The Met. Office

A PRELIMINARY SUMMARY OF INFORMATION ON THE EXCEPTIONALLY

STRONG WINDS OF 16 OCTOBER 1987 OVER THE SOUTH OF ENGLAND

Meteorological Office, Advisory Services, London Road, Bracknell, Berks RG12 2SZ

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A PRELIMINARY SUMMARY OF INFORMATION ON THE EXCEPTIONALLY STRONG WINDS OF 16 OCTOBER 1987 OVER THE SOUTH OF ENGLAND

Prepared by the Met Office, Advisory Services, Bracknell

Note: This summary has been prepared in haste to meet the immediate demand from the public for some facts about the exceptional winds of 16 October 1987 over the south of England. In order to meet this demand this summary is based on information which is immediately available to Advisory Services. The data have not yet been subjected to our usual careful scrutiny. Therefore the analyses shown and the values quoted may be reviewed in the light of later examination. However it is believed that the summary will give a good guide to the extreme events of 16 October 1987.

Weather Situation on 15/16 October (see Annexes 1 to 6)

On the evening of 15 October at 2100 GMT (see Annex 1) a depression (Low) of central pressure 972 millibars was centred over the north of East Anglia. From this depression, a frontal zone lay across the south of England to another depression which was believed to be centred over the western entrance to the English Channel with a central pressure believed to be less than 966 millibars.

To the south of the frontal zone the air was quite mild and winds were blowing from between south and southwest. The air to the north of the frontal zone was cooler and winds were from the northeast.

By 0001 GMT (Annex 2) the depression in the west of the English Channel had deepened, probably to about 959 millibars and was centred over the south coast of Cornwall. The associated front was being forced to move quickly northwards over the south of England. A broad band of quite heavy rain was associated with the frontal zone.

By 0300 GMT (Annex 3) the depression was over the county of Avon with a central pressure of about 956 millibars and it was moving rapidly northeastwards. By 0600 GMT it had already reached the area of Humberside, probably with a central pressure of about 958 millibars and by 0900 GMT the depression was already well out into the North Sea (see Annex 5).

Annex 7 shows a satellite image with the depression centred off the east coast of England at 0830 GMT on 16 October.

Details of the surface wind conditions (Annexes 8 to 16)

Annexes 8 to 16 show the details of the surface winds as reported by observing sites. These reports form part of the full weather observation made in the 10 minutes or so prior to the nominal hour of observation shown on the charts. Therefore the MEAN wind direction and speed refers to a 10 minute period preceding the time shown. However the gust speed is the highest observed speed in the past HOUR. A guide to the interpretation of the plotted data is given at the end of this section.

At 2100 GMT on 15 October (Annex 8) most of the south of England except the coast of Sussex and Kent, was covered by light to moderate winds from the northeast. Stronger winds from the southwest were already affecting the coast of Sussex and Kent.

By 0001 GMT (Annex 9) the stronger winds had spread quickly northwards over the south of England, backing somewhat to a direction from the southsoutheast. Gusts to over 40 knots (46 miles per hour) were already being reported over inland areas.

The sequence of charts shown as Annexes 10 to 14 show hour by hour how the strong winds developed between 0200 GMT and 0600 GMT, the period when most areas experienced their strongest winds. Note particularly the gusts of 80 knots (92 mph) or more reported on the charts for hours ending 0400 GMT and

0500 GMT over the area southeast of a line approximately London to the Isle of Wight. Gusts to 82 knots (94 mph) were recorded in London between 0200 and 0300 GMT.

By 0600 GMT a broad belt of very strong winds covered most of England south of a line from a Severn Estuary to the Wash. The direction from which the wind was blowing had veered to between southwest and west by this time, as the centre of the depression moved quickly away over Humberside. By 0900 GMT (Annex 15) winds had decreased in strength over most areas except the north of East Anglia.

Key to Wind Charts

1. The "arrows" show the direction FROM which the 10 minute mean wind was blowing.

2. The short "feather" represents a speed of 5 knots (6 mph); the longer "feather" represents 10 knots (11 mph); a "triangle" represents 50 knots (58 mph).

Thus  indicates a wind of mean speed 45 knots (52 mph) blowing from the southwest and  is a wind of mean speed 70 knots (81 mph) blowing from the west.

3. The maximum gust in the hour is shown as "Gnn". For example, G90 is a gust of 90 knots (104 mph). The direction of the gust is not given. Note that only gusts exceeding a speed of 33 knots are reported in the routine weather observations.

Annex 17 shows the Maximum Gusts in knots reported during the 24 hours 0001 GMT to 2300 GMT on 16 October 1987. Most of these maximum gusts occurred in the period 0001 GMT to 0900 GMT.

How unusual were the wind speeds on 16 October 1987?

Providing sufficient long term wind records are available from a weather station with sophisticated wind recording equipment, it is possible by statistical methods to estimate the average interval in years between the occurrence of wind speeds of given strength. This interval is known as the RETURN PERIOD. It must be stressed that the Return Period is only an average time interval. In reality extreme winds could occur more frequently than the Return Period. Also the estimation of the Return Period is greatly affected by the quality and quantity of available data used in the analysis.

Annex 18 shows for 19 sites the highest "10 minute" mean speeds and/or the highest gusts recorded on 16 October together with an indication of the approximate Return Periods where available. As can be seen in some areas the wind speeds were not exceptional, having Return Periods of 20 years or less. However in a few cases the Return Periods appear to be in excess of 200 years and even possibly as long as 500 years or more in one or two cases. Again it must be stressed that these are estimates and it does not mean that it has been 500 years since such an event occurred nor does it mean that it will be 500 years before such winds will occur again. Nevertheless it does suggest that in some area the wind speeds recorded on 16 October 1987 were exceptionally strong for those areas. Elsewhere in Britain, especially in western and northern coastal areas (and over mountains) such wind speeds occur much more frequently.

Annex 19 shows a copy of part of the anemogram (wind record) from the observing site at Shoeburyness (Essex) during the time 0001 GMT to 1100 GMT on 16 October. The upper part of the diagram shows the record of the direction from which the wind was blowing. The lower part records the speed of the wind.

Annex 20 shows the official Beaufort Scale of Wind Force used by the Met Office and other meteorological services throughout the world.

Note that the term "Hurricane" strictly applies only to the special structure of a revolving storm in tropical latitudes of the Atlantic and therefore is not used to describe weather systems near to the British Isles. However the term "Hurricane Force" is used to describe winds of sustained speeds of 64 knots or more. No instrumented records of sustained winds of this speed for this occasion had come to hand at the time that this summary was being prepared but many gusts exceeding 64 knots occurred on 16 October.

The term "Strong Gale" is used in the Beaufort Scale but in Shipping Forecasts and Gale Warnings issued by the British Met Office the term "Severe Gale" is used to denote mean speeds of Force 9.

Historical Note

Amongst previous exceptional gales which have caused extensive damage "within living memory" are:

Period	Area	Reason
5/8 January 1928	All UK	Gale with North Sea floods
14/15 January 1952	All UK	Severe gale; hurricane force winds over north of Scotland
30 January/1 February 1953	All UK	Severe NW gale; North Sea floods.
4 November 1957	All UK	Exceptional gale
27 January 1961	Scotland	Hurricane force winds over the north of Scotland
11/18 February 1962	All UK	Exceptional gales; Sheffield storm damage
14/15 January 1968	Scotland	Exceptional gales; much damage in the Glasgow area.

One of the most notable storms of history which was recorded in detail by the famous author Daniel Defoe was the "Great Storm" of November 1703 which caused extensive damage and large loss of life.

Accounts of these earlier storms may often be found in local libraries especially in the archives of old newspapers.

Summary

The winds over parts of the southeast of England on 16 October 1987 will undoubtedly be the subject of much more detailed analysis during the coming months especially as more information is retrieved from recording sites. This summary may well be amended by later data. Enquirers who need more detailed reports for insurance, commercial or scientific purposes, etc are advised to contact:

The Met Office
Advisory Services (Room 228)
London Road
Bracknell
Berkshire RG12 2SZ Telex 849801 WEABKA G
DocFax 0344-422907

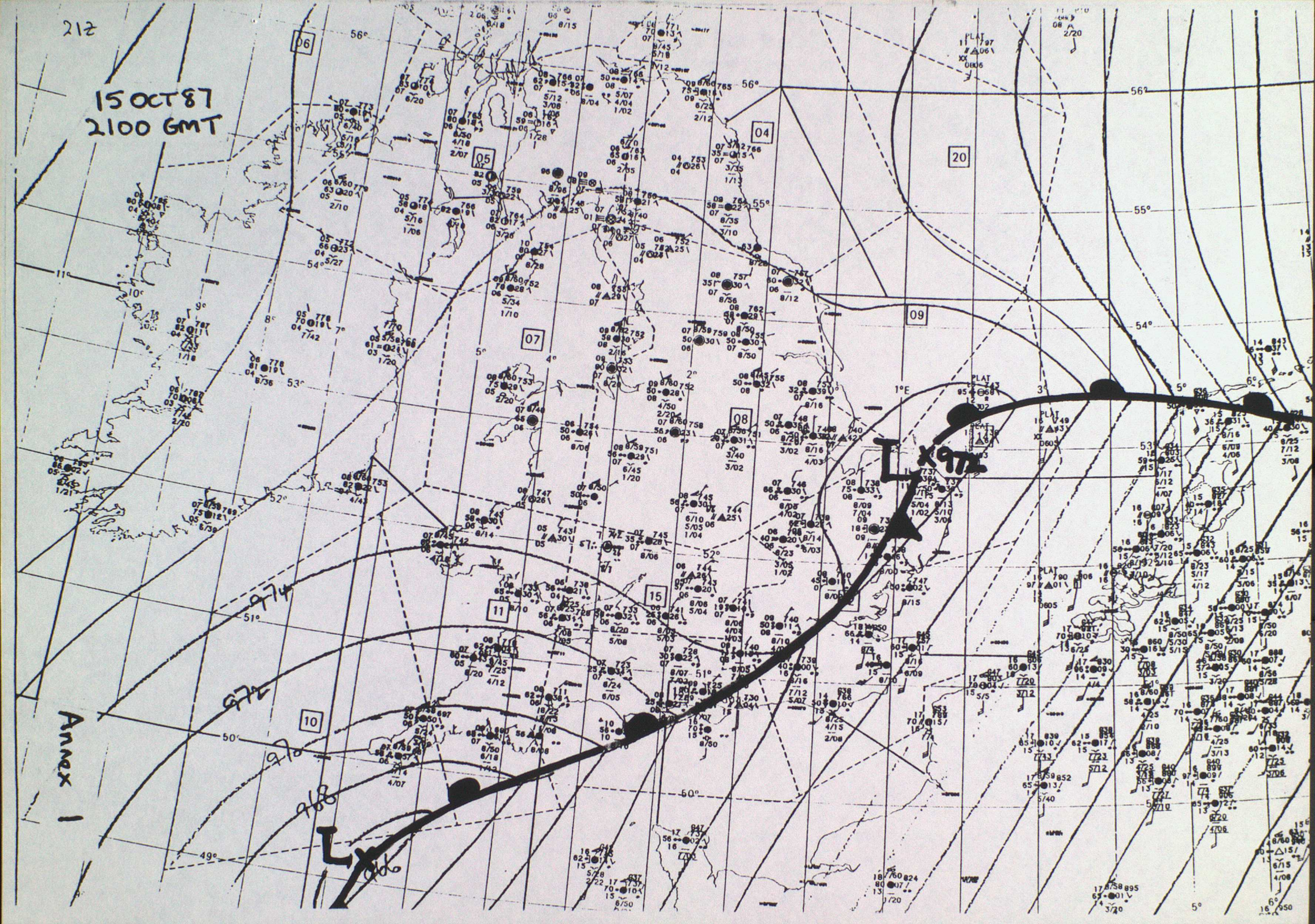
It is unlikely that detailed wind data from observing sites will be readily available to Advisory Services until mid-November following detailed quality control procedures. Potential enquirers are also reminded that the Met Office will make charges for responding to specific enquiries.

Note

The contents of this summary have only been lightly bound to facilitate separation of the pages for ease of examination, display or copying especially for school projects and discussions etc.

October 1987

Advisory Services
Met Office, Bracknell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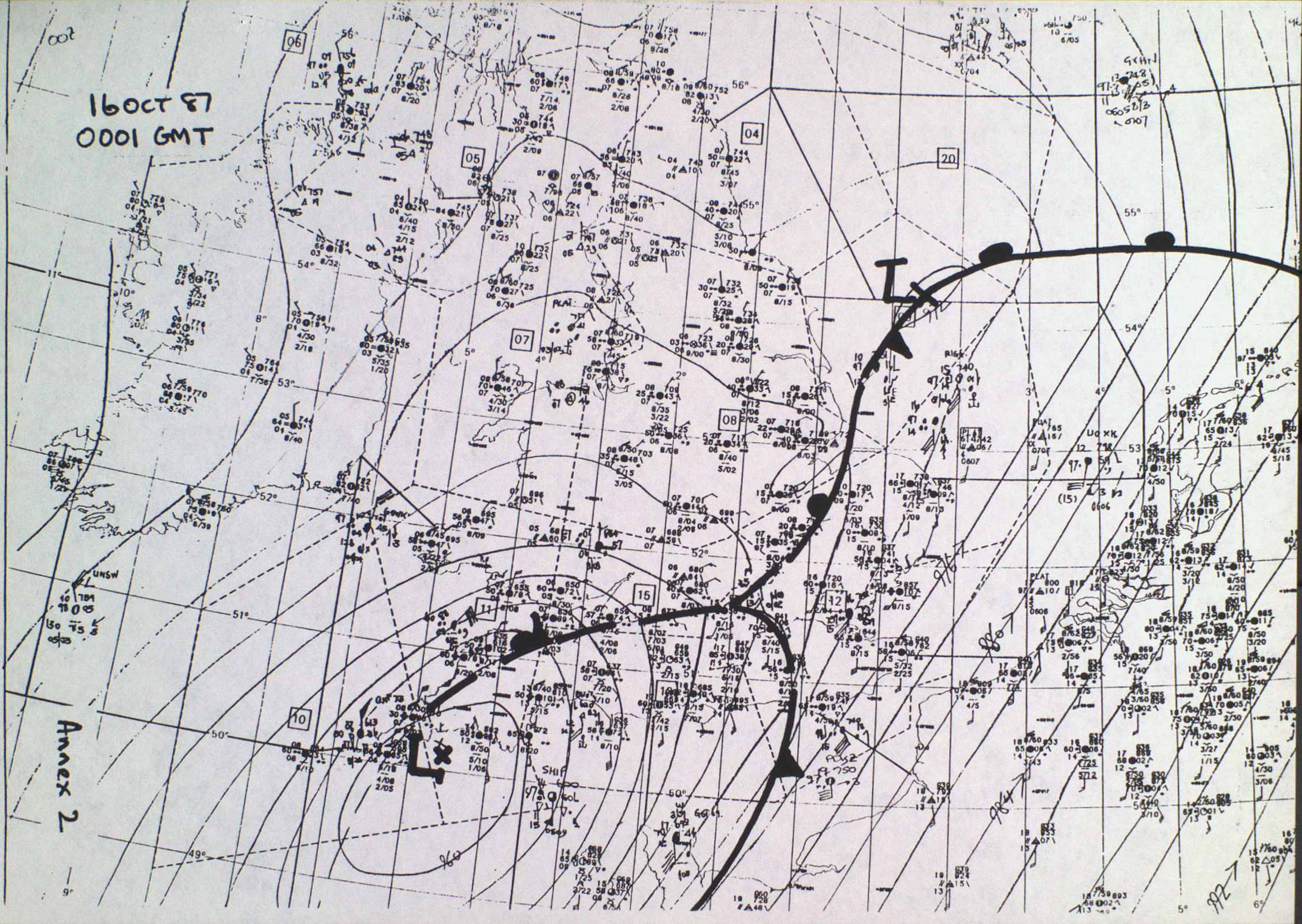
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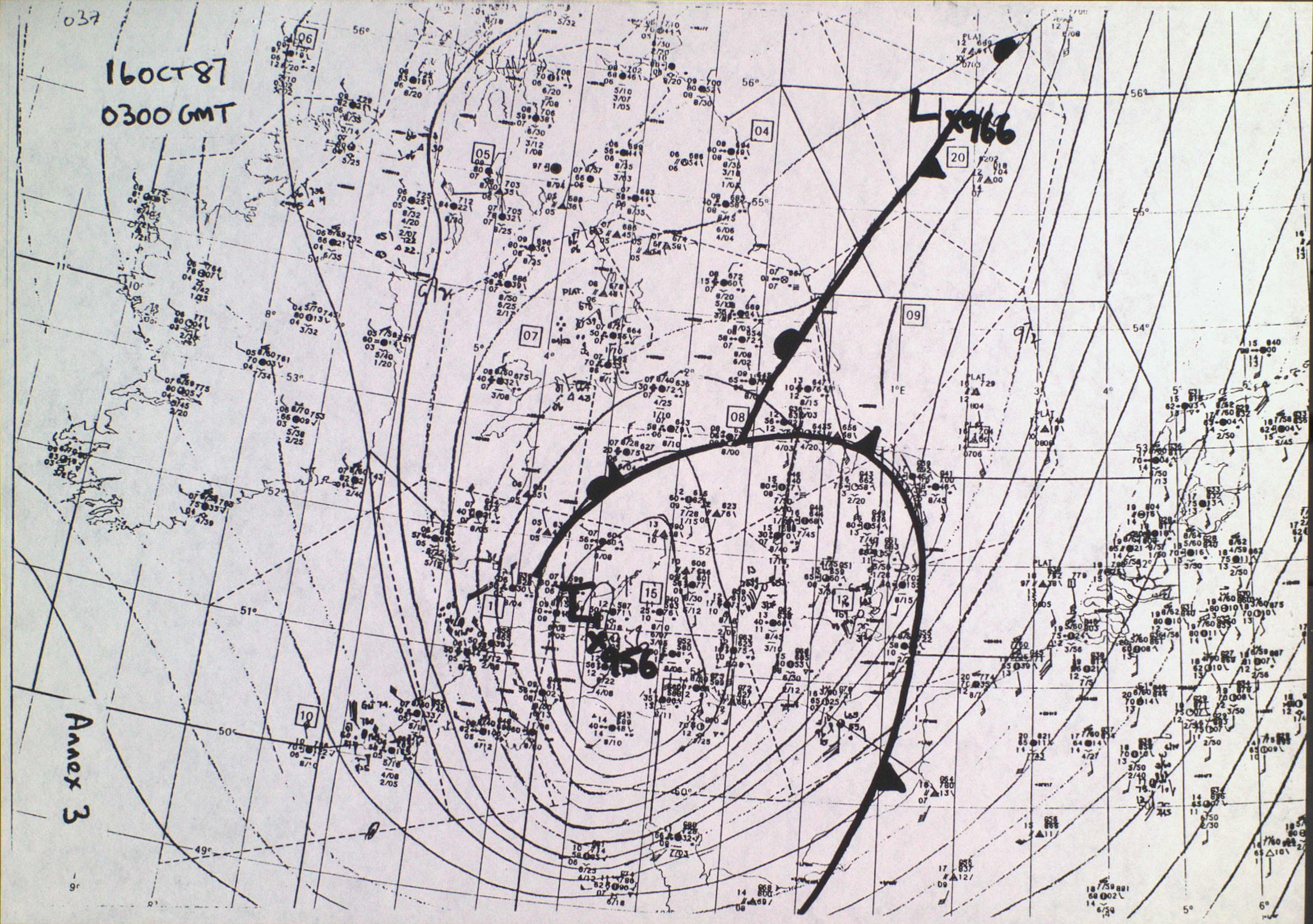
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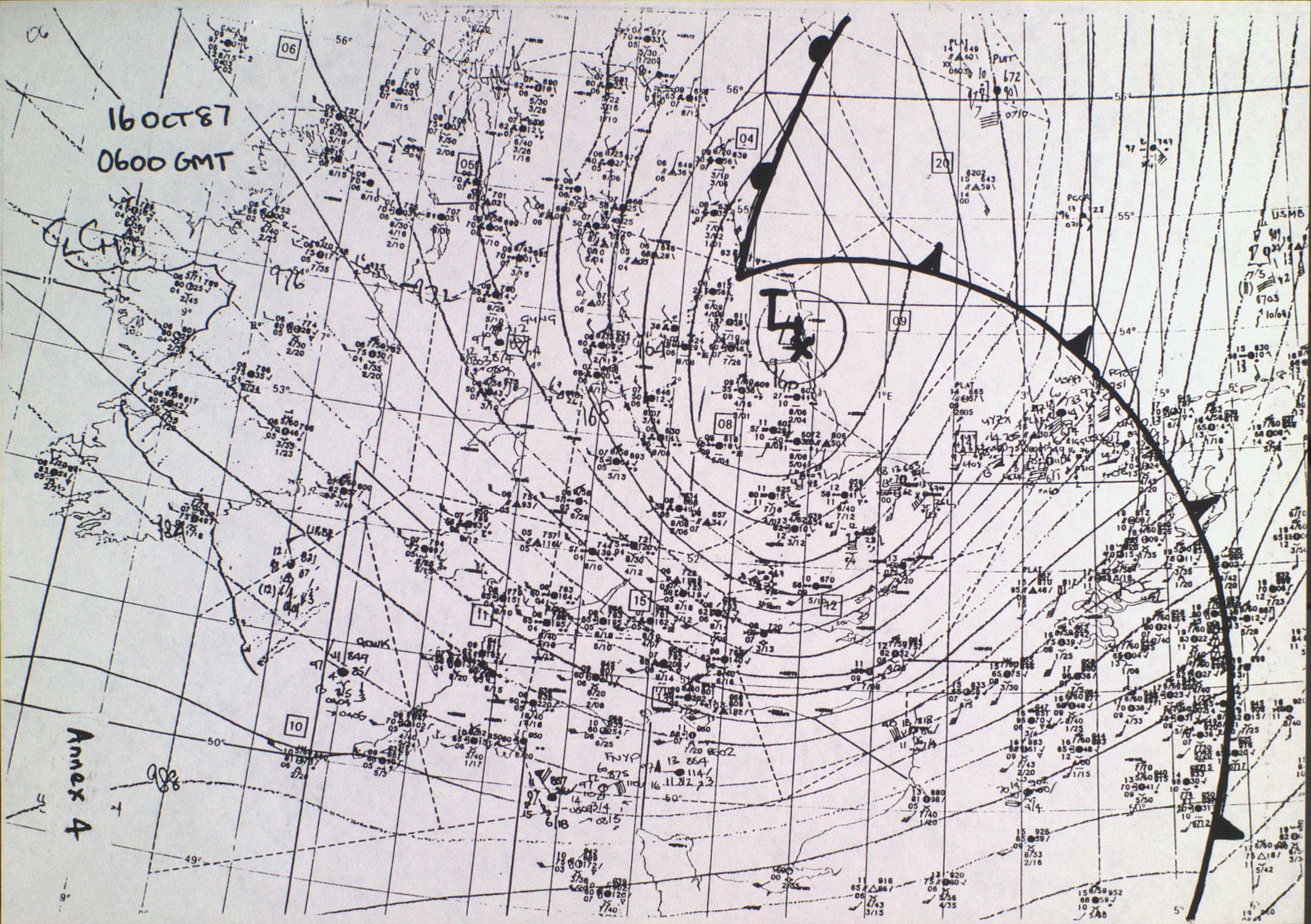
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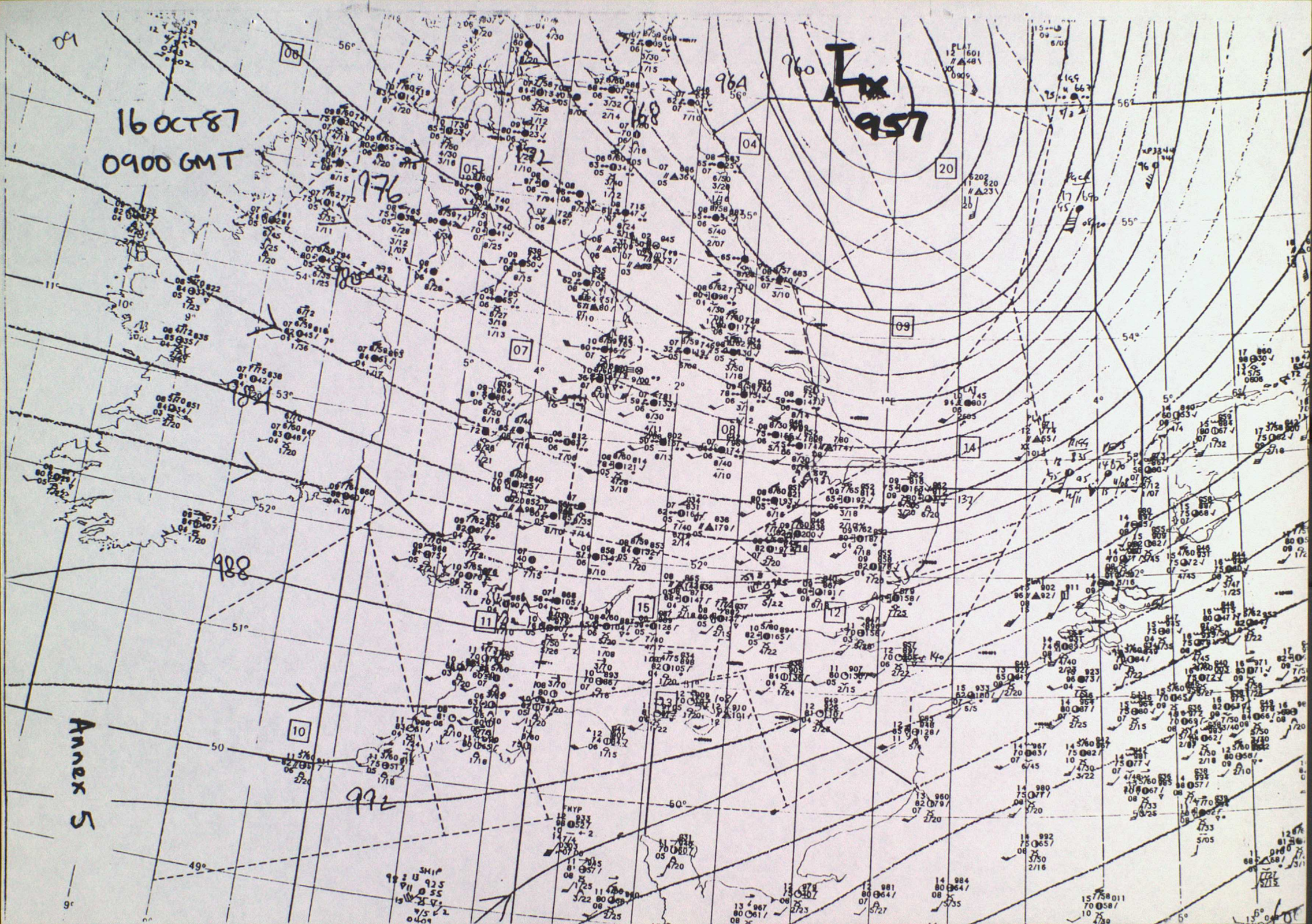
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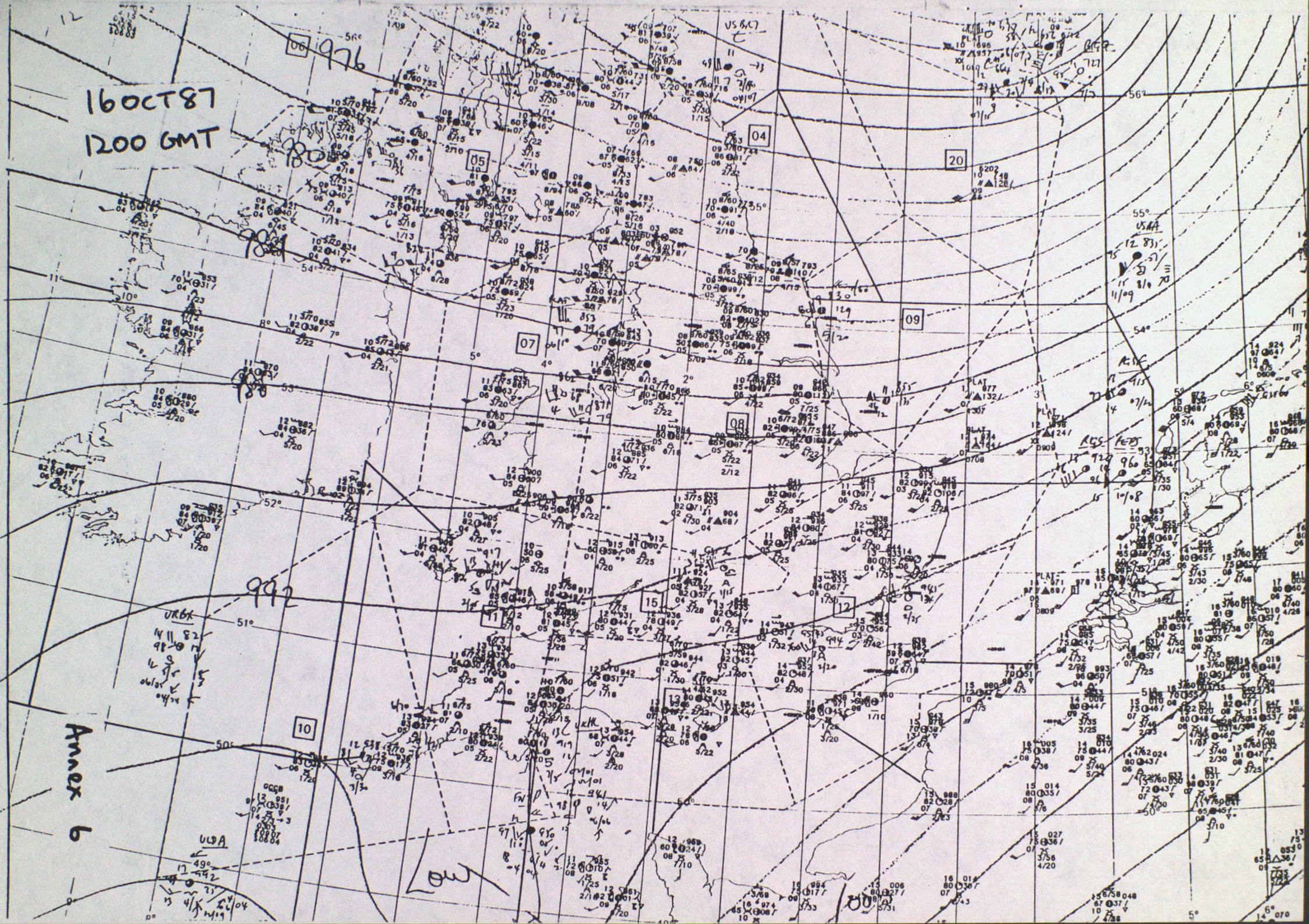
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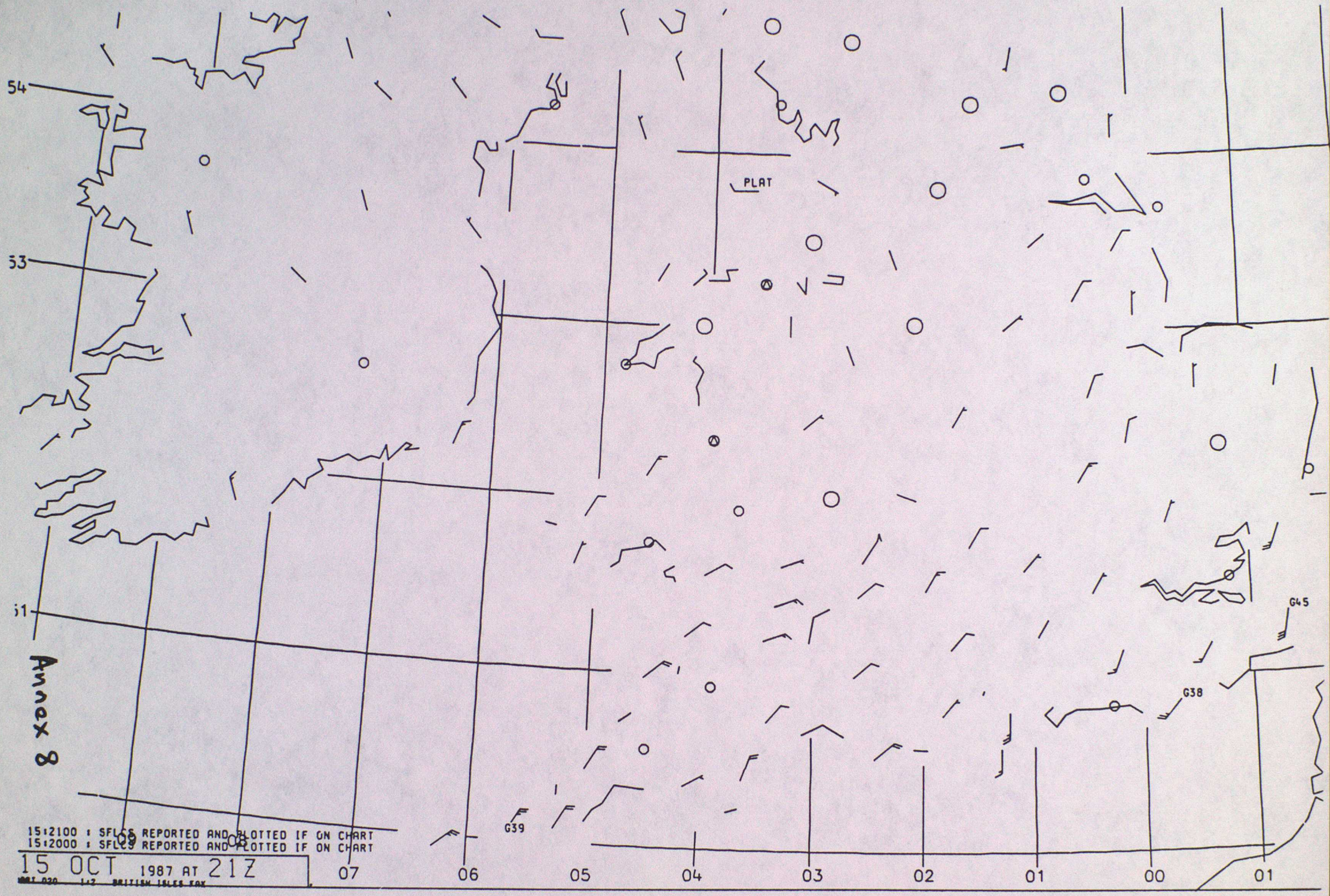
Annex 7

SATELLITE IMAGE FOR 0830 GMT ON 16 OCT 1987.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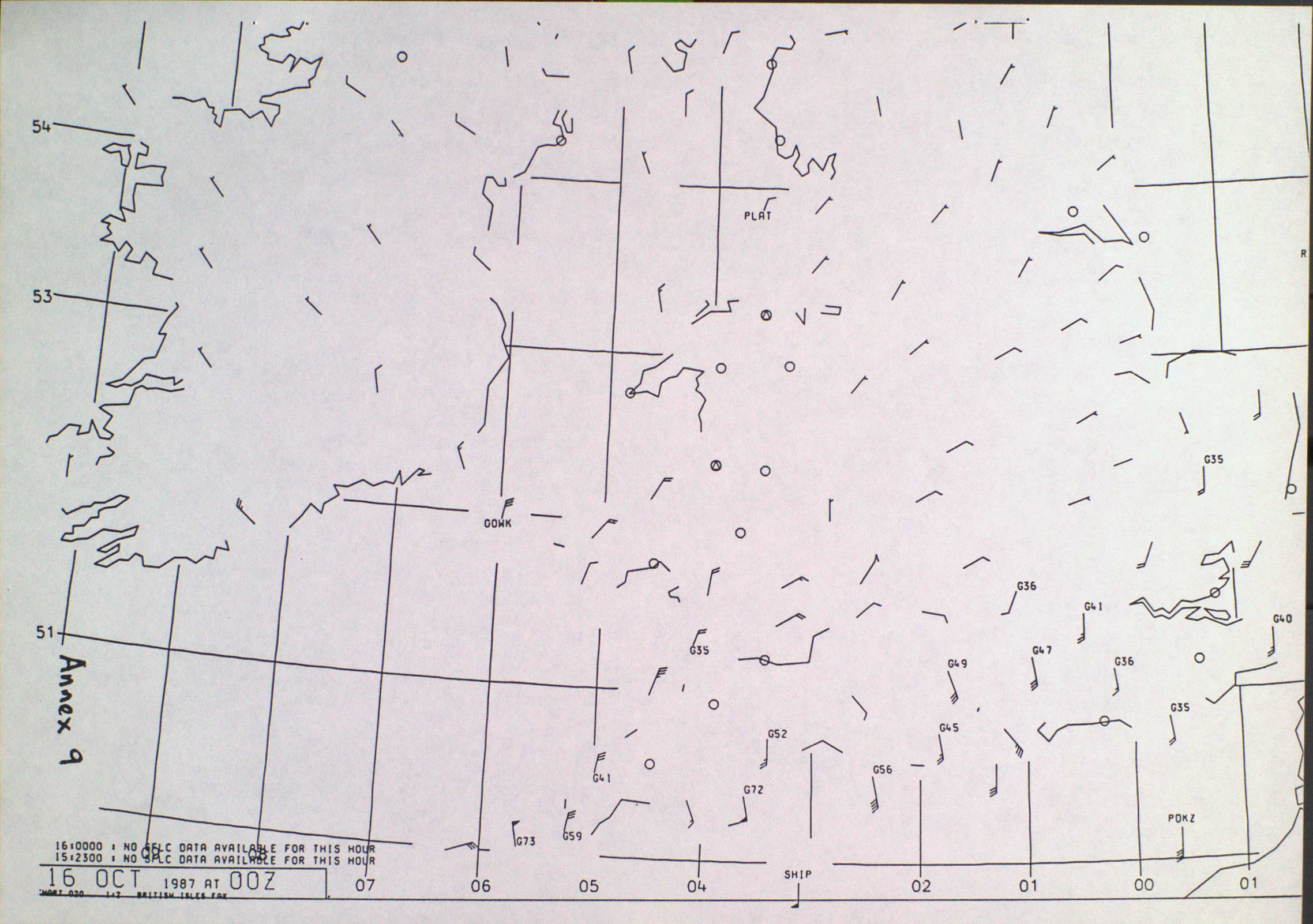
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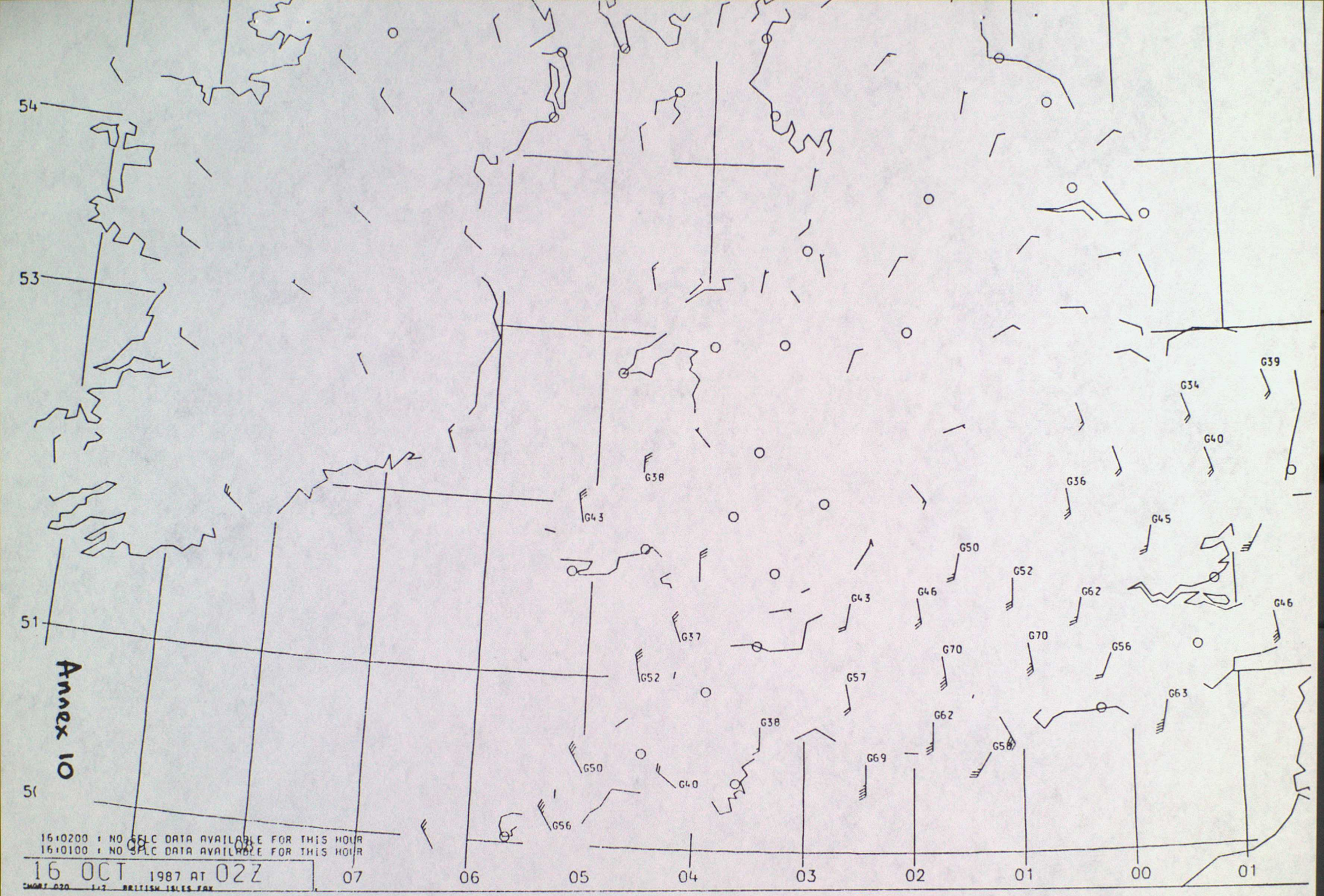
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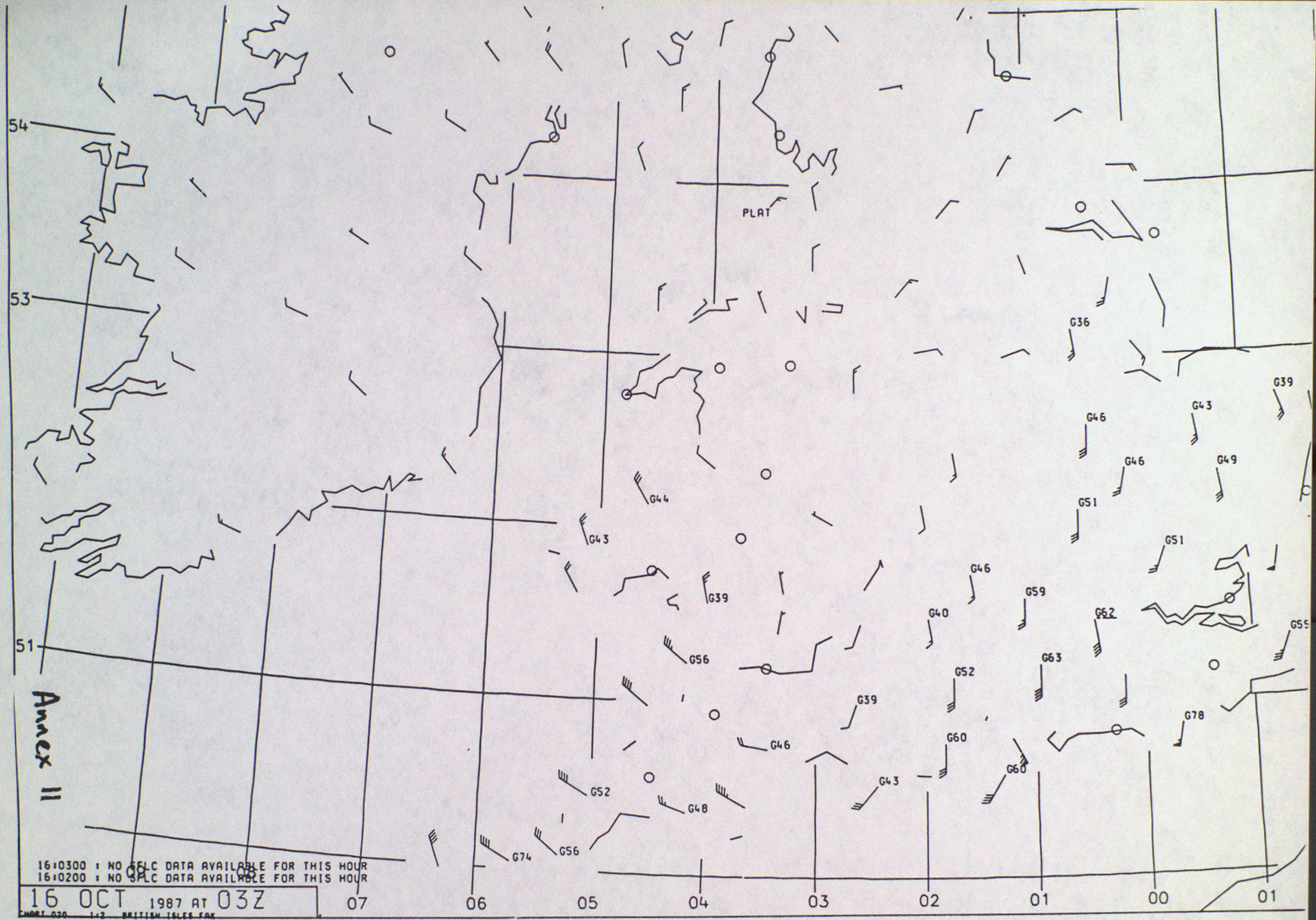

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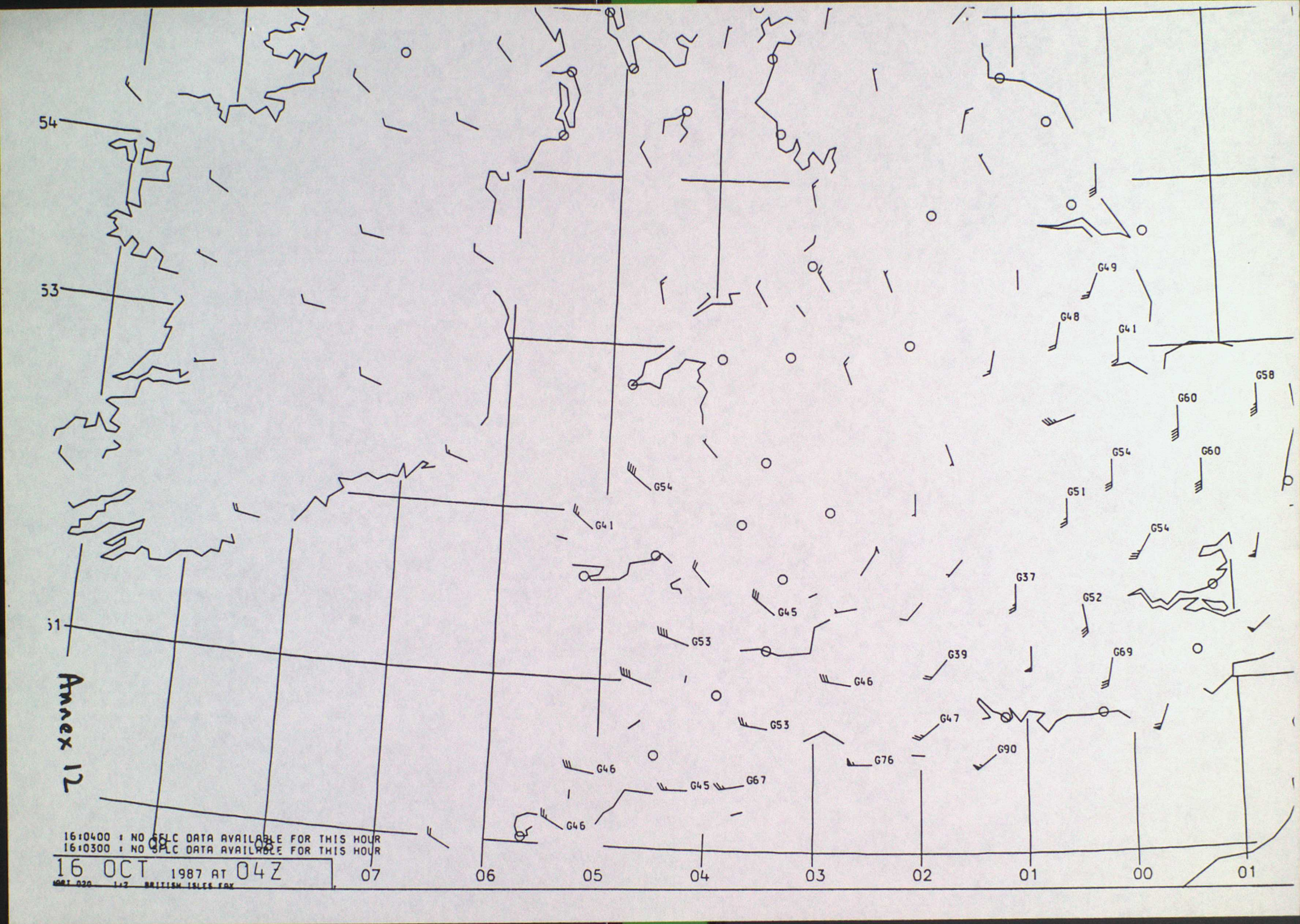
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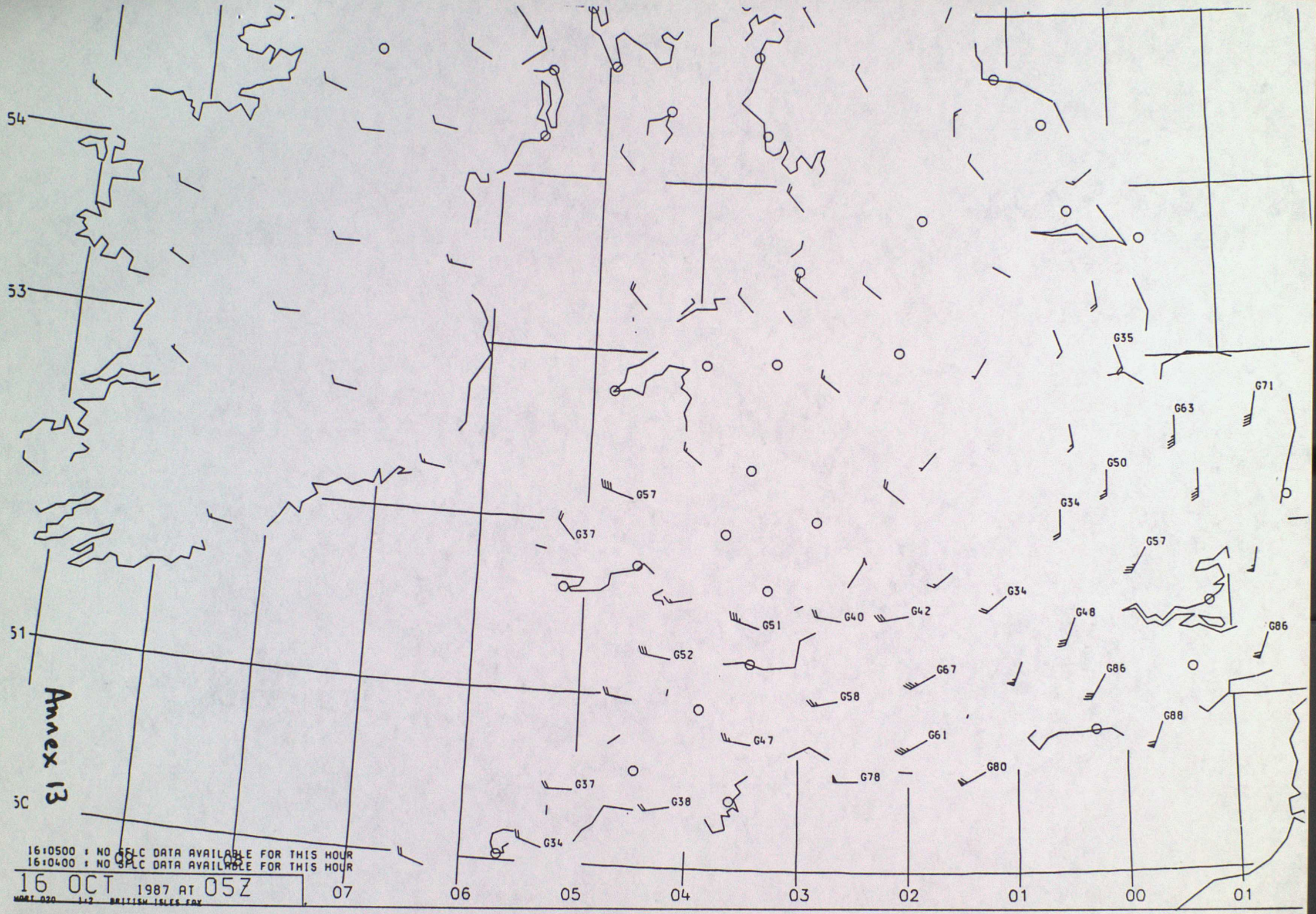
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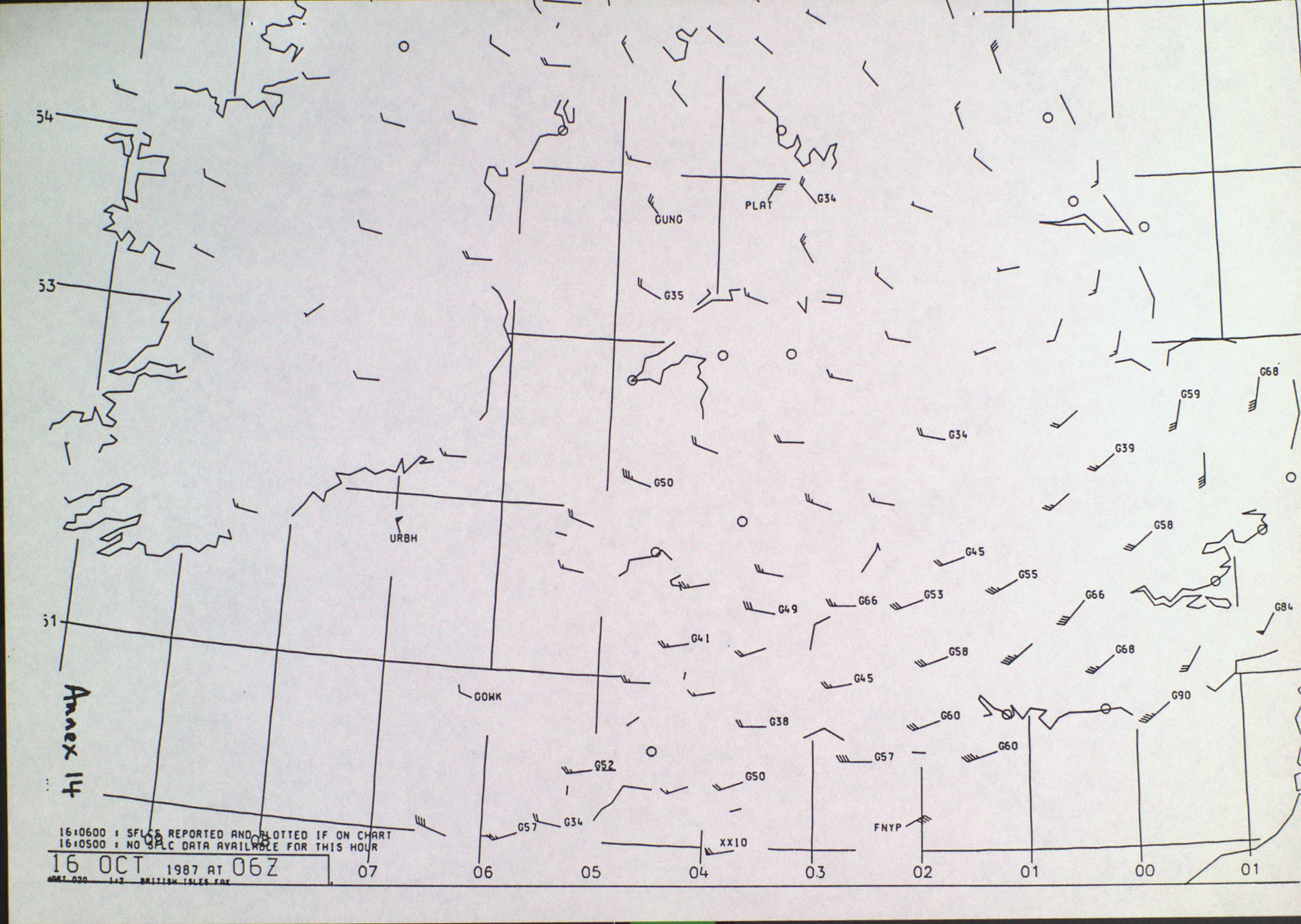
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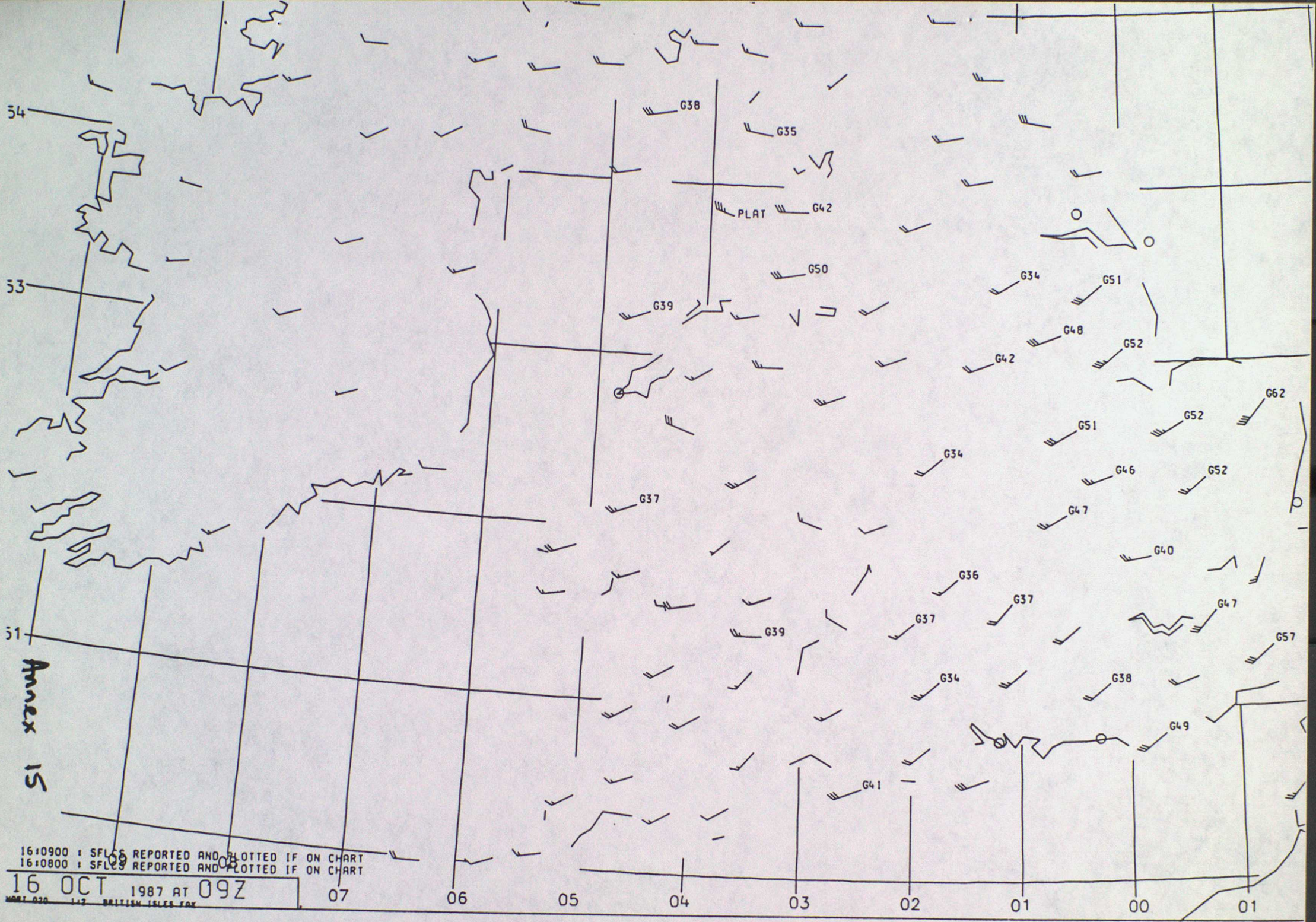
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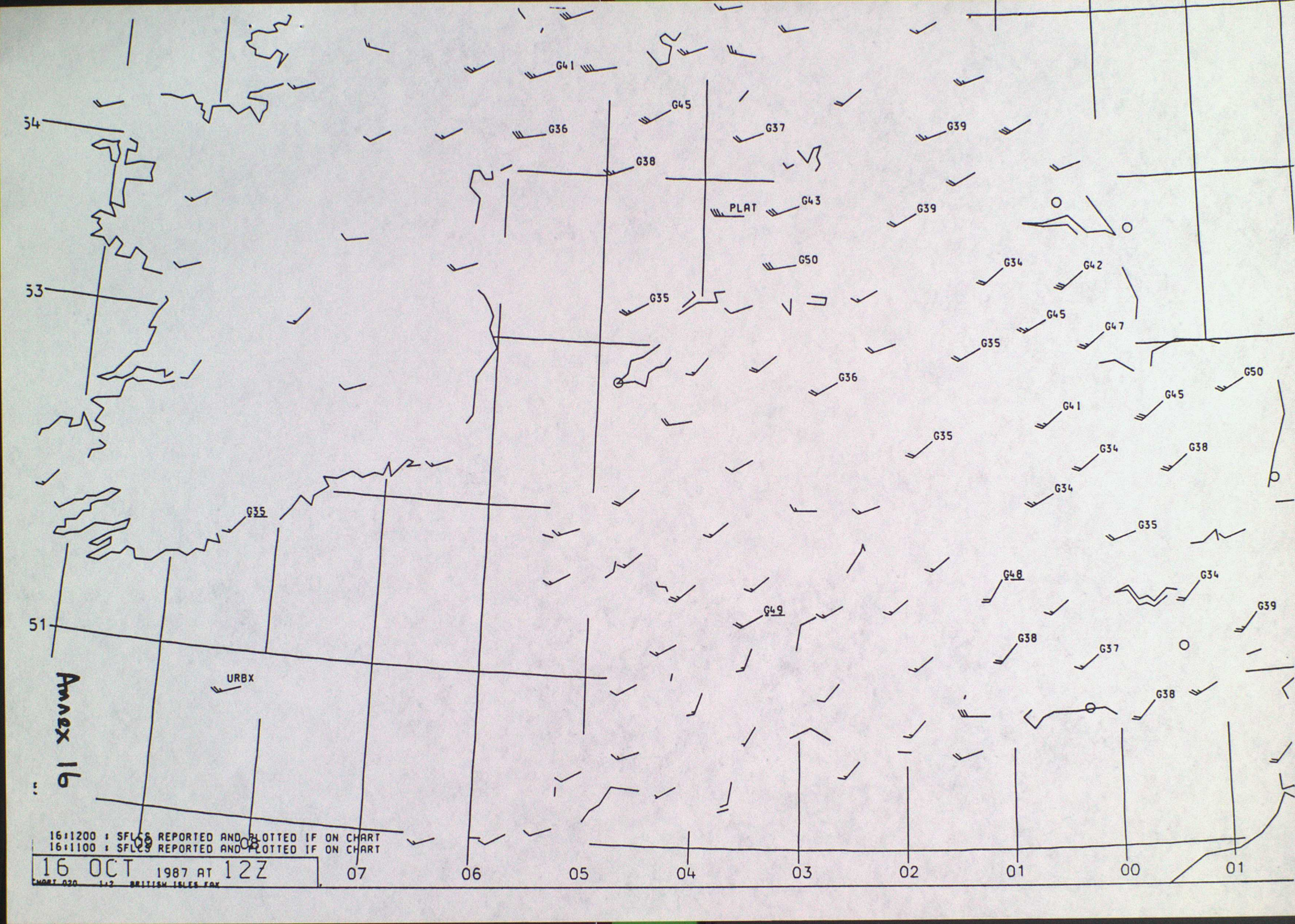
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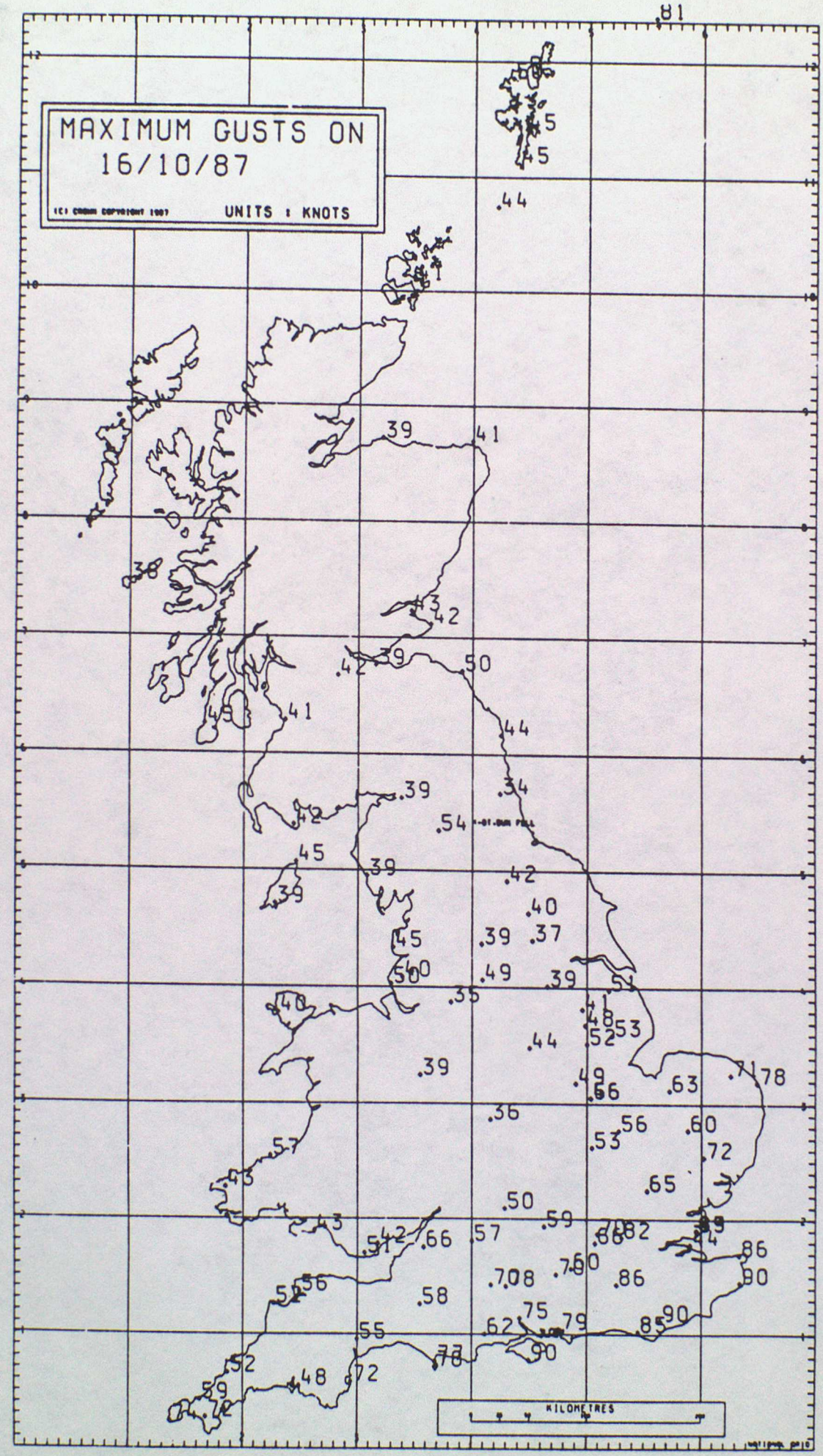
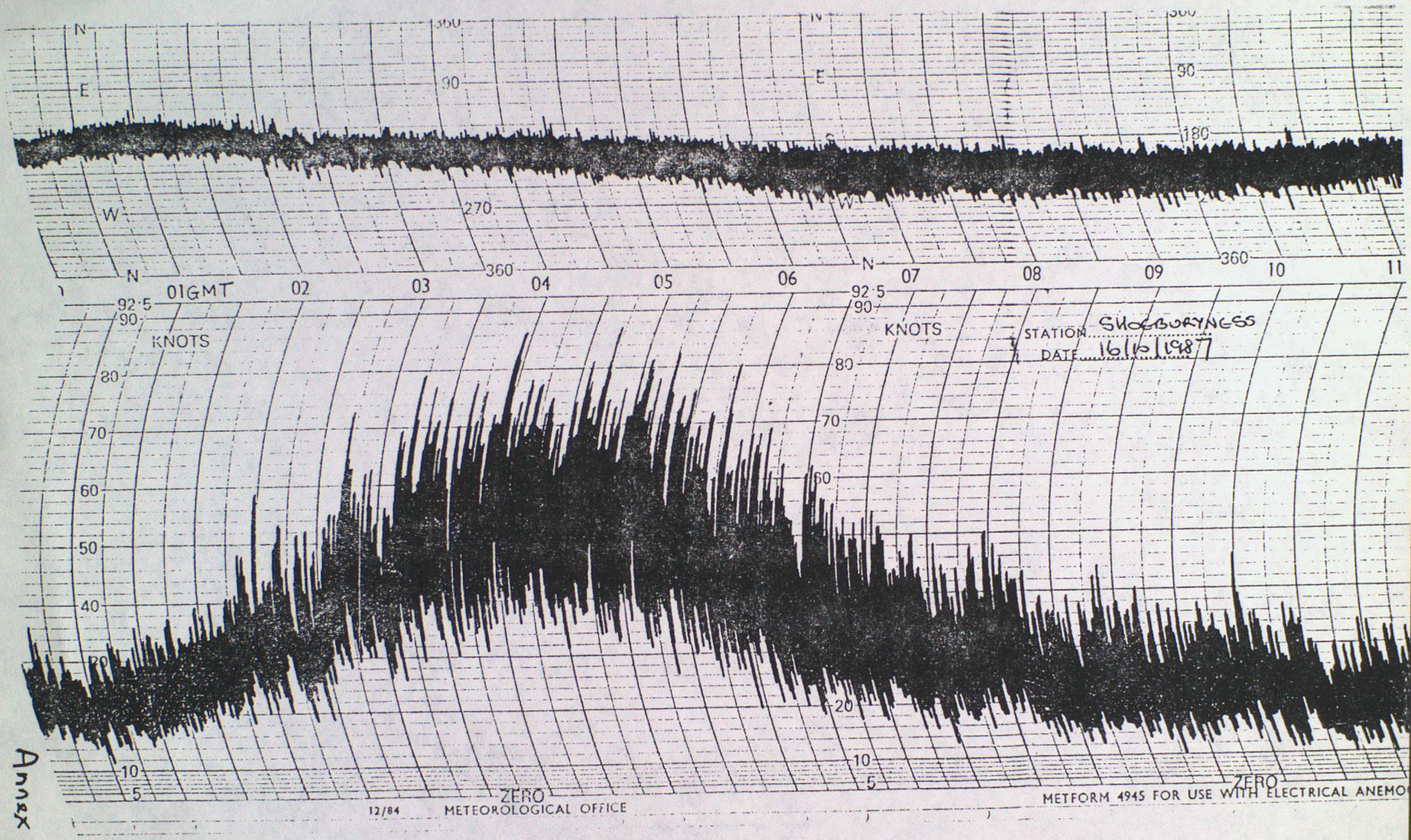

MAXIMUM GUSTS ON
16/10/87
(C) CROWN COPYRIGHT 1987
UNITS : KNOTS
KILOMETRES

Annex 17

Station/Area	*Highest Reported 10 Minute Mean Speed during 00 to 13 GMT on 16 Oct 1987		*Approximate Return Period of Mean Speed	Highest Reported Gust Speed during 00 to 13 GMT on 16 Oct 1987		Approximate Return Period of Gust Speed
	Knots	Miles per Hour	in Years	Knots	Miles per Hour	in Years
Brize Norton (Oxon)	25	29	Less than 10	50	58	Less than 10
Oxford	35	40	Not available	62	71	Not available
Boscombe Down (Salisbury)	36	41	Less than 10	70	81	20
Hurn (Bournemouth Airport)	37	43	10	62	71	10
Southampton Weather Centre	48	55	Not available	75	86	Not available
St Catherines (Isle of Wight)	58	67	" "	90	104	" "
Jersey (Channel Isles)	55	63	10	85	98	15
Herstmonceux (Eastbourne)	60	69	Not available	90	104	Not available
Langdon Bay (Dover)	62	71	" "	90	104	" "
Manston (Margate)	61	70	Over 500	86	99	Over 200
East Malling (Kent)	37	43	Not available	74	85	Not available
Gravesend (Kent)	34	39	" "	74	85	" "
Gatwick (W. Sussex)	34	39	Less than 10	86	99	Over 300
London Airport	39	45	20	66	76	40
London Weather Centre	44	51	200	82	94	120
Stansted Airport	34	39	10	65	75	20
Shoeburyness (Essex)	55	63	Over 500	87	100	Over 500
Wattisham (Stowmarket)	48	55	45	72	83	10
Hemsby (Gt Yarmouth)	45	52	Not available	78	90	Not available

* Strictly the Mean Speed over 1 hour should be used to calculate the Return Period. However as such data are not yet available the '10 Minute' (synoptic) Mean Speed has been taken as the best available guide.

Annex 18



Annex 19

COPY OF THE ANEMOGRAM(WIND RECORD) FOR SHOEBURYNESS(ESSEX) ON 16 OCTOBER 1987.

Met. O. 917

Meteorological Office

BEAUFORT SCALE OF WIND FORCE: SPECIFICATIONS AND EQUIVALENT SPEEDS

(MEAN SPEEDS ONLY, NO EQUIVALENT FOR GUSTS)

Beaufort Number	Description of wind	Specifications for use at sea[1]	Specifications for use on land	Equivalent speed at 10 m above ground[2]						Beaufort Number
				Knots		Miles per hour		Metres per second		
				Mean	Limits[3]	Mean	Limits[3]	Mean	Limits[3]	
0	Calm	Sea like a mirror	Calm: smoke rises vertically	0	<1	0	<1	0·0	0·0–0·2	0
1	Light air	Ripples with the appearance of scales are formed but without foam crests.	Direction of wind shown by smoke drift but not by wind vanes.	2	1–3	2	1–3	0·8	0·3–1·5	1
2	Light breeze	Small wavelets, still short but more pronounced—Crests have a glassy appearance and do not break.	Wind felt on face; leaves rustle; ordinary vanes moved by wind.	5	4–6	5	4–7	2·4	1·6–3·3	2
3	Gentle breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.	Leaves and small twigs in constant motion; wind extends light flag.	9	7–10	10	8–12	4·3	3·4–5·4	3
4	Moderate breeze	Small waves, becoming longer; fairly frequent white horses.	Raises dust and loose paper; small branches are moved.	13	11–16	15	13–18	6·7	5·5–7·9	4
5	Fresh breeze	Moderate waves, taking a more pronounced long form; many white horses are formed. (Chance of some spray.)	Small trees in leaf begin to sway; crested wavelets form on inland waters.	19	17–21	21	19–24	9·3	8·0–10·7	5
6	Strong breeze	Large waves begin to form; the white foam crests are more extensive everywhere. (Probably some spray).	Large branches in motion; umbrellas used with difficulty.	24	22–27	28	25–31	12·3	10·8–13·8	6
7	Near gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.	Whole trees in motion; inconvenience felt when walking against wind.	30	28–33	35	32–38	15·5	13·9–17·1	7
8	Gale	Moderately high waves of greater length; edges of crests begin to break into spindrift. The foam is blown in well-marked streaks along the direction of the wind.	Breaks twigs off trees; generally impedes progress.	37	34–40	42	39–46	18·9	17·2–20·7	8
* 9	Strong gale	High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility.	Slight structural damage occurs (chimney-pots and slates removed).	44	41–47	50	47–54	22·6	20·8–24·4	9
10	Storm	Very high waves with long overhanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea takes a white appearance. The tumbling of the sea becomes heavy and shock-like. Visibility affected.	Seldom experienced inland; trees uprooted; considerable structural damage occurs.	52	48–55	59	55–63	26·4	24·5–28·4	10
11	Violent storm	Exceptionally high waves. (Small and medium-sized ships might be for a time lost to view behind the waves.) The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.	Very rarely experienced; accompanied by widespread damage.	60	56–63	68	64–72	30·5	28·5–32·6	11
* 12	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.	... ...	—	⩾64	—	⩾ 73	—	⩾ 32·7	12

1 Where there is no swell and the fetch is not limited by proximity to land, the specifications describe the fully developed sea generated by steady winds of the forces indicated. There is always a lag in the response of the sea to wind speed changes, heavy rain appears to flatten the sea, and in shallow waters both water depth and tidal streams affect the sea state. Account should be taken of all these factors when estimating the wind force from the appearance of the sea.

2 Approximate corrections for wind speeds at other heights are: 2 m *subtract* 30 per cent; 3 m *subtract* 20 per cent; 6 m *subtract* 10 per cent; 15 m *add* 10 per cent; 30 m *add* 25 per cent.

3 For finding the Beaufort number corresponding to a recorded mean, or range of mean speeds, and *vice versa*.

*PLEASE REFER TO NOTES IN THE TEXT.

Annex 20

Dd 326062 1500 4/78 Bd (15163)