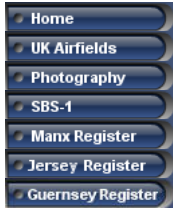


## SBS BaseStation

[illegible]

ID	Type	Description
MSG,1	ES Identification and Category	DF17 BDS 0,8
MSG,2	ES Surface Position Message	DF17 BDS 0,6 Triggered by nose gear squat switch.
MSG,3	ES Airborne Position Message	DF17 BDS 0,5
MSG,4	ES Airborne Velocity Message	DF17 BDS 0,9
MSG,5	Surveillance Alt Message	DF4, DF20 Triggered by ground radar. Not CRC secured. MSG,5 will only be output if the aircraft has previously sent a MSG,1, 2, 3, 4 or 8 signal.
MSG,6	Surveillance ID Message	DF5, DF21 Triggered by ground radar. Not CRC secured. MSG,6 will only be output if the aircraft has previously sent a

[illegible]

## MSG 8

Gnd

SEL

CS

ID

CS

AIR

STA

CLK

-1 -1

### Notes:

1. STA message uses the callsign field to record status flags based on user time-out values. Values are **PL** (Position Lost), **SL** (Signal Lost), **RM** (Remove), **AD** (Delete) and **OK** (used to reset time-outs if aircraft returns into cover).
2. CLK message returns a value of -1 in Fields 4 and 6. Field 5 is null.
3. MSG,7 (Air to Air message) has only recently been included in the socket output.
4. Although aircraft now transmit Heading and True Airspeed these values are not available in the socket output.

From the above table you see that MSG,1 messages only send data for the first eleven fields and the remaining 11 fields are empty. The result is a lot of commas in this (and in other MSG formats).

Examples of each message:

SEL,,496,2286,4CA4E5,27215,2010/02/19,18:06:07.710,2010/02/19,18:06:07.710,RYR1427
ID,,496,7162,405637,27928,2010/02/19,18:06:07.115,2010/02/19,18:06:07.115,EZY691A
AIR,,496,5906,400F01,27931,2010/02/19,18:06:07.128,2010/02/19,18:06:07.128
STA,,5,179,400AE7,10103,2008/11/28,14:58:51.153,2008/11/28,14:58:51.153,RM
CLK,,496,-1,-1,2010/02/19,18:18:19.036,2010/02/19,18:18:19.036
MSG,1,145,256,7404F2,11267,2008/11/28,23:48:18.611,2008/11/28,23:53:19.161,RJA1118,,,,,,,,,
MSG,2,496,603,400CB6,13168,2008/10/13,12:24:32.414,2008/10/13,12:28:52.074,,,0,76.4,258.3,54.05735,-4.38826,,,,,0
MSG,3,496,211,4CA2D6,10057,2008/11/28,14:53:50.594,2008/11/28,14:58:51.153,,37000,,51.45735,-1.02826,,,0,0,0,0
MSG,4,496,469,4CA767,27854,2010/02/19,17:58:13.039,2010/02/19,17:58:13.368,,,288.6,103.2,,,832,,,,,
MSG,5,496,329,394A65,27868,2010/02/19,17:58:12.644,2010/02/19,17:58:13.368,,10000,,,,,0,,0,0
MSG,6,496,237,4CA215,27864,2010/02/19,17:58:12.846,2010/02/19,17:58:13.368,,33325,,,,,0271,0,0,0,0
MSG,7,496,742,51106E,27929,2011/03/06,07:57:36.523,2011/03/06,07:57:37.054,,3775,,,,,,0
MSG,8,496,194,405F4E,27884,2010/02/19,17:58:13.244,2010/02/19,17:58:13.368,,,,,,,,,,0

## Interpolation

It can be seen that no single MSG type provides all the data we use in BaseStation and that some data fields are unique to one message type. Callsign is only found in MSG,1, VertRate only in MSG,4 and Squawk in MSG,6.

To collect all 11 data fields for one aircraft would require the reception of at least four MSG types (MSG,1, MSG,3, MSG,4 and MSG,6) but note that MSG,6 is only triggered by ground radar interrogation. If the aircraft is outside any ground radar coverage no MSG,6 will be sent. As MSG,6 is the only message that sends out the squawk code it means this will only be displayed for SBS users who are detecting aircraft within Mode S ground radar coverage.

Likewise MSG,5 and MSG,8 are only sent on interrogation but the data in these types is available in other messages.

MSG,5 and MSG,6 are not CRC secured and will only be received should an aircraft have already sent a MSG,1, 2, 3, 4 or 8.

## Ground targets

If Field 22 (IsOnGround) is being sent this will trigger a change of values in Field 12 (Altitude) and in Fields 15 and 16 (Latitude and Longitude). Field 12 (Altitude) will reset to zero and whilst the aircraft remains on the ground no altitude data will be sent.

## Positional Accuracy

The Compact Position Report in ADS-B sends Lat/Long data in 17 bits and when airborne this gives accuracy to 5.1 metres. 17 bits equates to four decimal places for Lat/Long values - e.g N54.1234, W145.1234. For ground operations greater positional accuracy is required and so Lat/Long values are extended to five decimal places - e.g. N54.12345, W145.12345 - which gives an accuracy of 1.25 metres.

To accommodate this accuracy into a 17 bit string some data is dropped - the full Lat/Long position data is no longer sent. In BaseStation the missing data needs to be added by the user and this is why Lat/Long values are only interpreted correctly if a location is set in the BaseStation Location Manager. For most users adding a home location in the Location Manager is sufficient but mobile users need to add further locations for the airfields they may be visiting abroad. By abroad I mean intercontinental as BaseStation now plots ground traffic correctly to within approx 2500nm of the set location (it formerly was only 90nm).

The socket data always shows Lat/Long data to five decimal places and can provide full 1.25 metre accuracy where this is sent.

## Credits

My thanks go to Andy (Three Miles), Dave Reid and Steve (Edgy) who have posted much information on the Kinetic forum about socket data format. Without their research this page wouldn't exist.

BST files

Basestation has the an option to record data. This is not raw socket data as described above but processed data for the Basestation display.

Unlike raw data, each string in the BST files shows 17 data field values. All are populated, using last known values for each string until a socket MSG updates any values.

The recorded datastream looks like this:

"2018/07/05","02:44:34.126","9004131","896463","ETD44A","United Arab Emirates","0","39000","39000","52.05327","-3.81704","-64","-64","484.6","":  
"2018/07/05","02:44:34.142","4736069","484445","KLM656","Netherlands","0","41000","41000","55.11269","-3.75159","0","0","480.8","122.2","25347"  
"2018/07/05","02:44:34.153","10672439","A2D937","AAL716","United States","0","40000","40000","51.65419","-3.77826","-64","-64","474.5","95.9",'  
"2018/07/05","02:44:34.153","10895798","A641B6","DAL132","United States","0","41000","41000","53.92718","-2.84215","-64","-64","494.4","107.3",'  
"2018/07/05","02:44:34.178","9004131","896463","ETD44A","United Arab Emirates","0","39000","39000","52.05309","-3.81561","0","0","484.6","102.6"  
"2018/07/05","02:44:35.122","4736069","484445","KLM656","Netherlands","0","41000","41000","55.11223","-3.75030","0","0","480.8","122.2","25347"  
"2018/07/05","02:44:35.124","10672439","A2D937","AAL716","United States","0","40000","40000","51.65408","-3.77647","-64","-64","474.5","95.9",'  
"2018/07/05","02:44:35.151","9004131","896463","ETD44A","United Arab Emirates","0","39000","39000","52.05286","-3.81393","0","0","484.6","102.6"  
"2018/07/05","02:44:35.155","10895798","A641B6","DAL132","United States","0","41000","41000","53.92667","-2.83924","-64","-64","494.4","107.3",'  
"2018/07/05","02:44:35.454","4736069","484445","KLM656","Netherlands","0","41000","41000","55.11147","-3.74817","0","0","480.8","122.2","25347"  
"2018/07/05","02:44:35.460","10672439","A2D937","AAL716","United States","0","40000","40000","51.65396","-3.77462","-64","-64","474.5","95.9",'

Field Data

The BST file contains 17 data fields separated by commas. These fields are:

Field 1:	Date message generated	Self evident
Field 2:	Time message generated	Self evident
Field 3:	Mode S Code (Decimal)	Aircraft Mode S decimal code
Field 4:	Mode S Code (Hex)	Aircraft Mode S hexadecimal code
Field 5:	Callsign	An eight digit flight ID - can be flight number or registration (or even nothing).
Field 6:	Country	Interpolated from Mode S code using the Countries.dat file.
Field 7:	IsOnGround	Flag to indicate ground squat switch is active
Field 8:	Altitude	Mode C altitude. Height relative to 1013.2mb (Flight Level). Not height AMSL..
Field 9:	Altitude	A placeholder for future development. Same data as above.
Field 10:	Latitude	North and East positive. South and West negative.
Field 11:	Longitude	North and East positive. South and West negative.
Field 12:	VerticalRate	64ft resolution
Field 13:	VerticalRate	Adjusted data for Basestation screen presentation.
Field 14:	GroundSpeed	Speed over ground (not indicated airspeed)
Field 15:	Track	Track of aircraft (not heading). Derived from the velocity E/W and velocity N/S
Field 16:	Squawk (Decimal)	Assigned Mode A squawk code, decimal.
Field 17:	Squawk (Octal)	Assigned Mode A squawk code, octal. Cockpit setting.

