMSHAVEN, 11/03/1943.
 GERMAN PRISONERS EVACUATED TO NAPLES; GERMAN PLANES DIVE BOMB ANZIO, ITALY: EVACUATION OF WOUNDED MARINES, 12/22/1943.
 MISSION TO AIRFIELD NORTH OF ROME, 01/14/1944.
 MISSION TO WILHELMSHAVEN, 02/03/1944.
 MISSION TO BERLIN, GERMANY, 03/22/1944.
 MISSIONS TO BERNBERG & OBERPFAFFENHEFEN, 04/13/1944.
 COMBAT MISSION BERCK SUR MER, FRANCE 06/02/1944.
 MISSION TO HAMBURG, GERMANY, 06/18/1944.
 MISSION TO BERNBERG, GERMANY, 06/29/1944.
 JAP PLANES ATTACK CARRIER AND TASK FORCE, 06/30/1944.

- Anti-aircraft Battery are silhouetted against German sky streaked with vapor trails from allied and enemy planes engaged in Christmas Day dog-fight. Near Puffendorf, Germany., 12/25/1944. - with unknown photo on: [http://www.nara.gov/...](http://www.nara.gov/) [http://www.nara.gov/...](http://www.nara.gov/)
3. WWII (April 6, 1945, text only): "Two aircraft were missing as a result of a mid-air collision shortly before reaching the target at Leipzig: #43-38958, Green Hill Belle, 427BS, and #44-8647 (No Name), 360BS-M. The dense contrails appeared to contribute directly to the collision": [http://303rdbga.com/...](http://303rdbga.com/)
 4. WWII St.Pauls Cathedral contrails, photo: [http://gallery.yimg.com/...](http://gallery.yimg.com/)
 5. WWII (text only, there is another report also for this date): Merseburg - one of the roughest targets in the ETO! Most difficult mission was mission #275, 21 Nov. 1944; target Leuna works in Merseburg, Germany. Thick fog from 18,000 to above 28,000 feet made visual bombing impossible. PFF (Radar) bombing from 18,000 feet was ineffective and also exposed the group to murderous accurate flak. Thick contrails obscured vision and made tight formation impossible. As it was, Lt. Green's plane collided with Lt. Virag's ship sending him down where ME-109s finished the job. Many ships dropped bombs when they saw others salvo, resulting in a scattered drop and in no way accurate.:" [http://www.303rdbga.com/...](http://www.303rdbga.com/)
 6. WWII (text only): "5th April 1945 (Mission 158) AC 43-38286 (Flying Dutchmen), Don McCutchan, 7th Squadron Unterschlaersbach (10 miles W of Nurnburg) 5 April, jet airfield shocked by our 2 ship formation. Very bad weather, 25,000 ft clouds, dense persistent contrails, assembly impossible. Back over Belgium at 800 ft 7 1/2 hrs , 900 miles": [http://www.jccc.net/...](http://www.jccc.net/)
 7. Check for redundancy: WWII (Nov 21, 1944, text only): "Meyer maneuvered his formation into position for a surprise attack, himself shooting down three FW-190s. In one case, he used the contrail of an FW-190 for cover, firing at the unseen enemy until he could see strike flashes through the contrail, then breaking off just before ramming the burning enemy plane": [http://acepilots.com/...](http://acepilots.com/)
 8. WWII memories, February 3, 1945, over Berlin, with contrails; text only: [http://www.dhm.de/...](http://www.dhm.de/)
 9. WWII (text only): " As you've assumed, the bomber crews as well as our fighter escort saw contrails about every day even though an effort was made to avoid them. As was often said, they represented large fingers pointing to the bombers. Obviously of assistance to the enemy fighters who could spot us at a considerable distance. The nature of the contrails was such that they required certain atmospheric conditions to form. Thus, they were principally affected by altitude. At the pre-mission briefings, they typically advised us of the altitude that the formation of contrails could be expected with an effort made to avoid that particular altitude. More often than not though, we did in fact make contrails indicating that their information was faulty or that flying at that altitude couldn't be avoided. We in B-24s typically bombed from about 22,000 feet while the B-17s, which could fly higher, bombed from around 27,000, particularly at tough targets where higher was better in an effort to avoid the flak as much as possible. My recollection is that the contrails persisted for some time. While I don't recall timing them, I would guess that they could be seen for fifteen minutes or more. At times, Germany appeared to be almost covered by contrails as far as you could see. Essentially creating a cloud layer which could possibly persist for hours I suppose. The bombers' in more or less straight lines, the fighters', usually above us, more random as they criss crossed or circled. A common sight was the escorts dropping their tanks and heading off after the bad guys. The contrails also tended to create a cloud layer which restricted the visibility of the following aircraft. So, contrails represented a problem to us and were to be avoided if at all possible": [http://www.ecotoday.com/...](http://www.ecotoday.com/)
 10. Doublet? Contrails and flak, WWII: [http://www.secretvietnamwar.com/...](http://www.secretvietnamwar.com/)

KOREAN WAR ...up

1. 1950: "As we moved nearer to the target, I spotted contrails across the river. For the past thirty minutes there had not been one word on the radio, and then, I heard loud and clear; "Bandits at ten o'clock, coming in." Immediately the throttles went to 100% and the dog fight was on": <http://www.onr.com/user/dtg/Chapter1.htm>
2. 1953: "For one thing, Red interceptors were locating the B29s by trailing their contrails on moonlit nights. Such nights were now avoided": [http://www.airpower.maxwell.af.mil/...](http://www.airpower.maxwell.af.mil/)
3. "Darkness no longer afforded B-29s protection to attack targets in North Korea; enemy night interceptors shot down four B-29s in January. The enemy used ground radar to guide interceptors to the medium bombers; moonlight, contrails, searchlights, and flares for visual identification; and controller aircraft for coordination of fighter passes": [http://www.au.af.mil/...](http://www.au.af.mil/)
4. "The Fifth Air Force joined the Navy and Marines to provide fighter escorts to intercept enemy aircraft before they could attack the B-29s. Bomber Command also restricted missions along the Yalu to cloudy, dark nights because on clear nights contrails gave away the bombers' positions": [http://www.maxwell.af.mil/...](http://www.maxwell.af.mil/)
5. "I recall the specifics of the route of flight and the actual flying of the mission itself, but do not recall the escorts. Typically, there was the rendezvous over Chinampo Peninsula, normally SOP for long range reconnaissance, the calling off of MiG trains leaving the station as reported by "Stovepipe Control" and the F-86s weaving overhead as escorts. Far ahead in the skies over China, the tiny silver dots and contrail streamers would start to form as the Migs climbed up through contrail altitude. Contrails over North Korea/China start to form at about 28,000 feet and quit forming at about 34,000 feet in the late fall and winter time. A defensive measure/bit of information well worth knowing. It makes an airplane harder to see if they ain't pulling contrails. You either fly above or below the contrail level": [http://www.cottonpickers.org/...](http://www.cottonpickers.org/)
6. "1953 Jan. 10/11: 307th BW B-29s bombed Sonchon and Anju marshaling yards. Enemy searchlights illuminated a B-29 apparently betrayed by its contrails, and fighters shot it down": [http://www.afa.org/...](http://www.afa.org/)
7. "Another reason for the friction was that often the F-86s were supposed to provide a MiG cap to protect the Fighter Bombers from attack during their bombing runs. The F-86s were sitting at 30,000 feet watching for contrails from the north. Unfortunately, the seasoned Russian pilots simply came in low witho