

# THOR Draft Data Dictionary

## Error Management

There are several sources for error when dealing with MISREPS. The easiest to deal with are gross errors where the numbers are obviously wrong – weapon weight alone is greater than the maximum takeoff weight of the aircraft, latitude or longitude values that place the attack on an allied country, B-29 attacks against Japan in 1942, etc. These errors tend to be obvious, and closer inspection usually reveals the source of the error (numerical transposition, a missed +/- sign, mistyped character on a punch card, character recognition error in the OCR process, etc.). Other errors are more subtle and require greater levels of effort to find and remove. One of the most common of these is duplicate entries, where the same data may be entered in multiple records. Sources for this include poor database ingest procedures, such that the data is accidentally loaded more than once; normally, this would affect a range of sorties that are all input at the same time, which tends to draw attention as an anomaly during review procedures. Alternatively, initial and follow-up reports of the same sortie may be input as more data becomes available over time. Here the solution is usually to choose the latest report on the grounds it should have the best data. Additionally, when merging data from different databases, the same sortie may appear slightly differently due to slightly different data structures. The key here is to analyze multiple data elements to determine if the sortie is actually a duplicate. If, for example, the date, take-off base, take-off time, aircraft type, unit, mission number, callsign, weapon load, and target struck are all simultaneously identical, then it can be flagged as a duplicate. Criteria used vary slightly depending on the quality and nature of the dataset; but in general, no less than five independent fields were compared to determine the likelihood of duplication. Another source of error and confusion is when dealing with aircraft that carry more than one weapon type and/or strike more than one target. It is possible that they can be counted as multiple sorties instead of multiple strikes by the same sortie. (See the **Note on Database Design** below)

The target coordinates are another potential source of error. As the science of geodesy has evolved over time, the underlying shape of the Earth and the resulting coordinate system in use has been refined multiple times since 1914. Moreover, different grid schemes with different reference points have been used (British Purple and Red grids in WWII MTO, Military Grid Reference System (MGRS)) that also require conversion to latitude and longitude values. The database preserves the original coordinates as provided in the original data, and also performs the conversions to the current WGS84 standard. Depending on the accuracy and spatial resolution of the original measurement, and the accuracy of the conversion process, any inherent location error may be magnified as part of the transformation.

In theory, there may be cases where the data is flat-out wrong or false, but this is expected to be highly unlikely overall for a few reasons. First, individual MISREPS were reviewed daily by the unit Operations Officer and/or Commander before being sent up to the higher echelon of command where the data was

again scrutinized.<sup>1,2</sup> These officers had a vested interest in checking and ensuring an accurate report of the day's activities went forward. A number of MISREPS that were manually input into the database demonstrate this and are tattooed with pen and ink changes made by these reviewing officials correcting typos or clarifying details. Secondly, inclusion of these reports into the databases of the time had to make sense. Personnel involved in the process had knowledge of the events and would have (or should have) been able to correct or at least identify those items that did not make sense<sup>3</sup>.

There are instances where data may be incorrect, but the resources to correct it are beyond the capabilities of the study. In WW2, there is one data field where this is evident, and it is left unmodified in the database for interest, but without high confidence. That data field is "Number of enemy aircraft destroyed".

Since bombers were flying in formations of hundreds of planes, and multiple gunners from multiple planes were shooting at multiple enemy fighter aircraft, each gunner naturally reported that their bullets were the one that shot down the enemy aircraft. This results in an inflated number of enemy aircraft shot down. This problem was identified by the survey personnel and intelligence personnel at the time, and low confidence was placed on this information. Also, in the IBM punch card data from the Korean War, the documentation advises that the columns for MIA and KIA are initial reports only, and do not represent accurate numbers after the report was filed; i.e., missing airmen found or KIA airmen that were actually only wounded and recovered. Another specific instance during the Vietnam conflict is the "Menu" bombing campaign, where the US was clandestinely bombing Cambodia, and reports were altered at 7th AF to cover up this fact to lower echelons but the correct data was reported to the JCS. The data so far examined in the CACTA and SEADAB databases (originally JCS databases) indicates that the actual, "undoctored" data seems to have made it into the database.

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<sup>1</sup> Fifteenth Air Force HQ procedures: "The target worksheets are normally sent to the Machine Section for processing once a week. After the data has been processed a check listing is made and every item is visually audited against the worksheets. At the month's end a listing by group in date order is made and the totals are checked against the hand totals on the Group Daily History sheets. Non-adding items are sight checked against the original Form 34. Corrections to be made are noted on the listing, then new cards are punched and replace the incorrect cards in the file. A final check listing is then made and checked against the history sheets for balance." *Correspondence from 15th Air Force Headquarters to Commanding General, USSAFE (Attn: Statistical Control Office)*, 24 Apr 1945. AFHRA unpublished correspondence of United States Strategic Forces in Europe. IRIS # 00214753. Call # 519.1254-3.

<sup>2</sup> Many early daily mission reports (on RAF forms) by 12th Bomb Group from North Africa in 1942 contain pen or pencil annotations by the squadron ops officer or commander including details initially left out of the report. Over time, these annotations decrease as the desired information is included in subsequent submissions.

<sup>3</sup>For example, the initial 509 Composite Group report from the Nagasaki atomic bombing mission on 9 August 1945 reports a first "bomb release" time and last "bomb release" time. There is an immediate reply by teletype from 20 AF demanding clarification regarding number and type of bombs released, as there was only supposed to be one atomic bomb on board.

## Note on Database Design:

There were many potential ways to organize the data. Depending on how it was originally presented, one could either get an accurate count of sorties flown, weapons dropped or targets hit, but not all three. Therefore efforts have been taken in the design of the THOR database to be flexible enough to answer each of these questions, while not falsely inflating the other values. The challenge has been how to account for multiple planes attacking multiple targets with multiple weapons per sortie flown. The solution has been to have each instance of a unique weapon type or engagement of a unique target generates a new record. That is, if plane A drops six 500 pound bombs on target 1, that will generate one record. If the same plane A drops two 250 pound bombs on the same target 1, that generates a second record. If the same plane A then drops three 250 pound bombs on a different target 2, that generates a third record. So the same sortie can generate multiple records. The “Sortie Dupe” field is a flag indicator that will be set to zero for the first weapons use, and will be a “one” when the same sortie employs multiple weapons or attacks multiple targets. A request for a sortie count/summary, etc. will ignore records with a “one” in the “Sortie Dupe” field. That way, the correct accounting can take place whatever the focus of the accrual count (sorties, weapons, targets). This challenge has been encountered before – in the US Strategic Bombing Survey the “Aircraft Attacking” or “Aircraft Dropping Bombs” fields would be left blank, even though the weapons tonnage and types were given. This didn’t mean that the weapons magically appeared over the target; rather it meant that the aircraft sorties were already accounted for in relation to another weapon type or target. While appropriate (and elegant) for the punch card technology of the time, the USSBS approach has caused difficulties with the traceability of the aircraft and their associated weapons payload when attempting to interpret the data 70 years later<sup>4</sup>. Hence the adoption of the “Sortie Dupe” field to indicate repeated data.

## Terminology

Terms sometimes casually used interchangeably have similar meanings, but can lead to different numerical answers. For consistency, the following terms are used throughout the database and article:

**Sortie:** One takeoff and landing of one aircraft

**Mission:** One or several sorties that are grouped together to accomplish a specific purpose<sup>5</sup>

**Record:** One line of data in the database (*See Note on Database Design for more detail on how records are organized in the database*)

**Munitions weight:** For consistency, all tonnage terms use 1 ton = 2,000 pounds. All munitions weight values in THOR are converted to pounds and fractions of a pound (i.e.: a value of 1.0625 pounds is used, not 1 pound and 1 ounce). All kilograms are converted to pounds using a factor of 2.2 pounds/kilogram. All bullet weights are in pounds. Only the warhead portion of a missile or bullet portion of a cartridge

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<sup>4</sup> This is very evident in the “Incendiary Attacks on Japan” dataset, where up to three different types of incendiary weapons were loaded in multiple B-29 aircraft from multiple Groups, which then flew in formation and all dropped simultaneously on the same target city in Japan.

<sup>5</sup> Refined slightly on the 1946

USSBS definition: “A mission, in the sense in which the term is used in this report, is an attack by any number of aircraft on a single target during the course of a day.” US Strategic Bombing Survey. **Bombing Accuracy, USAAF Heavy and Medium Bombers in the ETO**. Military Analysis Division, Jan 1947. p.2.

round is used in THOR. For example, a notional 100 pound Hellfire missile has a 10 pound explosive head and approximately 90 pounds of booster fuel and structure. Only the 10 pounds of explosive that reaches the target is counted in THOR. Likewise, a nominal 30mm HEI-T cartridge weighs 1.48 pounds<sup>6</sup>, of which, only the .79 pound bullet would be recorded in THOR.

**Strike:** Each attack on a separate target during the same sortie is counted as a separate strike. A separate target is defined as a unique set of latitude and longitude coordinates.

Attacks on a target made by the same striking force within an arbitrary 90 minute window are considered as part of the same strike. The time window is of more interest after the advent of aerial refueling (Vietnam and later) where attacking sorties can make one or multiple passes over the target, break off, refuel, re-acquire and re-attack the same target, thus accounting for the potential situation of one aircraft having accomplished two strikes on one target during the same sortie.

Several WW2-era bomber streams could not accomplish one strike in the 90 minute window due to sheer number of aircraft passing over the target. In such cases, the time limit is ignored by the database.

## Geolocation

One of the strengths of the THOR approach is the ability to output the information on a map. The spatial analysis of the information enables graphical analyses that would be next to impossible if the information were left in textual or tabular form. This GIS approach comes with its own inherent limitations and caveats that are exacerbated by the resolution of historical data. In today's location-aware environment, it is unconsciously assumed that a location is exact, to within a meter of the actual person or object. This has not always been the case. Today's precision weapons are a relatively recent phenomenon, and not representative of past bombing capabilities. Where one GPS-guided munition today can destroy a bridge pier, in the past this could require multiple weapons from multiple aircraft saturating a target area in order to have a high probability of success.

The USSBS recorded data in DDMM format (DegreeDegreeMinuteMinute), providing accuracy to one minute of arc on the Earth's surface. That works out to 6702 feet or 1868 meters, or one nautical mile at the equator. While this seems enormous by contemporary standards, bomb fields created by hundreds of aircraft dropping thousands of unguided "dumb" munitions would typically saturate an area where the goal was to get over 50% of the bombs inside a circle 1,000 feet in radius.<sup>7</sup> The targets chosen were for the most part matched against this type of bombing capability; rail marshalling yards,

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<sup>6</sup> [http://www.navweaps.com/Weapons/WNUS\\_30mm\\_BushmasterII.htm](http://www.navweaps.com/Weapons/WNUS_30mm_BushmasterII.htm), Accessed 28 Nov 2012.

<sup>7</sup> "a box varied in size from 3 to 18 or more aircraft...all the aircraft in a box bombed as a unit; that is to say each box had a lead bombardier who was primarily responsible for the bombing and the other aircraft in the box simply released their bombs when they observed the leader's bombs fall from his plane. It is therefore the usual technique in bombing analysis to consider the error made in the bombs released from a single box rather than to measure the errors made by each individual bomb...The measurement in question was the percentage of the bombs in the pattern which fell within 1,000 feet of the assigned point." US Strategic Bombing Survey. **Bombing Accuracy, USAAF Heavy and Medium Bombers in the ETO**. Military Analysis Division, Jan 1947. p.2.

industrial plants, oil refineries, and others represent target sets that can effectively be attacked with this level of precision, best incapacitated by an area bombing approach. Actual results demonstrated this level of accuracy was a challenge to achieve given wartime conditions. For a 4-month period in 1944, under good to fair visibility (and with significant air superiority), 30% of the tonnage fell within 1,000 feet radius, 64% within ½ mile, and 82% within a mile radius of the target<sup>8</sup>. Therefore, a 1 nautical mile uncertainty of geolocation uncertainty seems more than reasonable in these conditions.

The table below lists the inherent accuracy of the geolocation based on the level of granularity in the source target source location.

Location Measurement System	Original Measurement Format	Limit of Geolocation Accuracy (meters)	Limit of Geolocation Accuracy (Feet)
Latitude/Longitude (where DD represents the value in degrees [equivalent to DDD for Longitude], and M represents Minutes, S represents Seconds, and .DDD represents decimal fractions of a degree )	DD	112080m	364320 ft.
	DD MM	1868m	6072 ft. (1 nm)
	DD MM SS	31.133m	101.833 ft.
	DD	112080m	364320 ft.
	DD.D	11208.0m	36432.0 ft.
	DD.DD	1120.8m	3643.2 ft.
	DD.DDD	112m	364.32 ft.
	DD.DDDD	11.2m	36.43 ft.
	DD.DDDDD	1.2m	3.643 ft.
MGRS or UTM (where AA represents the 100,000 m digraph, and X represents Easting, Y represents Northing )	AAXY	10,000m	32500 ft.
	AAXXY	1,000m	3250 ft.
	AAXXXYY	100m	325 ft.
	AAXXXXYYY	10m	32.5 ft.
	AAXXXXXYYY	1m	3.25 ft.

Table 1: Geolocation uncertainty based on coordinate system precision. THOR converts all original measurement formats to a DD.DDDDD format for consistent calculation and reporting.

For internal consistency, THOR converts the original measurement format into a DD.DDDDD format and also translates the source location measurement system into the WGS84 coordinate measurement system. The source measurements are also preserved untouched, to preserve the original information, and to serve as a check for outside parties in case the conversion process was flawed. Additionally, even though the data may be converted into a DD.DDDDD (or greater number of decimal places) format, does not mean that the accuracy has improved by the additional significant figures. The original level of uncertainty stays with the data. Further details on the geolocation challenge for each war are described in that specific conflict's section.

<sup>8</sup> Exhibit R, US Strategic Bombing Survey. **Bombing Accuracy, USAAF Heavy and Medium Bombers in the ETO.** Military Analysis Division, Jan 1947. p.25.

# Conflict-Specific Data Sets

## World War 1 (1914-1918)

### World War 1 Data Included

Data currently in the collection is digitized from the Daily Raid Reports of the 1st Daylight Bomb Group of the American Air Service in World War 1. This includes records from the 96th, 20th, 11th, and 166th Aero Squadrons. These daily records span dates from June to November 1918, and are the most detailed records found to date. British records of the Royal Naval Air Service/Royal Flying Corps/Royal Air Force (RNAS/RFC/RAF) cover the period from 30 June 1916 to November 1918 for the No. 55, 97, 99, 10, 104, 110, 115, 215, and 216 Sqdns. These British records and French bombing data were provided by Mr. Steven Suddaby, then-President of the World War 1 Historical Society, who personally digitized the data based on French Unit War Diaries available online at:

[http://www.memoiredeshommes.sga.defense.gouv.fr/jmo/img-viewer/1\\_A\\_286\\_003/viewer.html](http://www.memoiredeshommes.sga.defense.gouv.fr/jmo/img-viewer/1_A_286_003/viewer.html)

French bombing data covers the period from 8 Aug 1914 to November 1918. Mr. Suddaby also provided data on Italian sorties operating on the Western Front from January to October 1918. Data on Italian sorties on the Italian Front and Americans flying on the Italian front were found in the form of documents from the AFHRA's unpublished Caproni papers. These documents consisted of a mix of US War Department records and reports<sup>9</sup>, and documents from the Italian government. Italian War Bulletins in this collection were translated into English by Ms. Iris Moebius. Additional information was gleaned from books<sup>10</sup>

When a detailed description of the bombing location was lacking, and there were no contemporary aerial photographs indicating bomb craters that could be geolocated and matched up with the bombing mission, the coordinates for the named city were used. The coordinates used were those from the US National Geospatial Agency placename gazetteer database available online.

### World War 1 Data missing

The records on hand are being evaluated to determine what gaps exist in the bombing record for WW1, a record that now begins within the first seven days of conflict in August of 1914, and continues through November 1918.

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<sup>9</sup> *Italian Bombardment Activities during 1915-1918, during the World War or the Italo-Austrian front; List of bombing operations carried out by Italian Airships during the World War, 1914-1918.*

<sup>10</sup> *Dear Bert: An American Pilot Flying in World War 1 Italy.* Lewis, Edward Davis. Logisma Editore. 2002. *1918-1958 Nel 40 Anniversario delle Battaglie del Piave e di Vittorio Veneto.* Magg. Generale A.A. r.s. Vincenzo Lioy. Ufficio Storico Aeronautica Militare

## World War 1 Data Sources

A full list of the sources used is included in the bibliography.

### A Note on WW1 Geolocation:

Fidelity of geolocation coordinates varies widely in WW1 data, but this is not an isolated case – a similar problem was experienced by the framers of the Gulf War Air Power Survey some eighty years later.<sup>11</sup> Depending on the archival materials available, in some cases, aerial photographs could be cross-referenced with mission reports, and geolocation down to the actual bomb crater location could be determined – a granularity and fidelity comparable to today’s GPS-guided munitions. In other cases, significant landmarks were described in sufficient accuracy to place the strike to an accuracy of a few hundred feet. In other cases, the location place name is the only description available, providing an uncertainty circle up to a few kilometers in diameter. Another source of error is the use of identical or similar names in multiple locations. Therefore, it is quite possible that the wrong location was inadvertently selected for geolocation.

When presented with multiple locations having the same appellation, the list was narrowed when possible by additional information (“near Metz”, etc.). Failing that, coordinates were selected based on relevance to the battleground (i.e., a location with latitude of 44 N was well south of the WW1 western front battlefields, and excluded from further consideration.) However, when presented with several choices for a location, each equally plausible, the choice was made arbitrarily – resulting in an acceptable accuracy at the macro level, but perhaps unsatisfactory at the detail level. As more people gain exposure to the database, and bring their unique scholarly knowledge to bear, it is desired that corroborating evidence can be provided and applied (via subsequent version updates) to correct any mistakes or errors this process has introduced into the historical record.

Sources used for geolocation data were the National Geospatial Agency’s on-line Geonames database, for historical placenames that the NGA site could not resolve, the familysearch database was found to be effective.

<http://geonames.nga.mil/ggmagaz/>

<https://labs.familysearch.org/stdfinder/StdPlaceLookupResults.jsp>

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<sup>11</sup> “Despite the overall abundance of data there are still significant holes in the records, some of them in critical areas, such as the detailed results of battlefield or tactical-level air operations against Iraqi ground forces in the Kuwait Theater of Operations (KTO). Certainly the ongoing research and data collection process will fill in many of these gaps, but some may never be closed entirely. The quality of information in any archive or database depends on the quality of the original source.” *Gulf War Air Power Survey, Volume V: A Statistical Compendium and Chronology*. Washington DC, 1993, pg.1.

For aircraft launch locations, the following sources were useful to identify shifting unit locations over time and then plug those placenames into the databases above:

[http://albindenis.free.fr/Site\\_escadrille/page\\_escadrilles\\_1\\_a\\_500.htm](http://albindenis.free.fr/Site_escadrille/page_escadrilles_1_a_500.htm) (French Sorties)

<http://patriot.net/~townsend/WW1AirMap2/> (British Sorties)

## World War 1 Data Fields

- 1) Master Index Number**  
Unique identifier number used to internally track the record fields
- 2) Classification**  
Security Classification of the material. World War 1 data is Unclassified
- 3) Date**  
(MM/DD/YYYY Format) Date the operation took place. In the case of night operations that span more than one day, the value will be the date that the plane took off from the launch base
- 4) Operation**  
Name of the operation being supported, if given or known
- 5) Country**  
Country to which the attacking aircraft belongs (i.e. USA, UK, Australia, etc.)
- 6) Service**  
Department or Service to which the attacking aircraft belongs (USAAF, USN, RAF, RAAF, etc.)
- 7) Unit**  
Military unit to which the attacking aircraft belongs – depending on the fidelity of the data, this may be a Numbered Air Force, Command, Wing, Group, or Squadron. The default value is Squadron
- 8) MDS**  
Mission Delivery System or airframe used to deliver the weapon to target – text name
- 9) Mission#**  
Specific mission number if known. Mission numbers may repeat between various levels of command (i.e. different squadrons, groups, wings, and Numbered Air Forces may each have a similarly numbered Mission #35, but each of those may be different missions), hence mission number is not used as a unique identifier, but provided, when known, to correlate with other data that may reference it.
- 10) Departure**  
Day or night mission indicator when lacking more detailed information. Otherwise contains the date time stamp in MM/DD/YYYY HH:MM:SS format on a 24 hour clock. Times are assumed to be local time.
- 11) Return**  
Return date time stamp in same format as Departure. Blank if no data available.
- 12) Duration**  
Duration of flight calculated by subtracting Departure from Return Date/Time. Format is HH:MM:SS of elapsed mission time.
- 13) Number of planes launched**  
Number of aircraft that successfully took off in direct support of the bombing mission. Does not include escort aircraft.
- 14) Number of planes cancelled**  
Number of aircraft that did not make it to target for whatever reason.
- 15) Number of planes attacking**  
Number of aircraft that actually attacked the target.



**16) Callsign**

Callsign of aircraft or pilot name. For WW1, the airship name

**17) Number of Weapons expended**

Number of weapons expended.

**18) Weapon type**

Text description of weapon type

**19) Total Weapon weight in pounds**

Calculated amount based on "Number of Weapons Expended" and weapon weight indexed by "Weapon Type" on an internal lookup table. Weapon weight is based on the net explosive actually delivered to the target, irrespective of the weight of propellant it took to reach the target. For ammunition, this is the weight of the round, not the weight of the full bullet. Likewise, for a contemporary Hellfire missile, the missile itself weighs 100 pounds, but delivers a 20 pound explosive warhead to the target. The weight used for a Hellfire is 20 pounds.

**20) Bombload per plane**

Calculated value that divides the total weapon weight by the number of aircraft delivering the weapons load. Used as an internal check to ensure that the nominal bomb load is within the carrying capacity of the aircraft.

**21) TOT**

Time Over Target. This is a start time in HH:MM:SS format indicating when the bomb drop began. It does not indicate how long the bomb drop took, or the number of passes taken to accomplish the bomb drop.

**22) Latitude**

Target Latitude in Decimal degrees format (i.e. 30Deg 45 min is 30.75 degrees)

**23) Longitude**

Target Longitude in Decimal degrees format (i.e. 30Deg 45 min is 30.75 degrees)

**24) Tgt Location**

Text description of the target location, city name, etc.

**25) Country**

Text name of target country

**26) Tgt Name Type**

Text description of target category (Port, Aerodrome, Railyard, etc.)

**27) Altitude in meters**

Bomb release altitude in meters. Altitude is believed to be height above ground (unsure of how height was determined in 1918). When multiple altitudes are given, the lowest altitude is used

**28) Altitude in feet**

Bomb release altitude in feet. Altitude is believed to be height above ground (unsure of how height was determined in 1918). When multiple altitudes are given, the lowest altitude is used

**29) Speed in mph**

Notional speed at altitude for bomb release. Value provided from MDS specs.

**30) TO Base**

Take off Base place name

**31) TO Base Lat**

Take off Base Latitude in Decimal Degrees

**32) TO Base Long**

Take off Base Longitude in Decimal Degrees

**33) Bomb Damage Assessment**

Text description as provided in daily raid reports

**34) Enemy Action**

Text description as provided in daily raid reports

**35) Route Details**

Text description as provided in daily raid reports

**36) ISR Collected**

Text description as provided in daily raid reports

**37) Friendly Casualties**

Text description as provided in daily raid reports

**38) Weather Visibility**

Text description as provided in daily raid reports

39) Weather Reanalysis valid time

40) Altitude (ft.)

41) Wind direction (Degrees)

42) Wind Speed (Knots)

43) Temperature at altitude (Degrees Celsius)

44) Relative Humidity at altitude (%)

45) Temperature Dew Point Depression (T-Td) at Altitude (Degrees C)

46) Low Cloud Cover (%)

47) Mid Cloud Cover (%)

48) High Cloud Cover (%)

49) K-Index Thunderstorm Potential Indicator

50) TT-Index Severe Thunderstorm Potential Indicator

51) Icing Potential at Altitude

52) Moon Illumination (%)

53) Wind Direction 10 meters above ground (Degrees)

54) Wind Speed 10 meters above ground (Knots)

55) Surface Temperature (Deg C)

56) Precipitation past 3 hours (inches)

57) Percent of ground covered with snow (%)

**58) Sortie Duplicate Count**

This column serves as a flag indicator when the same sortie or sorties drop multiple types of weapons on the same target, or strike multiple targets while on the same sortie. The flag is set to "0" by default, and has a value of "1" if the sorties are accounted for in another record. This flag prevents multiple counts of the same sorties while preserving an accurate count of targets hit and weapons expended.

## World War 2 (1939-1945)

### Data included

Data from World War 2 comes primarily from the files of the US Strategic Bombing Survey. This data included US data in the European, Mediterranean, and Pacific theaters of war from mid-1942 or early 1943 (dependent on the dataset) to the respective VE Day (May 1945) or VJ Day (Aug 1945) period. Additionally, the USSBS data included British RAF European bombing data from December 1939 to VE day. Unit-level daily mission reports were used to fill in gaps in coverage from early 1942 for the Mediterranean and Pacific Theaters. Several books and documents were used to fill in the gaps in the RAF record from 1939 to 1945 so that the European bombing record is complete from 3 Sep 1939 to May 1945. By aircraft model, this archive contains heavy and medium bombers, broken out by type (B-17, B-24, B-25, B-26, etc.), which may be more robust than previous studies. Data from fighter aircraft in the MTO and ETO is limited to strafing records, and some records of the A-36, a ground attack model of the P-51 that was used in the Sicilian and Italian campaigns.

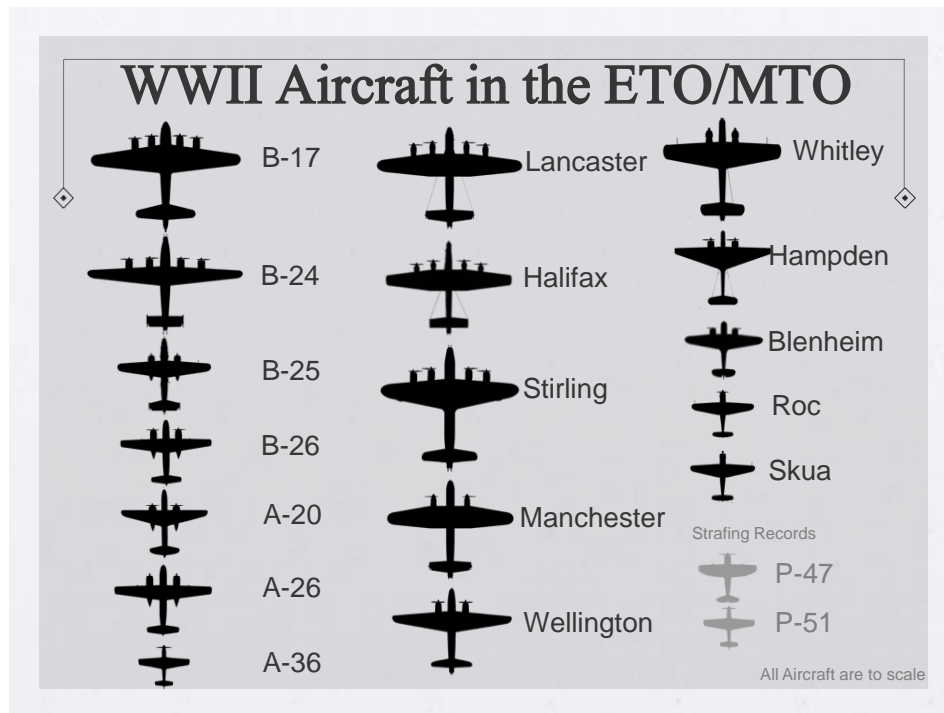


Figure 1: Aircraft types from the European and Mediterranean theaters whose missions are recorded in records collected by the US Strategic Bombing Survey / AAF Evaluation Board

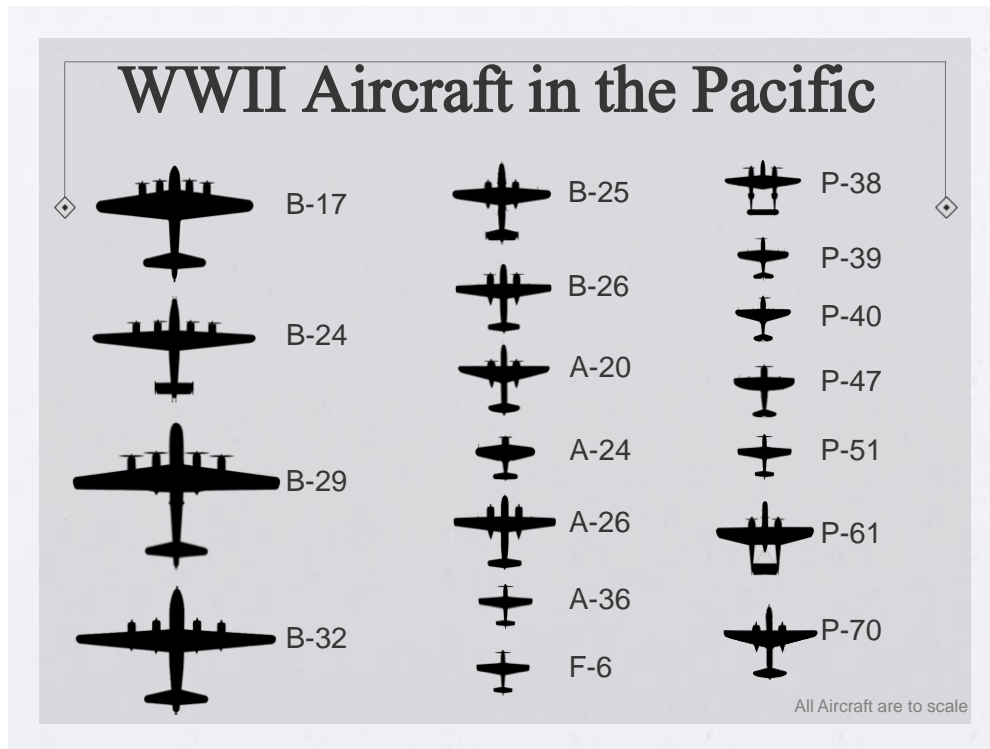


Figure 2: Aircraft types from the Pacific and China-Burma-India theaters whose missions are recorded in records collected by the US Strategic Bombing Survey / AAF Evaluation Board

### Data not included (still searching for)

Coverage of RAF bombing in the Mediterranean, African, and Pacific theaters lacks the robustness of the rest of the record. Further research into these theaters may result in more detailed data surfacing at a later date. Missions flown by the Chinese Air Force personnel as part of the 14 AF Chinese American Composite Wing 1943-1945 may be included as missions flown by USAAF personnel in the USSBS data, but further analysis is required to determine which missions are included and which ones might still be missing from the record.

### Data Sources

Primary sources for this archive were the surviving documents of the Strategic Bombing Survey and the AAF Evaluation Board. These two concurrent surveys were occurring at the end of WW2, and agreed on using a common data set to simplify and streamline data collection between their studies, but the actual data analysis was done independently by each study, consistent with the study's individual charter. Thus, the USSBS focused on strategic bombing analysis, while the AAFEB looked into the size, scale, and mission apportionment required for a post-war air force.

The common data set used by both studies is what THOR is preserving, without regard to assessing the conclusions of either study. A set of five different IBM punch cards (Target Master Cards, Target Detail Cards, Target Bombing Cards, Mission Data Cards, and Mission Loss Cards) were made to capture the

data recorded in the AAF Form 34 for each unit. These Form 34's were weekly summaries of the missions flown by the units and passed up to their respective higher headquarters for reporting and aggregation. Two identical sets of punch cards were made – one for each study. While a complete record of all of the data from these punch cards does not appear to have survived, a sizable amount has been located in the collections of the AFHRA and the National Archives in the form of initial tabulation printouts from these punch cards. It is these tabulations that have been digitized to allow the examination of bombing at the operational level in World War 2.

A full list of the sources used is included in the bibliography.

## USSBS Geolocation

Geolocation for World War 2 data was accomplished using the latitude and longitude values provided by the United States Strategic Bombing Survey. These data are provided in a DDMM (Latitude) or DDDMM (Longitude) format. Data is cross-referenced between bombing data and target books via target ID numbers. Additionally, the MDS volumes also list the target ID and Latitude and Longitude values, so this serves as an additional check on the cross-reference process. There was a shift in the target ID's during the war, as the Joint Targeting process was refined, and new target ID's were issued for past and future targets. Both sets of numbers appear well documented and cross-referenced in the data, so this is not expected to be an issue.

The Target Data volumes were digitized ( 24,186 records), and then compared against digitized targeting data in the Aircraft Summary volumes(21,562 records), 12 AF Transportation Targets volume (4,828 records), Harvard Statistical Analysis #2 for 8th and 15th Air Forces ( TBD records), and Strafing Targets ( 3,289 records). Duplicates were identified by means of developing a unique data ID string formed by concatenating selected field contents for each record (i.e.: Target Name, Target Description, New Country Code, Old Target Code, New Target Code, Industry ID code, Numbered Air Force). These were then sorted by the database software and duplicate data ID strings were marked for removal. Before the duplicates were removed, the entries were all examined by hand to ensure all possible information was transferred to the records remaining. In particular, some record sets had more information on the old target codes that was transferred to corresponding records being kept. Additionally, latitude and longitude location data were transferred when target name and target codes were identical between the records. There are still duplicate target records in the resulting data. In some cases, the only difference between two records is which Air Force struck the target. Additionally, it was noted that there are significant misspellings and abbreviations of place names that can result in duplicate entries. For the time being, these are being left in the data as a means of matching the target data against other data products that may contain the identical abbreviations and misspellings. Current count places the target list at 38,308 records after all of the consolidation process is complete.

TGT Books	12 AF Trans Tgts	MDS Summaries	Strafing Records	Harvard #2
Location Name	Location Name	Location Name	Location Name	Location Name
Country Code	Country Code	Country Code	Country Code	Country Code
Industry Code	Industry Code	Industry Code	Industry Code	Industry Code
New TGT Code	New TGT Code		New TGT Code	
Old TGT Code	Old TGT Code	Old TGT Code	Old TGT Code	

There are a number of entries in the targeting reference books that have blanks or “9999” as the location. Additionally, there are cases where only the longitude is provided in both the latitude and longitude data columns. In particular, a number of entries for V1 and V2 launch sites were in these categories. NOBALL or CROSSBOW target location data was hand entered for sites identified in the 9 AF “NOBALL TARGET LIST” March –Aug 1944.

For these situations, geolocation was attempted using outside resources to generate latitude and longitude values for these location place names. The following protocol was followed:

1. Search for exact location match via: <http://geonames.nga.mil/ggmagaz/>
2. If no match found or possible due to information in hand, search via “starts with” or “ends with” or “contains”; Start with search restricted to Country Code provided. Widen search if no answers found. (One town in Europe has changed its nationality four times since WW2, due to shifting national boundaries. During WW2 it was located inside Italy, but is now belongs to Bosnia-Herzegovina, which is where the geonames gazetteer locates it.)
3. If presented with more than one option, look for match based on match with USSBS-provided longitude value (i.e., if USSBS value has a blank or “9999” for latitude but lists longitude as “130E”, look for choice that contains a longitude value of “1.5”)
4. If USSBS-provided values are blank or “9999”, use first exact match NGA Gazetteer option that has the annotation “(Approved)” after the place name
5. If no exact match, but likely match is presented, annotate the place name with the name used.

For example “S Martino” with Country Code of “13” is searched via <http://geonames.nga.mil/ggmagaz/> using the parameters “Ends With” MARTINO (as the “S” could stand for San, Santa, Santo, Saint, Sainte, etc.) and restricted to ITALY (Country Code 13=Sicily and Italy). The “Name Type Search” field was set to include Conventional, Approved, Unverified, Provisional, Variant, Anglicized Variant, Historic, and Historic Non-Roman Script nomenclatures in the search.

The NGA geonames website found 97 names identifying 69 locations that meet these criteria, of which 29 are an exact match with San Martino being the “(Approved)” name versus “(Variant)”. The first exact match of “San Martino” as the “(Approved)” name was the 17th listed in the responses. In accordance with the protocol described above, the database is updated to reflect the data used: The name is updated to “S MARTINO (San Martino)” and the latitude of 46.783333, Longitude of 11.216667 are entered in place of “9999” and blank values.

An additional logic check is performed by looking at the data and the date of the strike to confirm they are logically consistent. In this case, San Martino is attacked by A-20's on April 17, 1945, so a northern Italian location is consistent with the flow of the war at that point (whereas a San Martino location in Sicily on this date would be an unusual outlier.)

These entered values are identifiable in the database, as they will be the only values with decimal degree format in the "Source Latitude" or "Source Longitude" field. It is possible that the wrong location was chosen by this method, but absent any additional identifying and amplifying records, there doesn't appear to be a better way to geolocate these bombing locations. As better information comes to light, these values can be updated or corrected if they do prove to be in error. The format makes them easily segregable from USSBS-provided values. Additionally, these entered values are in the WGS84 coordinate reference system, whereas the USSBS location data coordinate reference system is not specified in the documentation found to date. Given no identifying or documentary information to the contrary, it is assumed that the International 1924 reference system is used by default, since that was the latest in use prior to post-war mapping efforts.<sup>12</sup> Other than converting DDMMSS format to decimal degree format, the software does not make any geodetic corrections to the USSBS-provided data. Values that are already in decimal degrees are ignored by the software.

## Data Structure

There are a multitude of report formats used by the US Strategic Bombing Survey, but the data contained in each remains consistent, so the data fields will be presented once, though different reports used different subsets of the data. Where differences arise, they will be annotated below. A full breakout of all of the data codes used is attached in Appendix A. Brief descriptions will be provided below, highlighting discrepancies between the USSBS-published decode documents<sup>13</sup>, and data appearing in the records.

### 1) Location Name

Target Location place name, although it may also describe a factory name or other feature (e.g. ICARUS describes the Icarus aircraft factory in Belgrade, GUMTREE refers to Gumtree Road in Tunisia)

### 2) AC Type

Model type of the aircraft flown on the mission. In some cases, this type information is preceded by an "O", "G", or "S". Additionally, some of the records (primarily RAF) list the type as "Light", "Medium", or "Heavy" rather than an actual model designator.

### 3) Latitude

As given by the USSBS target books in DDMM format. In situations where the latitude was listed as blank or "9999", NGA geolocated values have been substituted, identifiable by the DD.DDDD format. See **USSBS Geolocation** for more details.

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<sup>12</sup> Conversations with the **USGS Coordinate Research Branch** have failed to identify any documentation identifying the coordinate reference system used by the USSBS, or what systems were widely in use prior to the post-war US-led worldwide geodetic surveys conducted beginning in 1949.

<sup>13</sup> Specifically, *Index of Codes*, pp. 157-161, *Statistical Appendix to the United States Strategic Bombing Survey*. Washington DC. 1946.

**4) Direction**

Number believed to indicate North or South. "5" = North

**5) Longitude**

As given by the USSBS target books in DDMM format. In situations where the longitude was listed as blank or "99999", NGA geolocated values have been substituted, identifiable by the DDD.DDDD format. See **USSBS Geolocation** for more details.

**6) Direction**

Number believed to indicate East or West. "5" = East, "6" = West

**7) Country Code**

Two different code systems were used to identify countries where the Location Name was located. Full details given in Appendix A. The database performs the code substitution and tracks by country name. Importantly, this is the country where the location was located during the war, not the one where it might be currently located due to shifting post-war political boundaries.

**8) Target ID Code**

An ID code used to uniquely identify targets.

**9) Day**

Self-explanatory, values from 1-31

**10) Month**

Self-explanatory, values from 1-12

**11) Year**

Single digit provided for the year (i.e. "3" = 1943). Not documented in the decode documents: blank values indicate 1940, and "9" indicates 1939

**12) Industry Code**

Used to identify the target group the attack was intended against. Full listing provided in Appendix A.

**13) AC Attacking**

Number of aircraft attacking the target. Inclusion or calculation of this number varied by Numbered Air Force and over time. It may be lower than the dispatched number to account for generation losses, and higher than the number of aircraft dropping bombs.

**14) AC Dispatched**

Number of aircraft launched to perform a mission

**15) Weather Abort**

Number of aircraft that turned back without attacking due to weather

**16) Mechanical Abort**

Number of aircraft that turned back without attacking due to mechanical fault

**17) Miscellaneous Abort**

Number of aircraft that turned back without attacking due to miscellaneous reasons. Seven categories of miscellaneous reasons are provided in Table C of Appendix A. No further breakout of the distribution of these reasons is available at this time.

**18) Other Abort**



Number of aircraft that turned back without attacking due to other reasons. Again, difficult to pin down what was thrown in the "Other" category that wasn't "Miscellaneous", it appears this category tracked crew issues – airmen getting ill in flight, failure of the oxygen system, etc.

**19) Spares Returning**

Number of spare aircraft launched that did not continue toward the target

**20) AC Dropping Bombs**

Number of aircraft actually dropping bombs on target

**21) Msn Type**

16 different mission categories are listed in the USSBS Statistical Appendix, full listing in Appendix A.

**22) TGT Priority**

5 Different target priorities indicating whether this was a primary target, secondary, target of opportunity, target of last resort, or not indicated.

**23) Organization Type:**

W= Wing; G=Group; S=Squadron; F=Flight; D=Detachment; C=Command (as in Bomber Command). The use of "C" is not documented in the USSBS Statistical Appendix, but is deduced from context of the USSBS Pacific records.

**24) NAF**

When provided, the numbered Air Force responsible for that mission; "R" = RAF. Other numerical codes were used when single digit: 5,6,7,8,9 for 5 AF, 6 AF, 7 AF, 8 AF, and 9 AF. For double digit NAF's, letters were used: J, K, L, M, N, A, B, C, D, E for 11 AF, 12 AF, 13 AF, 14 AF, 15 AF, 20 AF. 10 AF appears to use a blank or null character for the code. Codes B, C, D, E are still in work.

**25) Unit**

When provided, the number designation for the unit (i.e. 96 BS would be "96" with corresponding Org Type above being "S")

**26) Tgt Description**

Identifying detail of the target. The industry code may be "78" indicating "Airfield", but the Target Description field would amplify this by adding "Seaplane Base"

**27) Altitude**

Given in hundreds of feet; i.e. "100" = 10,000 feet

**28) Sighting Method**

One of 13 different methods of finding the target. Full details provided in Appendix A.

**29) # AC lost to AAA**

Self-explanatory

**30) # AC lost to EA**

Self-explanatory

**31) # AC lost to Accident**

Self-explanatory

**32) # AC Lost Total**

Self-explanatory

**33) # AC damaged by AAA**

Self-explanatory

**34) # AC damaged by EA**

Self-explanatory

**35) # AC damaged by Accident**

Self-explanatory

**36) # AC damaged Total**

Self-explanatory

**37) # of HE Bombs**

Self-explanatory. Number of High explosive bombs dropped on the target

**38) Type of HE Bombs**

Specific explosive weight or size of each bomb and nomenclature (250 lb. (GP-M37), 500 lb. (GP-M43 or M64), etc.)

**39) Tons HE**

Self-explanatory

**40) # of Fragmentation Bombs**

Self-explanatory

**41) Type of Fragmentation Bombs**

Specific explosive weight or size of each bomb and nomenclature (260 lb. (FS-M81), 540 lb. (FS-TS or FS-M27), etc.)

**42) Tons Fragmentation**

Self-explanatory

**43) # of Incendiary Bombs**

Self-explanatory

**44) Type of Incendiary Bombs**

Specific explosive weight or size of each bomb and nomenclature (100 lb. (I-M47A1 or I-M47A2), 500 lb. (I-M76), etc.)

**45) Tons Incendiary**

Self-explanatory

**46) Total Tons**

Total Tons of munitions dropped on target

**47) Tons Lost or Jettisoned**

Includes bombs on aircraft shot down before they dropped bombs on target as well as aircraft that had to jettison their bomb load due to an in-flight problem.

**48) Enemy AC Destroyed**

Number of aircraft claimed as destroyed by aircrews. Multiple aircrews in formation pooling their defensive firepower to shoot at the same enemy aircraft would each claim the kill, so the number destroyed is inflated, a condition recognized at the time

The following data fields are still in work:

**49) JTG Country**

**50) JTG Area**

**51) JTG Number**

- 52) TC Country
- 53) TC Location
- 54) TC Industry
- 55) TC Sub
- 56) Total KIA/MIA
- 57) Total Wounded
- 58) EAC Kill
- 59) EAC Probable
- 60) EAC Damaged
- 61) EAC Ground Kill
- 62) EAC Ground Probable
- 63) EAC Ground Damage
- 64) Fighters Encountered
- 65) Bombers Encountered
- 66) Machine gun
- 67) Rocket
- 68) Card Count
- 69) Bullets
- 70) Caliber
- 71) Rockets
- 72) Caliber

## Korean War (1950-1953)

### Data included

The Korean War data set consists of data from the B-29 mission reports, and data from a punch card archive from start of the conflict through April 1951. The B-29 mission reports were hand-transcribed from the typed, multipage reports compiled after each mission. Where provided, lat/long values were recorded, though often MGRS values were used. Of note, the MGRS grid in use during the Korean War is referenced to the "Japan B" grid, and differs from today's MGRS grid. Luckily, there is a rather involved but straightforward transformation that allows the conversion from the JAPAN B MGRS grid to current latitude and longitude values. Both values are presented in the database.

The punch card database is a record of every sortie taking off under 5 AF control during the reported time period, and includes 22 distinct data elements, such as unit Identification and mission information, to include the amount of ordnance employed. The only data not present in this database is the target location data.

### Data not included (still searching for)

Navy and USMC data.

### Data Sources

### Data Structure

**1) Group Designation**

Alphanumeric abbreviation of Group; also indicates if sorties are coalition forces; e.g. RHAF (Royal Hellenic Air Force for Greek aircraft, RAAF for Royal Australian AF aircraft, SAAF for South African AF aircraft)

**2) Squadron Designation**

Alphanumeric abbreviation of Squadron flying the sortie.

**3) Operating Location**

Alphanumeric code for takeoff location. No decode document has been found to match up with these codes. However, given the Squadron and Group designations, these can be deduced using data provided in unit histories.

**4) Type and Model of aircraft**

Self-explanatory (Example: B-26)

**5) Sorties Airborne**

Total number of aircraft launched

**6) Sorties Effective**

Total number of aircraft conducting the mission

**7) Sorties abortive**

Self-explanatory

**8) Number of aircraft lost on mission to enemy aircraft**

Self-explanatory

**9) Number of aircraft lost on mission to enemy ground fire**

Self-explanatory

**10) Number of aircraft lost on mission to enemy action, causes unknown**

Self-explanatory

**11) Number of aircraft lost on mission to other causes**

Self-explanatory

**12) Number of aircraft receiving major damage**

Self-explanatory

**13) Number of personnel KIA**

Flash reporting data from units at time of report. Not to be used as authoritative for historical purposes. Personnel may have been mistakenly reported as KIA when they were in fact just WIA or missing. Likewise, personnel reported as MIA and later determined to be KIA were not corrected on subsequent reports.<sup>14</sup>

**14) Number of personnel WIA**

Flash reporting data from units at time of report. Not to be used as authoritative for historical purposes. Personnel may have been mistakenly reported as KIA when they were in fact just WIA or missing. Likewise, personnel reported as MIA and later determined to be KIA were not corrected on subsequent reports.

**15) Number of personnel MIA**

Flash reporting data from units at time of report. Not to be used as authoritative for historical purposes. Personnel may have been mistakenly reported as KIA when they were in fact just WIA or missing. Likewise, personnel reported as MIA and later determined to be KIA were not corrected on subsequent reports.

**16) Number of Enemy aircraft destroyed (confirmed)**

Self-explanatory

**17) Number of Enemy aircraft destroyed (probable)**

Self-explanatory

**18) Tons of bombs expended**

Self-explanatory

**19) Number of rockets expended**

Self-explanatory

**20) Total rounds of ammunition expended (nearest hundred rounds)**

Self-explanatory

**21) Day**

Values 1-31

**22) Month**

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<sup>14</sup> Letter from HQ Far East Air Forces to USAF Historical Division. *Subject: Daily Combat Operations Report, RCS: AF-SC-C6A.* 13 Dec 1950

Values 6-4 (corresponds to June 1950 through April 1951, thus, the month also indicates the year of the activity.)

## Vietnam War (1964\*-1975)

### Data included

### Data not included (still searching for)

Data prior to September 30, 1965 are not currently included in the database, as these records predate the CACTA database.

### Data Sources

CACTA, SEADAB, and SACCOACT

### Data Structure

Still In Work

# Appendix A

## World War 2 US Strategic Bombing Survey Codes

### A. Industry Code Table

Two-digit codes are provided in the USSBS Statistical Appendix<sup>15</sup>. Three digit are codes found in the data itself, indications are that the third digit (1-9) was used to distinguish between similar individual targets in the same target area. Thus, code "78" or "780" indicates Airfield or Aerodrome, and specific Aerodromes are listed with codes 780, 781, and 782 indicating aerodromes or airfields all geographically co-located in the same target area (This explains why oil refineries would have up to 9 targets clustered together, while explosives manufacturing plants, on the whole, rarely have more than 1 co-located target).

01 Unidentified Targets

02 Cities Towns and Urban Areas

03 Public Utilities - Electric Light and Power Companies, Gas Companies, Telephone Companies, Water Companies.

04 Government Buildings

09 Manufacturing Installations (not specifically identified below from Class 11 through 59)

11 Aircraft Factories and Assembly Plants

12 Propeller Plants

13 Engine Plants

14 Airframe Plants

15 A/C Component Plants

16 V-Weapon Factories

20 Armament and Ordnance Plants

21 Tank Factories

22 Vehicle Mfg. Plants

23 Explosives Mfg. Plants

30 Machinery & Equipment Mfg. Plants

31 Abrasives

32 Bearings Mfg. Plants

33 Electrical Products Mfg. Plants

34 Machine Tools Mfg. Plants

35 Optical Products Mfg. Plants

36 Precision Instrument Mfg. Plants

38 Mining, Coal, etc.

39 Iron and Steel Production Facilities, Blast Furnaces, Boiler Shops, Forges, Foundries Steel Works, Rolling-Mills

40 Light Metal Plants

41 Aluminum Production Facilities

42 Magnesium Production Facilities

43 Chemical Plants

44 Radio and Radar Manufacturing Plants

45 R.R. Manufacturing Works and Roundhouses

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<sup>15</sup> Specifically, *Index of Codes*, pp. 158-159, *Statistical Appendix to the United States Strategic Bombing Survey*. Washington DC. 1946.

- 46 Rubber and Tire Manufacturing Facilities
- 47 Natural Rubber Mfg.
- 48 Synthetic Rubber Mfg.
- 50 Oil Refineries
- 51 Natural Oil Refineries
- 52 Synthetic Oil Refineries
- 53 Oil Storage Facilities and other Oil Installations
- 60 Transportation Facilities (not specifically identified below)
- 61 Bridges
- 62 Tunnels
- 63 RR Installations, Tracks, Marshalling Yards, and Stations
- 64 Moving Trains & Rolling Stock
- 65 Highways and Vehicles
- 66 Waterways and Boats
- 70 Naval Installations
- 71 Ports and Harbors
- 72 Submarine Pens and Yards
- 73 Ships
- 74 Tugs, Barges, and Sampan
- 75 Ship building
- 78 Air Fields and Airdromes
- 80 Tactical Targets: (Unidentified or not listed below)
- 81 Troop Concentrations
- 82 Gun Emplacements
- 83 Supply Dumps and Warehouses
- 84 Radio & Radar Installations
- 85 V - Weapon Launching Sites
- 86 Direct Cooperation with Ground Forces

## B. Country Code Table

- 1 Albania
- 2 Austria
- 3 Belgium
- 4 Bulgaria
- 5 Czechoslovakia
- 6 Denmark
- 7 France
- 8 Germany
- 9 Great Britain
- 10 Greece
- 11 Holland or Netherlands
- 12 Hungary
- 13 Italy and Sicily
- 14 Yugoslavia
- 15 Luxembourg
- 16 Norway
- 17 Poland



18 Rumania  
19 Russia  
20 Spain  
21 Sweden  
22 Switzerland  
23 Turkey  
24 Abyssinia  
25 Algeria  
26 Egypt  
27 Eritrea  
28 French West Africa  
29 Libya  
30 Morocco  
31 Nigeria  
32 Tunisia  
33 Italy  
22 Corsica  
34 Crete  
35 Cyprus  
36 Malta  
37 Pantellerina  
38 Sardinia  
39 Sicily  
40 Italy  
41 Italy  
42 France  
43 France  
44 France  
45 France  
46 Germany / Poland?  
47 Germany / Bulgaria?  
48 Germany  
49 Germany  
50 Italy  
51 Italy  
52 Unidentified Target  
53 France  
54 France  
55  
56 Germany  
57 Germany  
58 Germany  
59  
60 Italy  
61 Italy  
62  
63  
64 Japan

65  
67 Germany  
68 Germany  
69  
70 Italy  
71 Italy

99 Unknown or Not Indicated

### C. Non-effective Aircraft – Miscellaneous Reasons

1 Intercepted  
2 Antiaircraft  
3 Fuel Shortage  
4 Navigational error  
5 Target reached but obscured  
6 Destroyed or missing before reaching target  
7 Personnel failure

### D. Sighting Method

1 Visual  
2 Instrument, general  
3 P.F.F.  
4 H2X  
5 GEE  
6 M. H. or Micro HH.  
8 SHORAN  
9 Not indicated  
R AZON or RAZON  
D Dive Bombing  
S Skip Bombing  
G Glide Bombing  
L Low Altitude Bombing

### E. Target Priority

1 Primary Target  
2 Secondary Target  
3 Target of Opportunity  
4 Target of Last Resort  
9 Not indicated

### F. Mission Type

1 Objective Bombing  
2 Patrol

- 3 Escort or Cover
- 4 Interception or Intruder
- 5 Strafing
- 6 Reconnaissance or Search
- 7 Diversionary
- 9 Fighter Sweep
- 10 Bombing and Strafing (Combined)
- 11 Transport, non-combat
- 12 Sea Search or attack or patrol (Over water only)
- 13 Leaflet Dropping
- 14 Transport, combat
- 16, Staging
- 99 Other or not indicated

### G. Visibility

- G .1 or 1/10 to .3 or 3/10 or **Good**
- C .4 or 4/10 to .7 or 7/10 or intervening **Clouds**
- P .8 or 8/10 to 1.0 or 10/10 or **Poor** or undercast
- 9 Not indicated

### H. Caliber of Cannon or Rocket Ammunition

- 2 20mm
- 3 37mm
- 7 75mm
- 40 4 ½ - inch rocket (M-8)
- 50 5 – inch rocket (AR & HVAR)

### I. Caliber of Machine Gun Ammunition

- 3 .30 or .303
- 5 .50

### J. Size of High Explosive Bombs

Code	Weight	Designation
1	100 pounds GP or RDX or HE	GP-M30
2	250 pounds GP or RDX or HE	GP-M57
2	300 pounds GP or RDX or HE	GP-31
3	500 pounds GP or RDX or HE	GP-M43 or GP-M64
3	600 pounds GP or RDX or HE	GP-M32
4	1,000 pounds GP or RDX or HE	GP-M44 or GP-M65
4	1,100 pounds GP or RDX or HE	GP-M33
5	2,000 pounds GP or RDX or HE	GP-M34 or GP-M66
6	4,000 pounds GP or RDX or HE	GP-M56

7	500 pounds Semi-armor piercing	SA-M58
8	1,000 pounds Semi-armor piercing	SA-M59
9	1,000 pounds Armor piercing	AP-Mk 33
10	1,600 pounds Armor piercing	AP-Mk 1
11	325 pounds Depth Bombs or Charges	DB-Mk 17
11	350 pounds Depth Bombs or Charges	DB-Mk 47
12	1,000 pounds Mines	M-Mk 26, 13, 19
13	1,660 pounds Mines	M-Mk 17
14	2,000 pounds Mines	M-Mk 12
15	Flares Pyrotechnics	Py-M26
15	Photo Flash (PF) Pyrotechnics	Py-M46 OR Py-M23A1
15	Parachute Flares Pyrotechnics	Py-M9A1
16	Torpedoes Miscellaneous	
C	Chaff Miscellaneous	
21	8,000 pounds Additional RAF Code	
22	12,000 pounds Additional RAF Code	Tallboy
23	22,000 pounds Additional RAF Code	Grand Slam "Earthquake Bomb"

#### K. Size of Incendiary Bombs

Code	Weight	Designation
1	2 pounds (Individual)	I-M52
2	4 pounds (Individual)	I-M50A2
3	6 pounds (Individual)	I-M69
4	10 pounds (Individual)	I-M74
5	100 pounds (Individual)	I-M47A1 or I-M47A2
6	500 pounds (Individual)	I-M76
7	84 pounds or 100 pounds or (14x6 pounds) Clusters	I-M12
8	228 pounds or (38x6 pounds) Clusters	I-M18
9	360 pounds or (60x6 pounds) Clusters	I-M13
10	136 pounds or 100 pounds or (34x4 pounds) Clusters	I-M6
11	440 pounds or (110x4 pounds) Clusters	I-M17
12	500 pounds or 512 pounds or (128x4 pounds) Clusters	I-M7
13	100 pounds WP (White Phosphorous)	WP-M47A2
14	332 pounds (USSBS Japan codes)	
15	400 pounds (USSBS Japan codes)	
16	501 pounds or 545 pounds (USSBS Japan codes)	
18	334 pounds (USSBS Japan codes)	
21	300 pounds Auxiliary fuel tank used as fire bombs	50 gallons
22	500 pounds Auxiliary fuel tank used as fire bombs	75 gallons
23	660 pounds Auxiliary fuel tank used as fire bombs	110 gallons
24	1,000 pounds Auxiliary fuel tank used as fire bombs	150 or 165 gallons
25	2,000 pounds Auxiliary fuel tank used as fire bombs	300 gallons
30	111 pounds (USSBS Japan codes)	
31	30 pounds Additional RAF Code	

32	250 pounds Additional RAF Code	
33	1,000 pounds Additional RAF Code	
34	2,000 pounds Additional RAF Code	
35	4,000 pounds Additional RAF Code	
36	25 pounds Additional RAF Code	
37	50 pounds Additional RAF Code	

#### L. Size of Fragmentation Bombs

Code	Weight	Designation
1	4 pounds Individual Bombs	BF-M83
2	20 pounds Individual Bombs	FS-M41
3	23 pounds Individual Bombs	FP-M40 or FP-M72
4	90 pounds Individual Bombs	FS-M82
5	260 pounds Individual Bombs	FS-M81
6	69 pounds or 100 pounds (3x23 pounds) Clusters (regular)	FP-M4
7	100 pounds or 120 pounds (6x20 pounds) Clusters (regular)	FS-M1A1
8	400 pounds or (20x20 pounds) Clusters (regular)	FS-T4E4 or FS-M26
9	540 pounds or (6x90 pounds) Clusters (regular)	FS-T8 or FS-M27
10	96 pounds or (24x4 pounds) Clusters (butterfly)	BF-T10 or BF-M28
11	360 pounds or (90x4 pounds) Clusters (butterfly)	BF-T11 or BT-M29
41	40 pounds Additional RAF Code	

#### M. Numbered Air Force Codes

Code	Air Force
1	1st Tactical Air Force
5	5th Air Force
6	6th Air Force (Caribbean Air Command/ Panama Canal Zone)
7	7th Air Force
8	8th Air Force
9	9th Air Force
	10th Air Force
J	11th Air Force
K	12th Air Force
L	13th Air Force
M	14th Air Force
N	15th Air Force
R	Royal Air Force
A	20th Air Force
<b>B</b>	<b>Antilles Air Command (?) 11/42-9/44 A20, P39, B17, B24, B25</b>
<b>C</b>	<b>Bermuda Base Command (?) 1/43-10/43 B25</b>
<b>D</b>	<b>1/43-11/44 P38, P39, P40, P47</b>
<b>E</b>	<b>AAF Anti-Submarine Command (?) 12/42-2/43 A20, B17</b>

## Appendix B

### Consolidated THOR data field listing – ACTIVELY IN WORK

Column #	Field	Format
1	<b>Date</b>	MMDDYYYY Display as MM/DD/YYYY
2	<b>Conflict</b>	WW1, WW2, Korean War, Vietnam War
3	<b>Theater</b>	Western Front, Italian Front, MTO, ETO, PTO, CBI, Korea, SEA
4	<b>Country</b>	Country flying mission (USA, UK, France, Italy)
5	<b>Service</b>	Abbreviation (USAF/USMC/RAF) of Service flying mission
6	<b>Numbered AF</b>	If applicable
7	<b>Group</b>	If Known
8	<b>Unit</b>	If Known
9	<b>Callsign</b>	Name+number
10	<b>Aircraft MDS</b>	Type/number, no hyphen, model as available: F15, F15E, B24
11	<b>Mission #</b>	Assigned mission
12	<b>Mission Type</b>	Function of mission: Strike, Armed Recce, CAS, etc.
13	<b>Service Supported</b>	SAC, USMC, etc.
14	<b>Operation Supported</b>	Operation name
15	<b>TO Location</b>	Launch base or ship
16	<b>TO Lat</b>	Launch Latitude
17	<b>TO Long</b>	Launch Longitude
18	<b>Flying Hours/Duration</b>	in hours & tenths of hours
19	<b># Dispatched</b>	Total AC launching in support of mission
20	<b># Attacking</b>	Total AC reaching Tgt; may be same as # Dropping bombs
21	<b># Dropping Bombs</b>	Total AC Dropping Bombs
22	<b>TGT Priority</b>	Primary, Secondary, Target of Opportunity, Target of Last Resort, NA
23	<b>Tgt Location</b>	Location Name
24	<b>TGT Province</b>	Political region
25	<b>Tgt Country</b>	Target Country
26	<b>Tgt Description</b>	Text description of target
27	<b>Tgt ID Code/ Number, etc.</b>	Target #, BE Entry, etc.
28	<b>TGT Industry/ID Code</b>	Target system Classification
29	<b>Tgt Lat</b>	Target Latitude
30	<b>Tgt Long</b>	Target Longitude
31	<b># Weapons</b>	# of weapons
32	<b>Weapon Type</b>	Nomenclature/Description: M64 500 lb. HE
33	<b># Weapons Jettisoned/Lost</b>	# of weapons
34	<b>Weight of Weapons jettisoned/Lost</b>	Total pounds
35	<b># Weapons Delivered</b>	# of weapons
36	<b>Total Weapon employed wt</b>	Total pounds on tgt
37	<b>Delivery Tactic</b>	Level, Dive bomb, loft, etc.

38	<b>Sighting/Nav Method</b>	Visual, H2X, Radar, Skyspot, SHORAN, etc.
39	<b>Target Control</b>	JTAC, FAC, CAS Type 1,2,or 3
40	<b>Speed</b>	in mph (True Airspeed?)
41	<b>Release Altitude</b>	in feet (MSL?)
42	<b>Period of Day</b>	Day(D) or Night(N) at TGT location
43	<b>TOT Start</b>	HH:MM 24 hour Time (Time at target)
44	<b>TOT End</b>	HH:MM 24 hour Time (Time at target)
45	<b>Weapon impact</b>	Text Description
46	<b>BDA/Results</b>	Text Description
47	<b>Comments</b>	Text Description
48	<b>Sortie Dupe</b>	Multitarget/multiweapon flag
49	<b>Visibility</b>	
50	<b>Target Weather</b>	
51	<b>Cloud Cover</b>	
52	<b>Cloud Base</b>	
53	<b>A/C Status</b>	Lost, Damaged, Divert, Abort
54	<b># Lost</b>	Total Lost/destroyed AC
55	<b>Lost AC Serial Number</b>	YYNNNN
56	<b>Lost Reason: AAA/Ground Fire</b>	
57	<b>Lost Reason: Enemy Aircraft</b>	
58	<b>Lost Reason: Missile</b>	
59	<b>Lost Reason: Accident</b>	
60	<b>Lost Reason: Ops Non-Hostile</b>	
61	<b>Lost Reason: Malfunction</b>	
62	<b>Lost Reason: Unknown</b>	
63	<b>Lost Lat</b>	Latitude last seen
64	<b>Lost Long</b>	Longitude last seen
65	<b>Crew Status: Recovered</b>	# of Crewmembers
66	<b>Crew Status: Killed</b>	# of Crewmembers
67	<b>Crew Status: Missing</b>	# of Crewmembers
68	<b>Crew Status: Captured</b>	# of Crewmembers
69	<b># Damaged</b>	Total Damaged AC
70	<b>Damaged Reason: AAA/Ground Fire</b>	
71	<b>Damaged Reason: Enemy Aircraft</b>	
72	<b>Damaged Reason: Missile</b>	
73	<b>Damaged Reason: Accident</b>	
74	<b>Damaged Reason: Ops Non-Hostile</b>	
75	<b>Damaged Reason: Malfunction</b>	
76	<b>Damaged Reason: Unknown</b>	
77	<b>#Divert</b>	
78	<b>Divert Reason: Intercepted</b>	

79	<b>Divert Reason: Antiaircraft</b>	
80	<b>Divert Reason: Fuel Shortage</b>	
81	<b>Divert Reason: Navigation Error</b>	
82	<b>Divert Reason: Weather</b>	
83	<b>Divert Reason: Personnel Failure</b>	
84	<b>Divert Reason: Malfunction</b>	
85	<b># Aborts</b>	Total non-effective AC
86	<b>Abort Reason: Intercepted</b>	
87	<b>Abort Reason: Antiaircraft</b>	
88	<b>Abort Reason: Fuel Shortage</b>	
89	<b>Abort Reason: Navigation Error</b>	
90	<b>Abort Reason: Weather</b>	
91	<b>Abort Reason: Personnel Failure</b>	
92	<b>Abort Reason: Malfunction</b>	
93	<b>Raw Data Line</b>	Original data line as applicable
94	<b>Wind direction (Degrees)</b>	
95	<b>Wind Speed (Knots)</b>	
96	<b>Temperature at altitude (Degrees Celsius)</b>	
97	<b>Relative Humidity at altitude (%)</b>	
98	<b>Temperature Dew Point Depression (T-Td) at Altitude (Degrees C)</b>	
99	<b>Low Cloud Cover (%)</b>	
100	<b>Mid Cloud Cover (%)</b>	
101	<b>High Cloud Cover (%)</b>	
102	<b>K-Index Thunderstorm Potential Indicator</b>	
103	<b>TT-Index Severe Thunderstorm Potential Indicator</b>	
104	<b>Icing Potential at Altitude</b>	
105	<b>Moon Illumination (%)</b>	
106	<b>Wind Direction 10 meters above ground (Degrees)</b>	
107	<b>Wind Speed 10 meters above ground (Knots)</b>	
108	<b>Surface Temperature (Deg C)</b>	
109	<b>Precipitation past 3 hours (inches)</b>	
110	<b>Percent of ground covered with snow (%)</b>	
111	<b>Weather Reanalysis valid time</b>	TOT



112

*Altitude (ft.)*

See **Release Altitude** (Column 39)

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168.7239-32	<b>AMERICAN AIR SERVICE GREW FROM THREE SQUADRONS AT ENTRY INTO WORLD WAR I TO 28 BY 11 NOV 18. UNITS OF AMERICAN AIR SERVICE PARTICIPATED IN BOTH SAINT MIHIEL AND MEUSE ARGONNE OPERATIONS. INCLUDES AIR SERVICE ORGANIZATION, TRANSLATION OF CAPTURED GERMAN DOCUMENT ON NIGHT RANGING BY AEROPLANE, AND OPERATION REPORTS.</b>	Office First Army Air Service Commander, AEF (Mitchell, Wm, Colonel)
168.7239-26	<b>History of 20th Aero Squadron, 1st Army</b>	Gorrel's History of the American Expeditionary Forces Air Service 1917-1919, Series N, Vol 16
168.7239-26	<b>History of 11th Aero Squadron, 1st Army</b>	Gorrel's History of the American Expeditionary Forces Air Service 1917-1919, Series N, Vol 16
168.7239-26	<b>History of 96th Aero Squadron, 1st Army</b>	Gorrel's History of the American Expeditionary Forces Air Service 1917-1919, Series N, Vol 16
168.7239-26	<b>History of 166th Aero Squadron, 1st Army</b>	Gorrel's History of the American Expeditionary Forces Air Service 1917-1919, Series N, Vol 16
168.7239-24	<b>1st Day Bombardment Group History, Orders, Reports</b>	<i>No author given, reference individual documents</i>

167.41-8	<b>1st Day Bombardment Group History, Orders, Reports</b>	<i>No author given, reference individual documents</i>
167.4131-5	<b>The AEF Day Bombers</b>	Edwin Boyd Fitzpatrick, West Point, NY
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K239.0512-1011 C.1	<b>Oral History interview of George C. Kenney.</b>	B Gen George W. Goddard, 6 May 1966.
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167.601-2	<b>MAP: St Mihiel</b>	General Pershing, USA
167.601-2	<b>MAP: Argonne Meuse - Metz</b>	1st Army Air Corps
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248.501-64	<b>Italian Bombardment Activities during 1915-1918, during the World War at the Italo-Austrian front</b>	M.I.D. Italy
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Book	<b><i>The US Air Service in World War 1 Volume III the Battle of St Mihiel</i></b>	Maurer Maurer, 1979
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Book	<b><i>Hostile Skies: A Combat History of the American Air Service in World War 1</i></b>	James J. Hudson, Syracuse University Press, © 1968.
Book	<b><i>French Strategic and Tactical Bombardment Forces of World War 1</i></b>	Rene Martel, Translated by Allen Suddaby, edited by Steven Suddaby, © 2007.
Book	<b><i>Skyfighters of France</i></b>	Henry Farre, © 2009 Oakpast Ltd.

Book

***The West Point Atlas of War: World War 1***

USMA © 1995

## World War II

<b>IRIS # or Call #</b>	<b>Dates</b>	<b>Title</b>	<b>Author</b>
113002		B-17	
113003		B-24	
113004		B-25	
113005		B-26	
113006		A-20	
113007		A-26	
113008		A-36	
113176		UNIDENTIFIED TARGETS	
113177		UNIDENTIFIED TARGETS	
113178		UNIDENTIFIED TARGETS Lt Med Bombers)	
113180		CITIES, TOWNS AND URBAN AREAS	
113181		CITIES, TOWNS AND URBAN AREAS	
113182		CITIES, TOWNS AND URBAN AREAS	
113183		CITIES, TOWNS AND URBAN AREAS	
113184		PUBLIC UTILITIES	
113185		PUBLIC UTILITIES	
113186		TARGETS INCLUDE LIGHT METALS PLANTS, ALUMINUM PRODUCTION FACILITIES, MAGNESIUM PRODUCTION FACILITIES, CHEMICAL PLANTS, RADIO AND RADAR MANUFACTURING PLANTS, RAILROAD MANUFACTURING WORKS AND ROUNDHOUSES, RUBBER AND TIRE MANUFACTURING FACILITIES, NATURAL RUBBER MANUFACTURING, AND SYNTHETIC RUBBER MANUFACTURING.	
113187		INDUSTRIAL AREA AND MANUFACTURING	

- 113188                    **INDUSTRIAL AREA AND MANUFACTURING**
- 113189                    **AIRCRAFT INDUSTRIES**
- 113190                    **AIRCRAFT INDUSTRIES**
- 113191                    **ARMAMENT AND ORDNANCE PLANTS, TANK FACTORIES,  
VEHICLE MANUFACTURING, EXPLOSIVES MANUFACTURING  
PLANTS**
- 113192                    **ARMAMENT AND ORDNANCE PLANTS, TANK FACTORIES,  
VEHICLE MANUFACTURING, EXPLOSIVES MANUFACTURING  
PLANTS**
- 113193                    **TARGETS INCLUDE MACHINERY AND EQUIPMENT  
MANUFACTURING PLANTS; ABRASIVES; BEARINGS  
MANUFACTURING PLANTS; ELECTRICAL PRODUCTS  
MANUFACTURING PLANTS; MACHINE TOOLS  
MANUFACTURING PLANTS; OPTICAL PRODUCTS  
MANUFACTURING PLANTS; PRECISION INSTRUMENTS  
MANUFACTURING PLANTS; AND IRON AND STEEL  
PRODUCTION FACILITIES: BLAST FURNACES, BOILER SHOPS,  
FORGES, FOUNDRIES, STEEL WORKS, AND ROLLING MILLS.**
- 113195                    **TARGETS INCLUDE LIGHT METALS PLANTS, ALUMINUM  
PRODUCTION FACILITIES, MAGNESIUM PRODUCTION  
FACILITIES, CHEMICAL PLANTS, RADIO AND RADAR  
MANUFACTURING PLANTS, RAILROAD MANUFACTURING  
WORKS AND ROUNDHOUSES, RUBBER AND TIRE  
MANUFACTURING FACILITIES, NATURAL RUBBER  
MANUFACTURING, AND SYNTHETIC RUBBER  
MANUFACTURING.**
- 113196                    **TARGETS INCLUDE OIL REFINERIES, NATURAL OIL  
REFINERIES, SYNTHETIC OIL REFINERIES, OIL STORAGE  
FACILITIES, AND OTHER INSTALLATIONS.**
- 113198                    **TARGETS INCLUDE OIL REFINERIES, NATURAL OIL  
REFINERIES, SYNTHETIC OIL REFINERIES, OIL STORAGE  
FACILITIES, AND OTHER OIL INSTALLATIONS.**
- 113199                    **TARGETS INCLUDE COMM FACILITIES, BRIDGES,  
TUNNELS,RAIL INSTALLATIONS, MOVING TRAINS,  
HIGHWAYS AND VEHICLES,WATERWAYS AND BOATS**

113200 TARGETS INCLUDE COMM FACILITIES, BRIDGES,  
TUNNELS,RAIL INSTALLATIONS, MOVING TRAINS,  
HIGHWAYS AND VEHICLES,WATERWAYS AND BOATS

113201 TARGETS INCLUDE NAVAL INSTALATIONS, PORTS, SUB PENS,  
SHIPS, TUGS, SHIPYARDS

113202 TARGETS INCLUDE NAVAL INSTALATIONS, PORTS, SUB PENS,  
SHIPS, TUGS, SHIPYARDS

113203 TARGETS INCLUDE NAVAL INSTALATIONS, PORTS, SUB PENS,  
SHIPS, TUGS, SHIPYARDS

113204 AIRFIELDS

113205 AIRFIELDS

113206 TARGETS INCLUDE TACTICAL TARGETS, TROOP  
CONCENTRATIONS, GUN EMPLACEMENTS, SUPPLY DUMPS,  
RADIO, V-WEAPON LAUNCHING SITES, DIRECT  
COOPERATION WITH GROUND FORCES

113207 TARGETS INCLUDE TACTICAL TARGETS, TROOP  
CONCENTRATIONS, GUN EMPLACEMENTS, SUPPLY DUMPS,  
RADIO, V-WEAPON LAUNCHING SITES, DIRECT  
COOPERATION WITH GROUND FORCES

113208 TARGETS INCLUDE TACTICAL TARGETS, TROOP  
CONCENTRATIONS, GUN EMPLACEMENTS, SUPPLY DUMPS,  
RADIO, V-WEAPON LAUNCHING SITES, DIRECT  
COOPERATION WITH GROUND FORCES

113209 TARGETS INCLUDE TACTICAL TARGETS, TROOP  
CONCENTRATIONS, GUN EMPLACEMENTS, SUPPLY DUMPS,  
RADIO, V-WEAPON LAUNCHING SITES, DIRECT  
COOPERATION WITH GROUND FORCES

113210 AIRFIELDS

113179 RAF UNIDENTIFIED TARGETS

113194 RAF TARGETS INCLUDE MACHINERY AND EQUIPMENT  
MANUFACTURING PLANTS; ABRASIVES; BEARINGS  
MANUFACTURING PLANTS; ELECTRICAL PRODUCTS  
MANUFACTURING PLANTS; MACHINE TOOLS  
MANUFACTURING PLANTS; OPTICAL PRODUCTS

**MANUFACTURING PLANTS; PRECISION INSTRUMENTS  
MANUFACTURING PLANTS; AND IRON AND STEEL  
PRODUCTION FACILITIES: BLAST FURNACES, BOILER SHOPS,  
FORGES, FOUNDRIES, STEEL WORKS, AND ROLLING MILLS.**

- 113197      **RAF TARGETS INCLUDE LIGHT METALS PLANTS, ALUMINUM  
PRODUCTION FACILITIES, MAGNESIUM PRODUCTION  
FACILITIES, CHEMICAL PLANTS, RADIO AND RADAR  
MANUFACTURING PLANTS, RAILROAD MANUFACTURING  
WORKS AND ROUNDHOUSES, RUBBER AND TIRE  
MANUFACTURING FACILITIES, NATURAL RUBBER  
MANUFACTURING, AND SYNTHETIC RUBBER  
MANUFACTURING.**
- 113211      **RAF TGT CODES 1-11? Looks like A-20, A-26, B-25, B-26  
sorties**
- 113212      **RAF TGT CODE 2 CITIES AND TOWNS**
- 113213      **RAF TGT CODE 3 PUBLIC UTILITIES**
- 113214      **RAF TGT CODES 4 AND 9**
- 113215      **RAF TGT CODES 11-16 - "\*2" cards since Total Tons was too  
much in "\*1" cards**
- 113216      **RAF TGT CODES 20-23 - "\*2" cards since Total Tons was too  
much in "\*1" cards**
- 113217      **RAF TGT CODES 50-53**
- 113218      **RAF TGT CODES 60-66**
- 113219      **RAF TGT CODES 70-75**
- 113220      **RAF TGT CODE 78 AIRFIELDS**
- 113221      **RAF TGT CODES 80-86**
- 113895      **TABULATING SERVICE SECTION REPORT AIR ATTACKS IN  
THE PACIFIC, 5 AIR FORCE**
- 113896      **TABULATING SERVICE SECTION REPORT AIR ATTACKS IN  
THE PACIFIC, 5 AIR FORCE**



113898            **TABULATING SERVICE SECTION REPORT AIR ATTACKS IN  
THE PACIFIC**

113899            **TABULATING SERVICE SECTION REPORT AIR ATTACKS IN  
THE PACIFIC, 7 AIR FORCE**

113901            **TABULATING SERVICE SECTION REPORT AIR ATTACKS IN THE  
PACIFIC, 10 AIR FORCE REPORT NO. 1**

113904            **AIR ATTACKS IN PACIFIC, 11 AIR FORCE**

113906            **AIR ATTACKS IN PACIFIC, 13 AIR FORCE**

113908            **AIR ATTACK IN THE PACIFIC**

113910            **AIR ATTACK IN THE PACIFIC**

113632            **CONTAINS SUMMARY REPORT BY DATE OF ATTACK OF  
BOMBING DIRECTED AGAINST EUROPEAN AND NORTH  
AFRICAN TRANSPORTATION TARGETS BY 12 AIR FORCE  
FROM FIRST ATTACK TO V-E DAY.**

113643            **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO  
NARRATIVE.**

113644            **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO  
NARRATIVE.**

113645            **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO  
NARRATIVE.**

113646            **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO  
NARRATIVE.**

113647            **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO  
NARRATIVE.**

113648            **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO  
NARRATIVE.**

113649            **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO  
NARRATIVE.**

113650            **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO  
NARRATIVE.**

- 113651                    **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO NARRATIVE.**
- 113652                    **CONCERNS EUROPEAN TARGETS ONLY. CONTAINS NO NARRATIVE.**
- 113655                    **AIR ATTACKS IN EUROPE, 15 AIR FORCE**
- 113662                    **TARGET BOMBING IN EUROPE, ROYAL AIR FORCE**
- 113673                    **CONTAINS TARGET DATA; MISSION LOSS AND TARGET MASTER CARD LISTING.**
- 113672                    **CONTAINS TARGET DATA; MISSION LOSS AND TARGET MASTER CARD LISTING.**
- 113653                    **TARGET BOMBING IN EUROPE, 9 AIR FORCE**
- 113654                    **AIR ATTACKS IN EUROPE, 12 AIR FORCE**
- 113660                    **CONTAINS MISSION and MISSION LOSS STATISTICS.**
- 113661                    **CONTAINS MISSION and MISSION LOSS STATISTICS.**
- 113674                    **CONTAINS MISSION and MISSION LOSS STATISTICS.**
- 113664                    **CONTROL BOOK, 8, 9, 12, 15 ARMY AIR FORCES, 1 TACTICAL AIR FORCE, AND ROYAL AIR FORCE**
- 113894                    **Msn Loss, Tgt Card, Msn Card data summarized by Numbered AF (5, 7, 10,11,13,14,20) Month and AC MDS**
- 113888                    **Navy Summary by country and industry by month**
- 1140075                   **Summarized by city and target area by NAF and Navy - # of Planes, Tones of HE or Other bombs**
- 113868                    **Japan Target Book - Provides Lat/Long clarity to above book**
- 113893                    **Incendiary Attacks on Japan Cities - AAF and Navy attacks summarized by day**

480.302	15 Mar - 31 May 1943	<b>Air Operations in the Alaskan Theater SC-SP-14 Auth J.O.W. 3 Aug 1943 Statistical Control Division Office of Management Control</b>	
480.245	9/1/1942- 5/1943	<b>11 AAF Combat Activities Mission Reports</b>	
480.308	1942-1945	<b>11 AF Narrative Summaries of Operations</b>	To be Read
863.305	12/2/41- 2/24/42	<b>First American Volunteer Group Diary, CBI 1941-1942 (Dr Lee Bowen's Material)</b>	
862.3081-2	8/1/1942	<b>DAILY WORKSHEETS ON OPERATIONS</b>	STATISTICAL CONTROL UNITS.
862.3081-2	9/1/1942	<b>DAILY WORKSHEETS ON OPERATIONS</b>	STATISTICAL CONTROL UNITS.
862.3081-2	10/1/1942	<b>DAILY WORKSHEETS ON OPERATIONS</b>	STATISTICAL CONTROL UNITS.
862.3081-2	11/1/1942	<b>DAILY WORKSHEETS ON OPERATIONS</b>	STATISTICAL CONTROL UNITS.
830.305-1	6/1/1942- 6/1/1943	<b>10 AF Operational Diary</b>	
830.306-1	Apr-Sep 42	<b>10 AF G-2 Files</b>	
700.61	4/1/1944	<b>Gazeteer to maps of Burma</b>	Army/Corps of Engineers
827.308-1	11/1/1942 -9/1/1943	<b>India Air Task Force Statistical Charts</b>	
830.3061-3	7/1942- 4/28/1943	<b>Missions from Dinjan</b>	
830.306-1	10/29/42- 4/27/43	<b>Missions in India - 10 AF B-24/B-25</b>	
830.306	2/12/1942 -1/1/1943	<b>Operations of the 10 United States Air Force</b>	

740.306-525C	Jun-42	<b>7th AF and the Battle of Midway</b>	
742.308		<b>Summary of Enemy and US Aircraft Losses Through the Action of VII Bomber Command</b>	
740.306-1	7-Jun-42	<b>Combat Operations, Midway Area, 3-4 June 1942</b>	431 BS(H)
		<b>VII Bomber Command Raid on Wake Island</b>	
742.3083		<b>7 Bomber Command Monthly Combat Data</b>	
742.308		<b>Missions against Wake and Gilbert Islands</b>	
742.01 V.9	5/31-7/44	<b>Reports of missions flown against Islands in Central Pacific by units of 7 Bomber Command</b>	
742.01 V.4	5/31-7/44	<b>Liaison Journal on Battle of Midway, Report on Command Participation in Gilbert Islands Offensive</b>	
GP-376-SU-OP(BOMB)	Dec 1942-Aug 1943	<b>Mission Summaries of 376 Bomb Group, 1st Provisional Group, HALPRO, and 98 Bomb Group</b>	
533.1621	10/1/1942 - 12/1/1942	<b>9 AF Incoming and Outgoing Messages</b>	
138.5-13 V.7	12/1/1944	<b>Successes and Failures of Operations: Operation Corkscrew, Capture of Island of Pantelleria</b>	
612.430E-1	5/1/1943-6/1/1943	<b>Operation Corkscrew</b>	Northwest African Air Forces
612.430E-1	5/1/1943-6/1/1943	<b>Chart on Bombing of Pantelleria</b>	Northwest African Air Forces
622.430-9	6/1/1943-2/1/1944	<b>Operation Pantelleria</b>	Northwest African Air Forces
101-52	5/8/1943-6/14/1943	<b>Reduction of Pantelleria and Adjacent Islands</b>	AAF Historical Study #52

**12 BG History - includes Daily Tgt List**

**Gazetteer of Italy**

**RAF in Desert 1941-1942**

**RAF in Desert May-Jun 1942**

**RAF Air Support Handbook**

**NZ in Egypt**

**9 AF Lessons Learned in El Alamein**

**Italian Tgts 1943**

**Operation Avalanche**

**Op Avalanche 2**

**Op Avalanche prep**

**Foggia MY Attack**

**Op Avalanche 3**

**Op Husky**

**Appendix B Op Husky**

**12 AF Merchant Shipping**

AFD-  
090522-041

AFD-  
090522-051

AFD-  
090602-067

**9 AF in Western Desert**

**Africa, Atlantic and Indian Ocean Islands**

**Air Phase of N African invasion**

**Cyrenaica - Landing Ground List**

**French Equatorial Africa - Landing Ground List**

**History Air Attack Review UK**

**History 12 BG**

**Middle East Command - Landing Field Location**

**Middle East Command - Landing grounds Location**

**Mission Report - 15 AF Fiume**

**Mission Report - 15 AF Vienna**

**Mission Report No. 208**

**Mission Reports - 14 AF (2)**

**Mission Reports - 15 AF Linz**

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## 5 AF History

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## 5 AF Periodic History

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