PROJECT DOCUMENTATION

Master location identifier database

Weather Graphics Technologies

1 October 2010
Revised 1 March 2021

www.weathergraphics.com / servicedesk@weathergraphics.com

Any recommendations, opinions, or findings stated in this documentation or database are based on circumstances and facts as they appeared to exist at the time that Weather Graphics performed the work.

This dataset is not approved for aerial navigation purposes.

NOTE

Changes to the MLID table format took place on October 1, 2010; November 1, 2010; August 1, 2019; and March 1, 2021, in which the column ordering of this database was changed. If you use any applications, scripts, or macros that rely upon this database and which were designed around earlier releases, please inspect them and make appropriate changes before use. Changes to the format cannot be ruled out at any point, but we are striving to avoid further changes where possible.

DIFFERENCES IN VERSIONS

Standard Version

* Non-current stations are omitted (status column is “m” or “z” only)
* Time zone, start/end dates, postal code, and remarks are omitted
* Quality and source data is omitted
* Provided at no cost

Professional Version

* Contains all available rows and columns
* Provided for a fee, which assists us in the continued development and maintenance of this product

Master Location Identifier Database

Documentation

The Master Location Identifier Database (MLID) is a universal conversion table of all known worldwide government weather station identifiers. All station equivalencies in common use have been determined. The table is designed to allow forward and reverse crossreferencing, in other words, it is possible to convert an old station identifier of one type to a current station identifier of a different type.

Part of the reason for the development of this listing is that errors, ambiguous rows, and omissions exist throughout many databases, including even the official NCDC station tables. Furthermore, all crossreferenced listings we know of are anywhere from 5 to 20 years out of date, contain omissions or errors, and/or provide little emphasis on international sites.

Because of these issues, Weather Graphics in 2010 determined that it was essential to develop a carefully controlled, standardized station table for our own internal projects. The MLID database from there grew into its own program. It represents 12 years of research, consolidating numerous sources of meteorological station listings and identifier sources, corrects various items of data identified as erroneous, and includes numerous quality control checks. Not all errors have been identified, due to the limited funds and time required to maintain 45,000 rows of data, but we believe the vast majority of the work has been completed, and that this product provides a highly valuable dataset for climatological and meteorological work. It also offers unique features for aviation interests.

1. Supported systems

The following identifier systems are currently used on a widespread basis in meteorological data exchange, and are supported by the MLID:

* ICAO (International Civil Aviation Organization) 4-letter indicator
* WMO (World Meteorological Organization) 5-digit identifier
* GHCN (Global Historical Climatology Network) 11-character identifier
* FAA (Federal Aviation Administration) 3/4-character identifier
* TC (Transport Canada) 3-character identifier
* NWS (National Weather Service, US) 3-4-character identifier

2. Sources

A complete list of sources is found at the end of this document, but the more important sources include:

* National Flight Database, maintained by the Federal Aviation Administration.
* World Meteorological Organization, Publication 9.
* Aeronautical information documents
* Department of Defense aeronautical publications
* Master station history records from Environment Canada.
* ICAO, NCDC, GHCN, and MASLIB station catalogues.

2.1. Special note about open-source identifiers.

There is an abundance of crowdsourced ICAO identifiers on the Internet which have originated largely from flight sim gaming communities, pilot communities, and anonymous submissions, rather than from official government sources. These have infiltrated numerous web-based identifier listings, including Wikipedia and a popular user-submitted airport database site. These identifiers have tainted a number of ICAO station listings online, including Wikipedia. Part of our design philosophy is to ensure these sources are kept out of the Master Location Identifier Database until they are verified against official sources. Only official stations assigned by national aviation and meteorological authorites are included in these tables.

2.2. Special notes about Canadian sources

We have found multiple instances of erroneous Canadian identifier listings in Federal Aviation Administration's Order JO 7350, "Location Identifiers", in particular with W-prefixed identifiers. Some of the assignments were changed to other locations up to 30 years ago, but the old locations still appear in the document, even in 2018 editions.

For example the July 2018 JO 7350 volume showed WBS equals Mary's Harbour NF, however Canadian station history documents obtained from Environment Canada show that WBS was changed from Mary's Harbour to Lac St Pierre QC on November 29, 1993. We have noted similar problems at other stations, such as WBD, WBZ, and WCZ. Therefore Canadian data from the FAA should be disregarded when a conflict arises. We occasionally use such stations to identify sources that are compromised by the outdated FAA tables.

It is thought that this problem may be due to coordination issues between Environment Canada and Nav Canada, compounded by Canada's unusually frequent rearrangement of WMO and ICAO assignments and a lack of documentation for end users.

3. Description

The following are columns provided in the Master Location Identifier Database. The start_(inclusive) and end_(inclusive) dates, if present, apply to the *entire row*. If a weather observation for the given identifier falls outside these ranges, then the row must be ignored; another row may have the information.

3.1. **Country code trigraph** (country3)

This is the ISO 3166-1 alpha-3 abbreviation. Additionally for oceanic locations (ships and buoys) a number of nonstandard ISO 3166-1 codes are used, as follows: XAT Atlantic Ocean, XPA Pacific Ocean, XIN Indian Ocean, XAR Arctic Ocean, and XGM Gulf of Mexico. The ISO-3166 scheme is that which is current as of publication time. This means that deprecated country codes (e.g. DDR for East German sites) are never used.

3.2. **Country code digraph** (country2)

This is the ISO 3166-1 alpha-2 abbreviation. Additionally for oceanic locations (ships and buoys) nonstandard ISO 3166-1 codes are used as follows: XA Atlantic Ocean, XP Pacific Ocean, XI Indian Ocean, XR, Arctic Ocean, XG Gulf of Mexico. The ISO-3166 scheme is that which is current as of publication time. This means that deprecated country codes (e.g. HV for Upper Volta) are never used.

3.3. **Country name** (country)

Plain-language country name. This is valid as of publication time. Old country names (e.g. South Vietnam) are never used.

3.4. **Region** (region)

This column holds the ISO 3166-2 country subdivision code.

3.5. **Subregion** (subregion)

This column is used for other region representations not recognised in ISO 3166 format. In the US the county name is usually given here. At this time there is no firm standardization for code representations. Some countries may show a mix of numerical and alphabetic subregion codes.

3.6. **Place name** (place_name)

Indicates the name of the closest major populated area (not the facility name). A populated area is considered to be either the metropolitan area if one is within about 50 km, or the closest civilian community with mixed residential and commercial zones. Alternate names for nearby towns and cities are demarcated by a pipe symbol (either space padded or not), in most to least significant order. The most widely accepted name comes first. In Russia and former Soviet republics, BGN/PCGN romanization system should always precede older GOST

spellings. For Chinese stations, Pinyin spellings should always precede the older Postal and Wade-Giles romanizations.

3.7. **Station name** (station_name)

The current name of the facility hosting the weather observation site. Alternate names which are current will also be listed, using an ampersand as a delimiter. All known historical names will also be listed, using a pipe symbol as a delimiter. Ordering is in reverse chronological order or most significant to least significant. If the entire entry is prefixed with (Abandoned) it means the facility location is correct but no longer exists and may not appear on current maps or photographs. To allow proper alphabetization, station names will never start with abbreviations, such as "NAS" or "JRB" which often are prefixed to various US military bases. Dates of operation may be placed in brackets; this is for clarification of the listing and it may be disregarded from end user listings.

3.8. **Notes** (notes)

Plaintext notes, manual data, and change logs are placed here.

Descriptive start and end years (inclusive) for diagnostic purposes are sometimes given here in *yyyy*, *yyyymm*, or *yyyymmdd* format. The codes E and L indicate "early" and "late", so 201E indicates the change occurred in the early 2010s (2010-2014) and 199L indicates the change occurred in the late 1990s (1995-1999). No middle (M) code is used. A rounded approximation of this figure will be given in the start and end columns.

Notations such as ADD/*yyyymmdd* indicate the date that a row was added to the table. This indicates the date that the change was first noticed, not when it occurred, and is preserved for diagnostic purposes. Some older ADD data was removed when official start and end dates were determined.

3.9. **Listing type** (type)

[Only implemented for a few sites -- this may removed at a future date with pertinent details written in the notes]

This indicates the type of data being represented by the row. Typically the row gives information for sensor locations, but an ICAO identifier may actually refer both to a sensor location in METAR observations, and to the airfield in aviation use. When multiple listing types occur, there will be multiple rows, each with unique latitude and elevation specifically associated with this type of data. Valid abbreviations are:

(none)	No location distinguished; it may be one of the types below
A	Airfield reference point (ARP) location
B	Weather sensor location approximate, barometer elevation given*
W	Weather sensor location exact, barometer elevation given*

* = Elevation will equal WMO value H_p, station elevation

3.10. **Station key** (stn_key)

This is a 8-character code that indicates a unique geographical location. It is for Weather Graphics internal use. It is constructed from the ISO 3166-1 alpha-2 country code and an arbitrary current applicable identifier. Identifier information should never be extracted or inferred from this element. Rather this element is only used internally by Weather Graphics. This column may be standardized in future releases.

NOTE: As of 2019 the station key column has not yet been standardized and is simply reserved for "future use".

3.11. **Crossreference ICAO identifier** (icao_xref)

The crossreference columns are used to provide the *current (non-obsolete) identifier* in use for the geographic coordinates shown on this row. In other words it can be used to convert an obsolete identifier to a current one. If the field is blank, then no *current* identifier applies. For more information on this type of identifier see the appropriate identifier listing in the paragraphs ahead.

3.12. **Crossreference national identifier** (national_id_xref)

The crossreference columns are used to provide the *current (non-obsolete) identifier* in use for the geographic coordinates shown on this row. In other words it can be used to convert an obsolete identifier to a current one. If the field is blank, then no *current* identifier applies. For more information on this type of identifier see the appropriate identifier listing in the paragraphs ahead.

3.13. **Crossreference WMO identifier** (wmo_xref)

The crossreference columns are used to provide the *current (non-obsolete) identifier* in use for the geographic coordinates shown on this row. In other words it can be used to convert an obsolete identifier to a current one. If the field is blank, then no *current* identifier applies. For more information on this type of identifier see the appropriate identifier listing in the paragraphs ahead.

3.14. **Identifier status** (status)

This indicates the status of all identifiers in the non-crossreference identifier columns which follow. Status will be "-" for current identifiers, "x" (obsolete identifiers), and "Z" for radar, non-meteorological ATC, and other special use. Older tables used "M" for current and "A" for abandoned stations. The overall rule is that *all data from the non-crossreference columns are considered obsolete if an "x" is present in this column*. Such data is provided for forensic and climatological purposes.

3.15. **ICAO identifier** (icao)

This column contains a historical International Civil Aeronautical Organization (ICAO) location indicator for the geographic coordinate in the lat and

lon columns. If the row is current (no "X" in the status column), then the current identifier will appear here. This is always a 4-character alphanumeric code.

If a Start Date or End Date is specified in the date columns, then all data for this identifier applies only during that period. If an "X" is present in the status row, then any information in this cell is considered obsolete, whether or not start or end dates are specified.

ICAO prefixes (national identifiers) may differ from the country in the case of military-use identifiers attached to overseas locations, in particular KQ (US military) and CU (Canadian military).

3.16. **ICAO identifier quality** (icao_quality)

Contains a quality code, as follows:

Code	Source type
A	Cardinal regulatory-level source (ICAO Doc 7910 or AIP)
B	Mission-critical source (DOD FLIP, Jeppesen, etc)
C	Non-critical material from a government source
D	Source uncertain but assessed to be accurate; ICAO identifier is not officially confirmed by ICAO [ICAO-NV]
E	Third-party non-official source; may be inaccurate

3.17. **ICAO identifier source** (icao_source)

Contains a source code which indicates the source of the icao data values. See Appendix 1 for a description of source codes.

3.18. **National identifier** (national_id)

Contains a 3-letter national aviation authority station identifier. If the row is current, the current identifier will appear here. This is always a 3-character alphanumeric code. Four-character national codes (such as TX55 for the Southland Center in Dallas TX; not to be confused with ICAO indicators) are omitted from this database since they are never used to transmit weather data.

NEXRAD 3-letter site identifiers are omitted from this column because they are actually NWS Location Identifiers. These are reflected in the special identifier column. This is because the FAA facility and radar site can share an identifier but be many miles apart, as in the case of GRK (Fort Hood TX).

It is important to note that the MLID project only tracks two sets of national identifiers: the US Federal Aviation Administration (FAA) location identifier and Transport Canada location indicator. These are designed to mesh with each other, however the growing use of Canadian ICAO identifiers in the CA-CV range has begun causing conflicts with US identifiers when the three-letter national identifier is extracted. Therefore these identifiers should be considered as paired with the country. As of 2019 we avoid including ICAOs in the CA-CV range except when known METAR data is being transmitted from the station. If

conflicts arise in the future we will delete the national identifier entry for those stations.

If a Start Date or End Date is specified in the date columns, then all data for this identifier applies only during that period. If an "X" is present in the status row, then any information in this cell is considered obsolete, whether or not start or end dates are specified.

3.19. **National identifier quality** (national_id_quality)

Contains a quality code, as follows:

A	Obtained from a cardinal source
C	Obtained from a secondary source
F	May be inaccurate

3.20. **National identifier source** (national_id_source)

Contains a source code which indicates the source of the national_identifier data value. See Appendix 1 for a description of source codes.

3.21. **WMO identifier** (wmo)

This column contains a historical World Meteorological Organization (WMO) station identifier for the geographic coordinate in the lat and lon columns. If the row is current, then the current identifier will appear here. This is always a 5-digit numeric code.

If a Start Date or End Date is specified in the date columns, then all data for this identifier applies only during that period. If an "X" is present in the status row, then any information in this cell is considered obsolete, whether or not start or end dates are specified.

3.22. **WMO identifier quality** (wmo_quality)

Contains a quality code

A	Obtained from a cardinal source
B	Obtained from a primary source at the national level
C	Obtained from a non-primary source at the national level
D	Obtained from a private party source
F	May be inaccurate

3.23. **WMO identifier source** (wmo_source)

Contains a source code which indicates the source of the wmo_historical data value. See Appendix 1 for a description of source codes.

3.24. **WBAN identifier** (wban)

This column contains a historical WBAN identifier for the geographic coordinate in the lat and lon columns. If the row is current, then the current

identifier will appear here. These are primarily for United States locations and are used for climatological purposes. If an "X" is present in the status row, then any information in this cell is considered obsolete, whether or not start or end dates are specified.

NOTE: No quality column is provided for the WBAN Identifier since there is a single agency that currently originates WBAN data (US/NOAA/NCDC).

3.25. **WBAN source** (wban_source)

Contains a source code which indicates the source of the wban_historical data value. See Appendix 1 for a description of source codes.

3.26. **GHCN identifier** (ghcn)

Contains the GHCN (Global Historical Climatology Network) identifier. This is determined by NOAA. The first two characters indicate the country using the FIPS (Federal Information Processing Standards) two-letter country code, followed by an alphanumeric code generally based on the host nation station number, the WBAN, or the WMO.

3.27. **Special identifier** (special)

Any identifiers that are not made up of any of the previous types of identifiers are placed in this column. The format is *a.../i...* where *a...* is the agency scheme name, followed by a solidus, and *i...* is the station identifier for that scheme. This is generally used to provide NWS Location Identifiers used for radar sites, which appear similar to ICAO codes but are in fact different. Consult Appendix 2 for detailed information on this column.

3.28. **Latitude** (lat)

See "Longitude" below.

3.29. **Longitude** (lon)

The latitude and longitude fields are used to indicate the latitude and longitude for the station in decimal degrees. A negative latitude value is always used for the southern hemisphere, and a negative longitude value is always used for the western hemisphere. If a value exists in the "type" column, this will indicate specifically which type of station data this value references.

The goal for the MLID program is to locate all identifiers to within 3 km of their correct location. Locating the precise position of observing sensors to the nearest 10 meters is beyond the scope of the MLID project, though effective in 2019 we have restructured the database to add the "type" column to allow provisions for this type of work, starting with separating barometer elevations from airfield elevations, and possibly at a later date, identifying sensor location. For precise sensor locations we strongly recommend the Gladstone weather quality reporter site <*weather.gladstonefamily.net*>. For airports the MLID coordinates

typically indicate the location of the facility's airfield reference point (ARP). For weather stations the best known sensor location will be given.

Most positions given in the MLID are accurate to the nearest hundredth of an arc-degree (±0.01°, or about 1 km or 3640 ft). The MLID does not attempt to account for less than 3 km of movement of equipment or facilities over time, such as the relocation of a sensor or weather station from one building to another on an airfield. This is for two reasons: minor changes in coordinates are not adequately documented in most countries; and tracking equipment and facilities at each location would enormously expand the complexity of the database. Therefore if we determine a coordinate, we rarely use precision greater than the nearest *thousandth of a degree* (100 meters). If there is considerable uncertainty in the position, a coarser precision will often be used.

It should also be noted that many sources, particularly versions of WMO Pub. 9 before 2015, and MASLIB, document locations in degrees and whole minutes. This gives an accuracy of only about 1 nautical mile. Furthermore we have frequently found errors of about 5 nm in these publications and sometimes much more than that. This is usually ascribed to the use of approximated or erroneous coordinates in old documents by a national meteorological or aviation agency. These approximated coordinates then become part of the permanent record. This is very common in developing countries, although the WMO's OSCAR program is currently trying to rectify this. We have identified and improved on approximated coordinates for thousands of stations, but sometimes there is still no way to know exactly where a station is located as sometimes only the city name is given with no further details.

3.30. **Latitude-longitude quality** (ll_quality)

Indicates the quality of the point being referenced. A cardinal source constitutes the host country's aeronautical information documents, or flight information publications approved for navigational use (Jeppesen, NIMA, or equivalent), the WMO Pub 9 listing, or the NCDC WBAN tables. Secondary sources are all other listings. Where multiple sources exist, those corresponding to lower alphabetic quality characters take precedence, so in effect, known meteorological equipment coordinates will always supersede airfield reference points.

This coding system was changed August 2019, and again February 2021 to allow for high-quality manual confirmation.

A	Manually verified and considered precise
B	Verified with an accurate official source [was A]
C	Verified, believed accurate [was B]
D	Best available [was C]
E	Estimated [was D]
F	Unreliable [was E]
G	Temporary - from an official listing
N	Verified; temporary from FAA NFD (no longer used)

3.31. **LL source** (ll_source)
Source of latitude-longitude data. See Appendix 1 for source codes.

3.32. **Elevation** (elevation)
This is the elevation in meters of the point being referenced. Typically this is the official airfield elevation or weather station elevation. However if a value exists in the "type" column, this will indicate specifically which type of point this value references.

3.33. **Station elevation quality** (elevation_quality)
Quality of the station elevation value. Codes are as follows:

A	Cardinal source, surveyed
B	Cardinal source, estimated
C	Cardinal source, unspecified method
D	Reliable secondary source, surveyed
E	Reliable secondary source, estimated
F	Reliable secondary source, unspecified method
G	Interpolated from digital elevation model
O	Airfield reference point from satellite or DEM
H	Estimated
Y	Estimated, accuracy is believed to be within 30 m
Z	Estimated, accuracy is believed to exceed 30 m

3.34. **Station elevation source** (elevation_source)
Source of latitude-longitude data. See Appendix 1 for source codes.

3.35. **Time zone** (tz)
Plaintext string indicating the valid time zone for the current row. The "tz database" format is used, which provides complete rules for the conversion of time for a specific date on any given year to UTC. The time zone for New York, for example, appears in the cell as "America/New_York". This is coincidentally the same system used to set the operating system time zone on Windows and Linux.

The "tz database" system avoids abbreviations such as "EST", "PST", etc, which can have ambiguous meanings. For instance, "CST" means Central Standard Time for Americans, but to other users can mean "China Standard Time" or "Cuba Standard Time". Some lists work around this by giving a numerical LST-GMT conversion in hours, but this also causes problems. For example KLAX (Los Angeles) and KSLC (Salt Lake City) both observe MST and are 7 hours behind Greenwich, but in the summer KSLC observes daylight time while KPHX does not. To solve this, the "tz database" system provides two different listings, "America/Denver" and "America/Phoenix", which provides all information necessary for times to be converted, even for historical dates where time zone rules were different.

For more information on this system, see <*https://en.wikipedia.org/wiki/Tz_database*>.

3.36. **Postal code** (postal_code)

Indicates the national postal code for the identifiers listed, if available. This is always prefixed by the ISO 3166-1 alpha-2 country code (such as "US" for the United States) and a dash.

3.37. **Start date** (start)

See "End date" section below.

3.38. **End date** (end)

Inclusive start and/or end date in *yyyy*, *yyyymm*, or *yyyymmdd* format, indicating the dates for which the historical columns (those columns following the status column) are valid. If blank, the station is either current or the end date is not known. If an exact calendar date is not specified (e.g. 198607 rather than 19860715), this indicates the date is approximate based on all available information and may be assumed to include the entirety of the month or year given. The "notes" column sometimes provides the follow-on identifier assignment for a obsolete identifier, or the previous assignment for an new identifier assignment.

In general when the start date is in *yyyy* format and has a year that ends in "0", the start date is accurate to only within 5 to 10 years. A more accurate value, such as 201001 instead of 2010, indicates higher confidence. The "notes" column will sometimes provide text indicating the degree of confidence in the start and end dates.

NOTE: *Start and End dates do not indicate a station operation date or a period of record date. This database does not track such information. Rather this indicates the date when the information on the given row, in particular the identifier assignments, are considered valid. A single station can have multiple rows with different Start/End dates to indicate identifier changes and changes in coordinates (typically included when the change is more than approximately 3 km, and ignored otherwise).*

3.39. **Deprecated column** (deprecated)

The remarks row was phased out in 2021 and data was moved to the "notes" column. Formerly, plain language remarks were entered here which pertained to the row. Some automatically-generated additions were removed.

3.40. **Grid** (grid)

Formerly coordinate group / latlongrp, but essentially is the same concept.

This is a coded value that indicates the 1-degree block that this station is in. It is strictly used for grouping stations according to coordinate.

Appendix 1

Source codes

Source codes are given in the format *sssyy*, where sss is the code indicating the information source (see below) and yy is the 2-digit year of publication (e.g. 2006 is "06"). Multiple sources are separated with a space or dash, ordered with least significant sources at the end. "Type" indicates what we consider source ranking: 1 for a cardinal source (official regulatory or mission-critical source), 2 for a secondary source (official non-regulatory, non-operational source), or 3 for tertiary sources (private-party databases and lists).

Code	Type	Source
AFD	3	AirfieldsDatabase.com website, by David W. Brooks <www.airfieldsdatabase.com> - Historical data
AFR	1	DoD Flight Information Publication Supplement: Africa
AFL	3	Abandoned and Little Known Airfields <www.members.tripod.com/airfields_freeman/>
AIP	1	Official aeronautical information document of the host country
AKA	1	Alaska Flight Information Publication, Department of Commerce [direct reprint of FAA data]
AMS	2	Army Map Service (includes S501 series topographic maps)
AST	2	ASTER Global Digital Elevation DEM (METI and NASA), 30 m resolution
AWS	1	AWS Master Station Library (MASLIB) Station Index
CAA	1	Civil Aeronautics Administration (CAA) historical documents
CAN	1	Canada Station Data Catalogue, Environment Canada
CRW	3	CrewLogbook.com pilot submissions (these were removed during a site redesign in early 2010)
ENA	1	DoD Flight Information Publication Supplement: Europe, North Atlantic, and Middle East
EQU	1	USA Kxxx ICAO rendered as cardinal FAA identifier with K prefix but not explicity stated as such in sources
FAA	1	National Flight Database. Federal Aviation Administration.
GFN	2	Great Falls - Nome, Photographic Supplement to Pilot's Handbook, U.S. Army Air Forces
GLA	3	Gladstone Weather
ICA	1	Doc. 7910, *Location indicators*. International Civil Aviation Organization.
ICN	2	Internal aeronautical data source. [ICAO-NV]
ICY	2	Internal aeronautical data source. [ICAO-NY]
JOG	2	Joint Operations Graphic, Defense Mapping Agency, Department of Defense.
JCS	1	JCS NOTAM (US DoD) website, an authoritative mirror of current ICAO data
MET	2	Environment Canada METSTAT table
NCO	2	NCEP NCO
PAA	1	DoD Flight Information Publication Supplement: Pacific Australia and Antarctica
RMK	-	See remarks for location method.
RUS	1	Secondary publications from Russia's Aeronautical Information Centre (CAIGA) (AIP authority for Russia)
SEC	1	Sectional Aeronautical Chart (USAAF or FAA)
SFI	1	Supplementary Flight Information Document, Department of the Air Force
USA	1	DoD Flight Information Publication Supplement: United States
USG	2	USGS Topographic Map showing runway elevation
VIE	1	Air Facilities Data Pamphlet, Vietnam & Cambodia (U.S. DoD) -- equivalent to AIP data
WGT	3	Weather Graphics Technologies -- determined by us inhouse
WMO	1	Pub. 9, *Location indicators*. World Meteorological Organization.
WPC	2	Weather Plotting Chart series, Defense Mapping Agency, U.S. Department of Defense.
WWW	3	Where We Were In Vietnam, by Michael P. Kelley

Effective 1 October 2010, AIP sources are listed simply as "AIP" rather then the ISO-3166-2 alpha-3 country code, and the country shown in the country column indicates which nation's AIP was used.

Appendix 2

Special use identifiers

Special use identifiers consist of special identifier systems that are not ICAO, WMO, national ID, MASLIB, or WBAN identifiers. This element will consist of a code, followed by a solidus, followed by a value:

system/value1

Some systems will offer two values, separated by a solidus:

system/value1/value2

A ICAO, WMO, national ID, MASLIB, or WBAN identifier will be given if the sites are co-located, otherwise they will be blank.

Systems and the meaning of the values are described below:

System	Usage
BUOY	National Buoy Data Center identifier. Value1 provides the buoy number.
MASLIB	US Air Force Master Station Library number. Not implemented but reserved for possible future use.
NWS	NWS Location Identifier. This is distinct from the FAA identifier, but if none is given it can be assumed to equal the national ID identifier. These identifiers are typically used for Weather Service Forecast Offices and coastal buoys.
RAD	Environment Canada radar sites.
NEXRAD	NEXRAD site. Value1 provides the 4-letter site identifier. Value2 provides the NEXRAD numerical site identifier (used in WSR-88D data packets).
TTU	Texas Tech University Mesonet identifier. Value1 provides the station identifier.

Appendix 3

Standard abbreviations

Listed here are standard abbreviations identifiers which may appear in the MLID under a station name. For non-English countries they are preferred as they help identify the type of facility without implying the use of English words in the facility's title.

Prefix	Usage
A	Airport (obsolete, should be replaced by AP)
AAF	Army Air Field
AB	Air Base
AD	Aerodrome
AFB	Air Force Base
AFS	Air Force Station
AF	Airfield (discouraged as it may be interpreted as "Air Force base")
AFLD	Airfield
AF AUX	Auxiliary Airfield
AGDM	Agricultural Drought Monitoring Station (Canada)
AHP	Army Heliport
AMOS	Automated Meteorological Observatory (US)
AP	Airport
APT	Airport (use of AP is preferred)
AUTO	Automated station
AWS	Automated weather station
CAA	Civil Aeronautics Authority facility (United States FAA before 1958)
CDA	Canada Department of Agriculture facility
CS	Climate Station (Canada)
FIR	Flight Information Region
HEL	Heliport
HLS	Helicopter landing site
INTL	International
INTL AP	International Airport
INTL APT	International Airport (use of AP is preferred)
LH	Light house
LS	Light station
LWIS	Limited Weather Information System
MARS	Meteorological Automatic Reporting System** (Canada)
MAPS	Modular Acquisition Processing System** (Canada)
MET	Meteorological
MWO	Meteorological Watch Office
NWS	NWS Location Identifier*
NAS	Naval Air Station
NOLF	Naval Outlying Field
OBS	Observatory (also MET OBS)
RAF	Royal Air Force
RCS	Reference Climate Station (Canada)
READAC	Remote Envir. Atmospheric Data Acquisition Concept** (Canada)
STN	Station

* A NWS location identifier sometimes differs from FAA identifiers, in particular with radar sites. The FAA identifier takes precedence and the NWS identifier is marked in the "special" column.

** MARS I was introduced in 1969; MARS II in 1975; MAPS I in 1979; MAPS II in 1983; READAC in 1988. The systems were replaced by AWOS (Automated Weather Observation System) around 1995.

Appendix 3

Identifier schemes

1. **World Meteorological Organization (WMO) identifier**. The WMO identifier scheme was introduced in 1948 by the International Meteorological Organization (later the WMO) to support the "International Meteorological Code", now known as SYNOP or FM 12 code. It relies on a 5-digit numeric value (zero-padded from the left) to identify a weather station. It is widely used in synoptic (every six hours) weather reports and upper air reports. The entire identifier is often called the "index number". The first two digits are referred to as the "block number" and indicate to the geographic area (00-29 Europe, 30-59 Asia, 60-68 Africa, 69 special use, 70-79 North America, 80-89 South America, 90-99 Oceania). The last three digits are loosely referred to as the "station number" in the context of "block numbers". The WMO provides free access to all WMO identifier assignments on its website, but these are not crossreferenced with ICAO and in some countries they only indicate a city name without indication of where the facility is located.

2. **ICAO Location Indicator**. The ICAO Location Indicator is a 4-character identifier which identifies stations which are part of the "aeronautical fixed service". ICAO indicators are published quarterly in ICAO Doc 7910. The original assignments were implemented in the early 1950s, though none of our sources show the exact date; not even ICAO has the information in their holdings. The assignments were distributed as biannual aeronautical amendments starting in January 1958 and published in book form starting in March 1967 with Doc 7910/1. The ICAO does not make assignments; it only outlines the requirements for these codes and publishes collections of the the information submitted by each member nation. These have historically been incomplete, therefore the member nation's aeronautical information documents provide the original source of identifier information.

All ICAO identifiers are assigned by member countries to their own territory, using the nationality letters (prefix) assigned to the country. In some cases these nationality letters may be provisionally attached to locations in a different country, in particular those allocated to military forces such as KQ (US military) and CU (Canadian military). In such cases the database rows will always indicate the actual country and city name of the coordinate.

3. **FAA Location Identifier (FAA LID)**. The FAA Location Identifier scheme is primarily a 3-character identifier developed in the 1940s by the Civil Aeronautics Administration (CAA). FAA LIDs were positively being published by 1948. The CAA became part of the FAA in 1958, and the identifiers continued in use. By the 1970s, numbers were permissible in the FAA LID for minor airports, while private airports were given 4-character FAA identifiers. These 4-character FAA

identifiers are not used internationally or in meteorology and are not in this database.

4. **Weather Bureau/Army/Navy (WBAN) identifier**. This was the earliest unified identifier scheme, implemented in 1957 to process the multitude of data sources with different identifiers. It was used by the United States Weather Bureau, Air Force, Navy, and Army; the Canadian Department of Transportation; and certain German and Korean stations in close cooperation with the US weather services A WBAN identifier is a 5-digit numerical identifier, similar in appearance to the WMO identifier but not equivalent. It is still used by NCDC to identify many of its climatological datasets and continues to be very important for meteorological work. NCDC provides free access to all known WBAN identifier assignments at <*https://www.ncdc.noaa.gov/homr/reports/platforms*>.

5. **Master Station Library (MASLIB) Catalog Number.** The MASLIB scheme was developed in the 1960s by Air Force Global Weather Center (AFGWC), now part of Air Force Weather Agency (AFWA). It was created to overcome shortfalls in the WBAN system, which was originally developed for United States climatology, and to assist AFGWC/AFWA with routing and processing data in real-time. AFGWC/AFWA has maintained the MASLIB for over 40 years, though public releases ceased after 1999 as the military increased its operations security focus. The MASLIB code consists of six numerical digits, and uses the WMO identifier as the root for its numbering system. If an identifier has a WMO assignment, its MASLIB number will be the WMO identifier suffixed with zero. If not, it will have an arbitrary one-digit suffix that produces a MASLIB number, using a manually selected nearby WMO station as the five-digit root.

6. **Environment Canada location identifier**. Canada bases their identifiers heavily on the FAA Location Identifier scheme, adopting most identifiers out of the Y-- block out of a memorandum of agreement with the FAA. Starting in the 1980s, Canada also began using identifiers starting with W (for climate stations), Z (for special use aviation), and X (for miscellaneous stations). Canadian identifiers are assigned by Transport Canada and Environment Canada. The Canadian METSTAT history tables indicate that Canada has begun using identifiers starting with other parts of the alphabet, such as A for agromet, S for standards, and V for sports venues. Since very few of these are used to transmit weather data and can potentially conflict with US identifiers, we generally disregard all Canadian identifiers except those starting with W, Y, and Z. [As of September 2018, Canadian stations outside the CW/CY/CZ range transmitting METAR data were CP68*, CP69*, CPBT, CPEH, CPFI, CPIR, CPRO, CPRY, CPST, CPSV, CPXL, CQCM, CQTF, CQWN, CRNM, CTAE, CTCK, CTNK, CTRA, and CTWN; asterisk indicates no current data].

7. **IATA Location Identifier**. The International Air Transport Association (IATA) location identifiers are 3-character codes developed in the 1950s or 1960s and governed by IATA Resolution 763. They are not part of the MLID.

Appendix 4

Historical ICAO indicator block changes

Presented here is a list of known ICAO indicator block changes that affected multiple stations. This will be incorporated into the database. If an exact calendar date is not specified, then the effective date is estimated based on all available information. Anyone who has corrections or specific information on effective dates should contact us.

New	Old	Change date	Country or region	Reference
BG	**OU**	1956-1967	Greenland	SFI56,AWS67
BI	**TF**	1956-1967	Iceland	SFI56,AWS67
DF	**DH**	1982-1994	Burkina-Faso (Upper Volta)	AFR82,AWS94
ED, ET	**ED**	1995/01	West Germany, identifiers reassigned to civilian facilities [2]	AWS94
ED, ET	**ET**	1995/01	East Germany, identifiers reassigned to military facilities [2]	AWS94
FE	**FF**	1982-1984	Central African Republic	DOD82,ICA85
FM	**CF**	1985-1990	Saint Pierre Island	ICA85,ICA90
GG	**GP**	1982-1984	Guinea-Bissau	DOD82,ICA85
HH	**HA**	1990-1994	Eritrean stns (seceded from Ethiopia 5/24/1993)	ICA90,ICA95
LJ	**LK**	1990-1994	Slovakia (seceded from Czechoslovakia 1/1/1993)	ICA90,ICA95
LP	**CS**	1956-1967	Azores	SFI56,AWS67
LQ	**LY**	1990-1994	Bosnia-Herzegovina (seceded from Yugoslavia 3/1/1992)	ICA90,ICA95
LU	**U**	1990-1994	Moldova (seceded from USSR 8/27/1991)	ICA90,ICA95
MA	**TN**	1985-1989	Netherlands Antilles	ICA85,ICA90
MP	**MB**	1975-1979	Panama (Canal Zone area)	ICA75,ICA80
MX	**ZQ**	1956-1967	Bermuda	SFI56,ICA70
NV	**NH**	1980-1984	Vanuatu	ICA80,ICA85
OY	**OD**	8/1991	South Yemen (absorbed into Yemen 5/22/1990)	AWS94
PF	**PA**	1985-1989	Alaska / Fort Yukon area	ICA85,ICA90
PO	**PA**	1985-1989	Alaska / Oliktok area	ICA85,ICA90
PP	**PA**	1985-1989	Alaska / Point Lay area	ICA85,ICA90
SK	**MC**	1985-1989	Colombia	ICA85,ICA90
SM	**ME**	1985-1989	Suriname	ICA85,ICA90
SO	**MO**	1985-1989	French Guiana	ICA85,ICA90
TF	**MF**	1985-1989	French Antilles	ICA85,ICA90
TI	**MI**	1985-1989	Virgin Islands (U.S.)	ICA85,ICA90
TJ	**MJ**	1985-1989	Puerto Rico	ICA85,ICA90
TX	**MX**	1985-1989	Bermuda	ICA85,ICA90
TX	**MX**	1976-1994	Bermuda	AWS76,AWS94
U	**EU**	1970-1974	USSR	ICA70,ICA75
VB	**XZ**	1960s	Burma/Myanmar (US military tactical sites)	PAA69
VG	**VP**	1979-1974	Bangladesh (seceded from Pakistan 3/25/1971-12/16/1971)	ICA70,ICA75
VV	**VW**	1975-1979	North Vietnam (absorbed into Vietnam 4/30/1975-4/2/1976)	ICA75,ICA80
VV	**IK**	1970s	Vietnam (US military tactical sites)	AWS73
VY	**VB**	1990-1994	Burma/Myanmar	ICA90,ICA95
Y	**AA**	11/1993	Australia (South Australia)	AWS94
Y	**AB**	11/1993	Australia (South Queensland)	AWS94
Y	**AC**	11/1993	Cocos Island	AWS94
Y	**AD**	11/1993	Australia (Northern Territory)	AWS94
Y	**AG**	11/1993	Solomon Islands	AWS94
Y	**AH**	11/1993	Australia (north Western Australia)	AWS94
Y	**AL**	11/1993	Australia (Tasmania)	AWS94
Y	**AM**	11/1993	Australia (Victoria - Tasmania)	AWS94
Y	**AN**	11/1993	Nauru	AWS94
Y	**AP**	11/1993	Australia (Western Australia)	AWS94
Y	**AS**	11/1993	Australia (New South Wales and A.C.T.)	AWS94
AS	**AT**	1975-1979	Australia (north Queensland)	AWS94
Y	**AY**	11/1993	Australia (Papua New Guinea)	AWS94
Z	**RC**	1/31/1976	People's Republic of China[1]	ICA75,ICA80
---	**---**	-	-	-

SPECIAL NOTE

[1] Before 1976 the People's Republic of China (PRC) and the island of Taiwan (claimed by and represented by the PRC) were both assigned the RC block. The PRC published a number of identifiers for Taiwan but assigned no identifiers for mainland China. Starting in February 1976, the PRC assigned RC as a Taiwan-specific identifier and began use of the blocks ZB, ZG, ZH, ZL, ZP, ZS, ZU, ZW, and ZY for mainland locations, a practice which continues to this day. These blocks are geographical and indicate the Area Control Center region for the station.

[2] Originally the block ED was assigned to West Germany and ET to East Germany. The countries reunified 1990-10-03. After reunification, the block ED was assigned to German civilian facilities and ET to German military facilities.

Appendix 5

Nonstandard Canadian identifiers

This is a listing of stations in Canada outside the CW/CX/CY/CZ range which have transmitted METAR data between June 2007 and September 2018. It is possible that one or more of the stations could be erroneously coded station identifiers from a different station, however this list is useful for detecting whether a station has been active. The only station within this range that is listed by the ICAO is CUUP (CFB Uplands ON); it has not reported data. Stations with an asterisk (*) are not recognized in Environment Canada's station catalogue and may indicate an ambiguous station or the use of an erroneous identifier. Because of the potential for collisions with the FAA 3-letter location identifier scheme, none of the stations in the CA-CU range can be included in the FAA 3-letter location identifier listing and only the ICAO identifiers are provided.

CAHR	03-Sep-2018	CMLA	14-Jun-2007
CAID*	06-Aug-2017	CMLI	14-Jun-2007
CALC*	03-Dec-2009	CMPL	14-Jun-2007
CALK*	23-Sep-2012	CMRU	14-Jun-2007
CBBA*	19-Jan-2013	CMRY	14-Jun-2007
CBBC	01-Sep-2018	CMSC	14-Jun-2007
CBBY*	22-Nov-2011	CMWD	14-Jun-2007
CBKP*	25-Jan-2013	CNUQ*	28-Jan-2011
CBYD*	29-Jun-2007	COBG*	17-Aug-2016
CCAE*	31-Mar-2008	COGB*	06-Apr-2008
CCAT*	05-Mar-2012	CORG*	03-Sep-2018
CCFA*	21-Jan-2013	CORI*	23-Mar-2012
CCJO*	18-Jan-2013	CORR*	24-Jan-2016
CCRM*	06-Mar-2012	CP68*	30-Jul-2017
CCTE*	24-Jan-2013	CP69*	14-Dec-2010
CERM*	03-Sep-2018	CPBT	04-Sep-2018
CFP7*	16-May-2015	CPEH	04-Sep-2018
CGCP*	28-Oct-2009	CPFI	04-Sep-2018
CGSL*	02-Apr-2008	CPIR	04-Sep-2018
CHCH*	28-Jan-2010	CPRO	04-Sep-2018
CHSE*	13-Nov-2009	CPRY	04-Sep-2018
CINS	20-Oct-2011	CPST	04-Sep-2018
CJBG*	16-May-2011	CPSV	04-Sep-2018
CJCT*	07-Dec-2008	CPXL	04-Sep-2018
CLCA*	30-Mar-2009	CQCM	28-Oct-2010
CLLP*	25-Jan-2013	CQTF*	01-Jun-2014
CLRB*	06-Oct-2013	CQWN*	04-Jun-2013
CMCW	14-Jun-2007	CRNM*	23-Jul-2009
CMFM	04-Sep-2018	CTAE	14-Jun-2007
CMFO*	15-Oct-2008	CTCK	03-Sep-2018
CMGB	04-Sep-2018	CTNK	03-Sep-2018
CMHB	14-Jun-2007	CTRA	03-Sep-2018
CMHW	14-Jun-2007	CTWN	14-Jun-2007

Appendix 6

Russian identifiers

As Russian is an official ICAO language, Russia assigns its identifiers in Cyrillic. This must then be transcoded to Latin. ICAO conversions from Cyrillic to Latin are based on the correspondence of the ITA-2 English and MTK-2 Russian teletype registers. Historically, the equivalence of these character sets allowed Russian and English messages to flow across teletype circuits converted phonetically to an approximation of the receiver's language. This included weather messages. Since ICAO location indicators are assigned by member states and may appear in Russian documents before publication in English, these conversion rules are important for working with identifier assignments.

Note that Russian identifiers beginning with Ь (Latin: X) are not included in the MLID. These assignments are known to been used since at least the 1970s-80s, but were intended for internal Soviet and Russian use, mostly for secondary and military airfields.

Since the ICAO does not authorize nationality codes beginning with X, and METAR observations do not normally originate from such stations, the MLID does not include these identifier sets.

The document with *complete* identifier assignments for Russia is not the AIP but "Сборник четырехбуквенных указателей (индексов) местоположения" published by the Federal Air Navigation Service and distributed by CAIGA.

MTK-2	ITA-2
А	A
Б	B
В	W
Г	G
Д	D
Е	E
Ж	V
З	Z
И	I
Й	J
К	K
Л	L
М	M
Н	N
О	O
П	P
Р	R
С	S
Т	T
У	U
Ф	F
Х	H
Ц	C
Ч	Not used
Ш	Not used
Щ	Not used
Ъ	Not used
Ы	Y
Ь	X
Э	Not used
Ю	Not used
Я	Q

Appendix 7

Major updates (recent)

All updates assume that standard updates to ICAO, WMO, and FAA data have been performed. This lists other changes.

V2021.03 - Several changes and improvements as follows:

* Series E begins with restructuring of the column arrangement. Hopefully this will be the last time such restructuring is needed.

* More descriptive text is being provided in the station_name column. Extended information may be provided here in brackets as well as in the "notes" column.

* MASLIB columns have been removed. This will no longer be supported since it cannot be maintained, the code is used in very few datasets (mostly 1940s-1950s historical data), and no updated information is available. A 2019 Freedom of Information Act (FOIA) request for an updated MASLIB has been unsuccessful, the agency citing an exemption as it related to infrastructure. If MASLIB data is re-instated in the future it will be coded in the "special identifier" column. In general, MASLIB numbers can be assumed to be a six-digit number comprised of the WMO station number followed by a zero. If users need MASLIB number conversions, older editions of MLID may be used.

* Column H, formerly "station_instance", has been changed to "notes", and Column AQ, formerly "remarks", has been deprecated and changed to "deprecated", with former contents moved to the notes column (except for ADJ/yyyymmdd rows which were considered not useful and removed). This was necessary to properly maintain the listing, as Column AQ was far out of sight during manual review and this prevented it from being maintained.

* WBAN values have been fully corrected and duplicates removed.

* The start_source and end_source columns were removed. These are not being maintained, and such information is being provided in the "notes" column when possible.

* GHCN values for US locations ("USWnnnnnn") have been created wherever a WBAN exists within the US.

* Row elevations with low quality ratings, such as those that were crowdsourced, have been replaced with ASTER Global Digital Elevation Model (GDEM) values, which will serve as a provisional source until more authoritative information is available.

* Classification scheme for latitude-longitude quality adjusted to allow a higher grade of quality (A, manual).

* A thorough audit and manual review of ICAO data has been conducted for the following countries: Russia and former USSR republics (ICAO U block), New Zealand, Great Britain, Myanmar, Bulgaria, Bosnia, Namibia, and Mongolia in accordance with those countries' latest AIP.

V2021.01 - Status column “X” and “x” standardized to lower case “x”. latgrp and longrp replaced with latlongroup and format changed to a coded value.

V2019.08D 2019-08-01 - Series D begins, which provides a major revision of the MLID format:

* current stations are set to a dash “-” in the status column to reduce visual clutter when loaded in spreadsheets.

* GHCN (NOAA Global Historical Climatology Network) identifiers have been added. All have been manually crossreferenced. Assignments in Australia were extensively checked for WMO and station matches against their weather station metadata.

* a “type” column was added to allow us to begin properly differentiating airfield coordinates/elevation from sensor coordinates/elevation. The earlier format only allowed differentiation of barometer elevation versus the station reference point elevation. Currently only “KDFW” is differentiated. [NOTE: This scheme may be moved to the row_purpose column with a coded abbreviation]

* barometer elevation data columns were removed. This scheme implied that a single row could serve two neighboring locations/facilities. Our intention is that each row should serve only a single location/facility, and will be determined by the “type” column.

* tables were restructured to delete IATA columns as these elements are not maintained, and travel industry requirements are not a focus of this database.

* airport abbreviations were standardized in the station_name column, particularly “Airport”, which was converted to “AP”. This provides brevity as well as providing a common standard for placenames across multiple languages.

V3.2.2 2019-02-10 - Extensive audit of China (PRC) ICAOs; fixed all known airport locations; added in placeholders for smaller city airports in case they correspond to a WMO station or an unidentified ICAO identifier is connected. There are still several unidentified stations which are inadequately documented in the PRC AIP (a common occurrence in many countries). Full update of GIS elements. Update of manual.

V3.2.1 2019-01-25 - Brought ICAO and WMO tables up to date to January 2019.

V3.2.0 2018-09-01 - Extensive Canadian changes for 2014-2015 WMO relocations. Canada station data catalogue updates, deprecated older stations, resolved additional changes. Extensive ICAO update (partly manual). Standard WMO/ICAO/FAA updates through August 2018 and metadata/documentation updates.

Appendix 8

Table column changelog

Dates given at the top of each column are start dates.

		Series C	Series D	Series E
Column		**2010-11-01**	**2019-08-02**	**2021-03-01**
A	**1**	country3	country3	country3
B	**2**	country2	country2	country2
C	**3**	country	country	country
D	**4**	region	region	region
E	**5**	subregion	subregion	subregion
F	**6**	city	place_name	place_name
G	**7**	station_name_current	station_name	station_name
H	**8**	station_name_special	station_name_instance	notes
I	**9**	stn_key	type	type
J	**10**	icao_xref	stn_key	stn_key
K	**11**	national_id_xref	icao_xref	icao_xref
L	**12**	wmo_xref	national_id_xref	national_id_xref
M	**13**	wban_xref	wmo_xref	wmo_xref
N	**14**	iata_xref	status	status
O	**15**	status	icao	icao
P	**16**	icao	icao_quality	icao_quality
Q	**17**	icao_quality	icao_source	icao_source
R	**18**	icao_source	national_id	national_id
S	**19**	national_id	national_id_quality	national_id_quality
T	**20**	national_id_quality	national_id_source	national_id_source
U	**21**	national_id_source	wmo	wmo
V	**22**	wmo	wmo_quality	wmo_quality
W	**23**	wmo_quality	wmo_source	wmo_source
X	**24**	wmo_source	maslib	wban
Y	**25**	maslib	maslib_src	wban_source
Z	**26**	maslib_source	wban	ghcn
AA	**27**	wban	wban_source	special
AB	**28**	wban_source	ghcn	lat
AC	**29**	special	special	lon
AD	**30**	lat_prp	lat	ll_quality
AE	**31**	lon_prp	lon	ll_source
AF	**32**	ll_quality	ll_quality	elev
AG	**33**	ll_source	ll_source	elev_quality
AH	**34**	elev_prp	elev	elev_source
AI	**35**	elev_prp_quality	elev_quality	tz
AJ	**36**	elev_prp_source	elev_source	postal_code
AK	**37**	elev_baro	tz	start
AL	**38**	elev_baro_quality	postal_code	end
AM	**39**	elev_baro_source	start	deprecated
AN	**40**	tz	start_source	grid
AO	**41**	postal_code	end	
AP	**42**	start (inclusive)	end_source	
AQ	**43**	start_source	remarks	
AR	**44**	end (inclusive)	latgrp	
AS	**45**	end_source	longrp	
AT	**46**	remarks		
AU	**47**	latgrp		
AV	**48**	longrp		