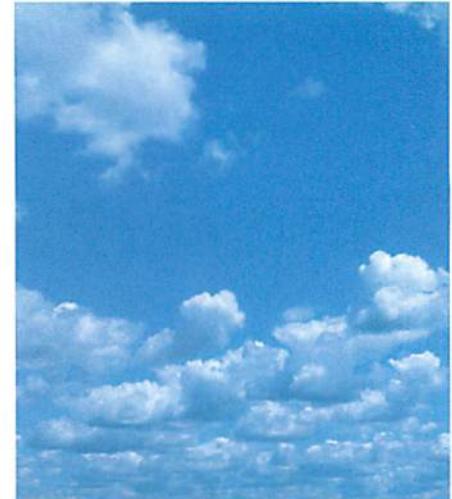# Hadley Centre

*for Climate Prediction and Research*

Digitization of Metform data and Conversion to Flatfile
Integer Format

by

M.Jackson

HCTN 11 October 1999

*Hadley Centre Technical Note*

**The Met.Office**

HADLEY CENTRE TECHNICAL NOTE NO. 11


DIGITIZATION OF METFORM DATA AND CONVERSION TO
FLATFILE INTEGER FORMAT


By


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October 1999


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NOTE:   This paper has not been published.  Permission to quote
        from it should be obtained from the Director of the
        Hadley Centre.

# Digitization of Metform data
## And Conversion to Flatfile Integer Format

### M Jackson

### October 1999

Unkeyed data for the period 1920 to 1939 were found on "Metforms" in the U.K. Met Office Archive. Part of these data with sheet numbers 30001 through 42999A containing data for the period 1935 to 1939 were digitized by Atlantic Data Services Ltd., Blandford, Dorset, between January and April 1996 at a cost of £50,000 (around 10p per record). A total of 478,796 records were keyed - 20,030 header records and 458,766 data records. This article describes how the original records were digitized into EBCDIC, quality controlled and converted to Flatfile format in preparation for later conversion to the U.S. LMR format before merging into COADS.

## METFORMS

A Metform is a pre-printed sheet of paper with enough space to allow up to 48 meteorological reports - 4 daily observations for 12 days. Usually only 1 or 2 observations are made each day and often the sheet is only part used. The forms are completed during the ship's voyage and sent to London from Ports of Call. Metforms containing consecutive reports were usually given the same sheet number with an alphabetic character appended e.g. 31426, 31426A, 31426B. Most of the forms are in excellent condition but a very small number (around 150) were found to be unsuitable for keying. Many have additional notes describing severe weather conditions near storms and barograph traces are often included. A marker on the EBCDIC record will indicate that additional manuscript notes are available in the Archive. A copy of the Metform can be seen in Appendix 2.

## DIGITIZATION

The Metforms are part of the National Archive and as such are not allowed away from official premises. However, the Met Office Librarian agreed that for the purpose of digitization the documents could be sent to Atlantic Data Services in small batches. A copy of the contract to digitize the records can be found in Appendix 7. There were a total of 104 boxes of documents to be transferred and it was agreed that up to 10 boxes could be transferred at any one time. Atlantic Data Services transport would collect 10 boxes on each visit. The data would be keyed at their Offices in Blandford and the resulting tapes and the 10 boxes returned when the next batch of documents were collected. When the tapes were received at the Met Office Archives they were transferred to the Computer Room prior to transferring the data to disk on COSMOS. The tapes were later returned to Atlantic Data Services.

The following quality control checks were made by Atlantic Data Services as the data were keyed.

1. Directions for surface wind, wind waves and swell waves were restricted to: 000-360, one of the standard 32 compass points (N/E, NNE, NE, etc), CONF (confused), VAR (variable) and CALM.
2. Time was accepted on the 24-hour clock - 00 to 24.
3. Date was checked against a system calendar for acceptable dates.
4. Latitude values were accepted in degrees and minutes from 0 through 90 degrees.
5. Longitude values were accepted in degrees and minutes from 0 through 180 degrees.
6. Quadrant values for Latitude and Longitude could only be keyed as N, S, E, or W.
7. To reduce keystrokes the Day of the Week was not keyed but calculated from the reported date. Unfortunately this prevented a later comparison of Day of the Week against Date for quality control purposes.

Atlantic Data Services used a contract programmer to design quality control for their systems. A better QC package could have been created if more time had been available for discussion. It would also have improved the quality of the data if the records could have been keyed twice but, with the financial constraint this was not possible.

A keying format was devised for the data but after around 4,000 records had been keyed it was found that attached thermometer readings were occasionally recorded in degrees Kelvin. A second data format was then created to allow for three digits in all the temperature fields. A second header format was also created at this time to allow for a minor deficiency.

Ship details and weather reports were digitized for each Metform. The ship details were stored in the header record and the weather reports were stored in data records. For each Metform sheet keyed there is on header record and up to 48 weather records. Both header and data records are 150 bytes in length. The header record is prefixed with the indicator '1' and contains information about the ship (Metform number, Ship name, Captain's name, route and height of barometer, etc). Each weather record is prefixed with the indicator '2' and contains one weather observation. Details of the Header Format are given in Appendix 3 and details of the Data Format are given in Appendix 4.

The data were keyed in 81 batches and stored as separate files - MED1.EEMETF01.DATA to MED1.EEMETF81.DATA. The filers have mixed formats and are archived until May 2001. Appendix 5 indicates the format used for each file.


QUALITY CONTROL

For convenience of working, the records were converted to a unified format - Header Format 1 (despite its minor deficiency) and Data Format 2 - shown in Appendix 3 and Appendix 4. They were then concatenated and stored as one large data set of 72Mbytes - MED1.EEMETFRM.DATA2. Quality control programs were written to identify queries/errors in the various fields.

QC Program 1. The Header records were quality controlled and corrected. Reference was made to the original Metform manuscript to correct spelling mistakes and find missing

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items. An asterisk was keyed when the value to be keyed could not be understood by the typist. After examining the occasions of asterisks it was clear that only a small number of typists used them and this was usually when say, the Captain's name could not be read. When this was understood most of the illegal characters could be changed without reference to the original observation, but the manuscript was referred to when necessary. Header records were manually created for Metforms, which were not keyed. But in these cases no weather reports followed. The data were stored in MED1.EEMETFRM.DATA3. (See Appendix 1)

QC Program 2. Illegal characters in the digitized weather records were found and corrected. Illegal characters were defined as characters in numeric fields (e.g. Date, Time, Pressure, Temperature fields) or non-acceptable characters in alphanumeric fields. E.g. Wind direction, Weather. Asterisks were also found in these weather records. As each field was checked and quality controlled, the asterisks were examined. These were either removed and the field left blank, changed to the best estimate or corrected after reference to the original manuscript. Asterisks are still likely to be found in fields, which have not been fully checked, e.g. Cloud type and sea and swell reports. The corrected data were archived as MED1.EEMETFRM.DATA4 until 30 June 2001. See Appendix 1.

QC Program 3. Pressure was expected to be keyed in inches of mercury, but after examining the records two types of error were found.
1.  In some sequences of reports the inches value was not keyed when the inches value did not change.
    E.g.   0000  GMT        29.34 inches was keyed as   2934
           0600  GMT          .56 inches was keyed as     56
           1200  GMT          .89 inches was keyed as     89
           1800  GMT        30.02 inches was keyed as   3002
    This keying practice occurred in reports from only a small number of ships and the errors were corrected manually.
2.  Pressure was occasionally recorded in whole millibars or millibars and tenths. There was sufficient keying space for the digits when whole millibars were found but when tenths were found and when the pressure was greater than 999.9 millibars the 1,000's digit was ignored. The conversion program used later to create the Flatfile format added 10000 when the value found was less than 500. The pressure-corrected data set was archived as MED1.EEMETFRM.DATA5 (See Appendix 1).

QC Program 4. Quality control tests were made on the time and position parameters. The records within each Metform were quality controlled to ensure that time went forward and that positions were such that the speed between pairs of positions was reasonable (i.e. less than 30 knots). A program to use the reported ships course and speed could not be developed in the time available. Positions reported over land were also examined. Many errors were due to the incorrect quadrant being indicated when the route crossed the equator, meridian or dateline. Others were due to positions given in mixed units - whole degrees, degrees and minutes or minutes given with only one digit. The last case caused the degrees to be misread.

Positions reported with only one digit in the minute field were corrected by program. The program stored in MED1.EEPROGLB.FORM(CORPOS2), see Appendix 1, was used to auto-correct around 2,500 records reporting in this way. The program examined the positions from all the reports from one Metform sheet. If the speed was excessive between

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two reports or the position was 'on land' then a zero digit was inserted in the tens position of the minute field. The quality control tests were repeated. If no query was raised then the additional zero was accepted. Otherwise the original observation was used.

After further quality control and examination of the original manuscript another 3,000 records were individually corrected using program CORRECT2, see Appendix 1. The 3,000 records include a small number of second corrections to those records wrongly corrected by CORPOS2. For convenience of storage the corrections were prepared in batches and contained in five files, CORDATA1 to CORDATA5, stored as members of MED1.EEPROGLB.FORM.

The corrections stored in CORDATA1 were used to correct MED1.EEMEFORM.CORR1 to create MED1.EEMETFRM.CORR2.
The corrections stored in CORDATA2 were used to correct MED1.EEMEFORM.CORR2 to create MED1.EEMETFRM.CORR3.
The corrections stored in CORDATA3 were used to correct MED1.EEMEFORM.CORR3 to create MED1.EEMETFRM.CORR4.
The corrections stored in CORDATA4 were used to correct MED1.EEMEFORM.CORR4 to create MED1.EEMETFRM.CORR5.
The corrections stored in CORDATA5 were used to correct MED1.EEMEFORM.CORR5 to create MED1.EEMETFRM.CORR6.

The final corrected data are stored in MED1.EEMETFRM.CORR6.

It was not possible in the time available to correct, absolutely, all the reported positions but it is estimated that there might be up to 1,000 positions which are incorrect by up to 5 degrees of latitude or longitude. None should be 'on land'. If an observation was found to be totally unusable the latitude and longitude were set to 9999 and 99999 respectively.


CONVERSION TO FLATFILE FORMAT

From the final quality controlled EBCDIC data set, a Flatfile version was created, using the program MED1.EEPROGLB.FORM(CREATFT2). Subroutines were used to decode each element and full details will be found as comments within these Fortran routines. Markers have been set in the Flatfile, when applicable, to indicate precision and units used in the original observation. A summary of the routines is given in Appendix 6. A preliminary version containing only date and position was created in March 1999 - MED1.EEMETFRM.FLAT1 and a later version (FLAT3) using the meteorological elements (as listed in Appendix 6) was created in October 1999. These data sets contain 578 Mbytes. The program has not been fully checked and there are known faults in some of the subroutines. Comments on the reliability are shown in the Appendix.

Appendix 9 lists a sample of Flatfiles created from the Metforms and Appendix 8 itemizes the meteorological parameters stored in Flatfile.

From this Flatfile format the records were converted to the Long Marine Record for the incorporation into COADS.

# List of Appendices

**Programs**

1. MED1.EEPROGLB.FORM(CORRECT2) to apply corrections stored in CORDATA1 to CORDATA5.
2. MED1.EEPROGLB.FORM(CREATFT2) to convert Metform records to Flatfile records. This file includes all required Subroutines.
3. MED1.EEPROGLB.FORM(CORPOS2) converts minute values in single digits to double digits.


**Data Sets**

MED1.EEMETF01.DATA to MED1.EEMETF81.DATA - Original keyed data (81 files), archived using the Met Office UABR Facility until May 2001

MED1.EEMETFRM.DATA2 - Concatenated original keyed data. Deleted.

MED1.EEMETFRM.DATA3 - Corrected header records. Deleted.

MED1.EEMETFRM.DATA4 - Illegal characters removed. Archived until June 2001

MED1.EEMETFRM.DATA4.BACK - Backup copy of Illegal characters removed. Archived until February 2004

MED1.EEMETFRM.DATA5 - Pressure field corrected. Deleted.

MED1.EEPROGLB.FORM(CORDATA1 to CORDATA5) - Corrections for individual numbered reports. Used in conjunction with MED1.EEPROGLB.FORM(CORRECT2) above.

MED1.EEMETFRM.CORR6 - Final quality controlled Metform data, archived using Met Office UABR Facility until October 2004.

MED1.EEMETFRM.CORR6.BACK - Backup of final quality controlled Metform data, archived using Met Office UABR Facility until October 2009.

MED1.EEMETFRM.FLAT1.DISK - Early version of Flatfile data set (March 1999), archived using Met Office UABR Facility until July 2004.

MED1.EEMETFRM.FLAT1.BACK - Backup of early version of Flatfile data set (March 1999), archived using Met Office UABR Facility until October 2009.

MED1.EEMETFRM.FLAT2.DISK - Second version of Flatfile data set (June 1999), archived using Met Office UABR Facility until July 2004.

MED1.EEMETFRM.FLAT2.BACK - Backup of second version of Flatfile data set (June 1999), archived using Met Office UABR Facility until October 2009.

MED1.EEMETFRM.FLAT3 - Third (but incomplete) version of Flatfile data set (October 1999), archived using Met Office UABR Facility until July 2009. The examples shown in Appendix 9 are printed from this data set.

**Photocopy of Metform**

## SYNCHRONIZED WEATHER OBSERVATIONS OVER ALL OCEANS.

## OCEAN CURRENT OBSERVATIONS.

(Rig and Steam or Motor) **Motr.** Ship. **LOSADA** Captain. **M. ARMSTRONG. D.S.O.** Voyage—From **COLON** to **LIVERPOOL.**

Address to which acknowledgment for this report and the Marine Observer may be sent: **% P.S.N.C° CANADA. Docks. LiVERPOOL**

| Year 1937 | | | Ship's Position, Course and Speed | | | | Wind at time of observation | | Barometer | | | | Temperatures | | Weather | | Vis. | Cloud Types and Amount | | | | Sea | | Swell | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | Day | Hour | Latitude N | Longitude W | True Course | Speed | Direction True | Force 0-12 | Uncorrected reading | Att. Ther. | True Pressure at Sea Level | Change/Tendency | Air | Sea Surface | time of obsn | Past Weather | by Scale | Lower Cloud Type | Amt | Middle Cloud Type | Upper Cloud Type | Direction True | Amt | Direction True | Amt | |
| may. 19 Wed. | | 12 18 | 12.56 | 75.11 | 056 | 8.4 | ENE | 5 | 29.95 | 84 | 29.77 | Steady | 82 | 83 | c | c | 8 | cu | 3 | — | ci-cu | 7 | ENE | 3 | — | — | |
| may. 20 Th. | | 12 18 | 14.55 14.55 | — 72.50 | 059 | 8.4 | ESE | 5 | 29.98 | 83 | 29.81 | Steady | 82 | 83 | o | c | 8 | cu | 5 | — | ci-cu | 9 | ESE | 3 | — | — | |
| may. 21 Fri. | | 12 | 16.37 | 69.29 | 060 | 8.0 | NE | 5 | 30.08 | 78 | 29.92 | Rising Steady | 74 | 80 | OR | OG | 6 | cu st. | 10 | — | — | 10 | NE | 3 | — | — | |
| may. 23 Sun. | | 12 | 20.15 | 65.19 | 041 | 9.5 | SExS | 1 | 30.17 | 80 | 30.02 | Steady | 78 | 79 | c | c | 8 | c-cu cu. | 5 | a-st | ci-s. | 7 | SExS | 1 | E | 1 | |
| may. 24 Mon. | | 12 | 23.25 | 62.32 | 044 | 9.0 | ExN | 2 | 30.14 | 78 | 30.00 | Steady | 73 | 77 | pc | pc | 8 | st-cu nb. | 8 | — | — | 8 | ExN | 1 | — | 9 | |
| may. 25 Tues. | | 12 | 26.24 | 59.52 | 043 | 9.0 | Calm | 0 | 30.18 | 77 | 29.99 | Steady | 75 | 76 | bc | c | 6 | cu | 1 | a-cu | ci | 4 | — | — | N | 1 | |
| may. 26 Wed. | | 12 | 29.09 | 56.44 | 043 | 9.2 | Calm | 0 | 30.16 | 74 | 30.04 | Steady | 72 | 72 | c | o | 7 | cu st. | 4 | a-cu | ci | 7 | — | — | N | 1 | |
| may. 27 Thu. | | 12 | 31.50 | 53.46 | 046 | 9.3 | NxW | 2 | 30.13 | 74 | 30.02 | Steady | 70 | 70 | o | o | 8 | cu | 2 | — | ci st | 8 | NW | 2 | N | 4 | |
| may. 28 | | 12 | 34.05 | 50.38 | 048 | 9.0 | NW | 2 | 30.08 | 74 | 29.97 | Steady | 70 | 69 | bc | bc | 9 | cu | 2 | — | — | 2 | NW | 2 | NW | 4 | |
| may. 29 | | 12 | 36.37 | 47.16 | 048 | 9.5 | NxW | 2 | 30.07 | 72 | 29.97 | Steady | 73 | 68 | ba | c | 8 | cu | 2 | a-cu | ci | 4 | NxW | 2 | NE | 7 | |
| may. 30 | | 12 | 39.16 | 43.43 | 052 | 9.5 | SSW | 4 | 30.10 | 73 | 30.01 | Steady | 71 | 68 | o | c | 8 | st cu | 7 | a-st | . | 9 | SSW | 3 | E | 4 | |
| may. 31 | | 12 | 44.30 | 39.29 | 054 | 10.0 | S | 5 | 30.10 | 71 | 30.02 | Steady | 66 | 66 | o | c | 8 | cu cu SE. | 7 | a-st | . | 9 | S | 4 | SE | 1 | |

### OCEAN CURRENT OBSERVATIONS

| Year 1937 Month | From | | To | | Position | | | | Set Direction True | Drift Nautical Miles | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day | Time | Day | Time | From Latitude N | From Longitude W | To Latitude N | To Longitude W | | | |
| May. | 18 | Noon | 19. | Noon | 10.46 | 78.02. | 12.51 | 75.20 | N45W | 12. | 11°49'N, 76°41' |
| " | 19 | Noon | 20 | Noon | 12.51 | 75.20 | 14.50 | 72.37 | N24 W | 13. | 13°51'N, 73°59' |
| " | 22 | Noon | 23 | Noon | 18.35 | 67.13 | 21.25 | 64.50 | N15 E | 19. | 20°00'N, 66°02 |
| " | 23 | Noon | 24 | Noon | 21.25 | 64.50 | 24.02 | 62.01 | N63E | 7. | 22°43'N, 63°25 |
| " | 26 | Noon | 27 | Noon | 29.57 | 56.26 | 32.01 | 53.21 | S81W | 19 | 30°49'N, 54°52 |
| " | 27 | Noon | 28 | Noon | 32.01 | 53.21 | 34.27 | 50.10 | South | 15. | 33°14'N, 51°44 |
| " | 28 | Noon | 29 | Noon | 34.27 | 50.10 | 36.59 | 46.46 | S64W | 8 | 35°43'N, 48°02 |
| " | 30 | Noon | 31 | Noon | 39.27 | 43.16 | 41.36 | 38.58 | EasT | 18. | 40.51'N. |

Was the speed measured by Log or Revolutions? **LOG.**
State of Loading, Light or Deep? **DEEP** Was the Propeller immersed? **YES.**
General Remarks as to reliance which may be placed on observations:—

37267

# Additional Remarks.

It is requested that remarks upon interesting experiences and full descriptions of phenomena, etc., should be entered in this space with a view to publication in "The Marine Observer."

---

## Particulars of Instruments:—(Please write word *Ship* in each case where not *M.O.*)

Barometer, (Mercury or Aneroid)?.. *Mercury*...　{Too High.. *correct*...} at 29.09 ins.　When and where last compared? *Jan. 18: 1937 at Liverpool*.

Maker of Instrument and No. (if any). *Chadburn No. 2671* .  Error?　{Too Low.. *correct*...}　Height above Sea Level.. *40*.. ft

Numbers and Description of other Instruments—.. *Thermometers by Casartelli: Duke Street, Liverpool*...

Requirements for next voyage may, with advantage, be notified direct to the appropriate Port Meteorological Officer or Merchant Navy Agent.　See list in "Marine Observer."

The observations recorded herein have been carefully made, *and the Register, Form 138 attached, contains a true record of the coded messages sent by W.T., together with particulars of communication.*

(If not a Selected Ship, cross out words in italics).

Signature and Rank of Principal Observing Officer.

Date *June 7th 1937*.　　Approved..　　Signature of Captain

---

LETTERS TO INDICATE THE STATE
OF THE WEATHER.

FOG AND VISIBILITY SCALE.

DOUGLAS SEA AND SWELL SCALES SEPARATELY.

SEA SCALE

SWELL SCALE

Great care should be taken to enter into their proper columns the scale number and direction of Sea and Swell separately.

## Format for Header Records

| Format 1 | Format 2 | Type of Data | Description of Entries |
|---|---|---|---|
| Column Numbers | | | |
| 1 | 1 | Record Type | 1 |
| 2 - 6 | 2 - 6 | } Sheet Number | {33001 to 43000 |
| 7 | 7 | } | {Blank, A, B, or C etc |
| 8 - 14 | 8 - 14 | Ship Type | Steam, etc |
| 15 - 34 | 15 - 34 | Ship Name | |
| 35 - 54 | 35 - 54 | Captain's name | |
| 55 - 74 | 55 - 74 | Voyage from | |
| 75 - 94 | 75 - 94 | Voyage to | |
| 95 - 97 | 95 - 97 | Measurement by | Log or revolutions |
| 98 -102 | 98 -102 | Loading | Light or Deep |
| 103 | 103 | Propeller immersed | Yes or No |
| 104 -106 | 104 -106 | Barometer | MERcury or ANeroid |
| 107 | | Not used | |
| 108 -112 | 107 -111 | Bar error too High | |
| 113 -117 | 112 -116 | Bar error too Low | |
| 118 -122 | 117 -121 | at Barometer reading | |
| 123 -127 | 122 -126 | Height of barometer | |
| 128 -129 | 127 -128 | Day } | |
| 130 -131 | 129 -130 | Month } of barometer check | |
| 132 -135 | 131 -134 | Year } | |
| 136 -150 | 135 -150 | Not used | |

**Format for Data Records**

| Format 1 Column Numbers | Format 2 | | Type of Data | Description of Entries |
|---|---|---|---|---|
| 1 | 1 | NAO | Record Type | 2 |
| 2 - 6 | 2 - 6 | AO | } Sheet Number | { 33001 to 43000 |
| 7 | 7 | AO | } | { Blank, A, B, or C etc |
| 8 - 9 | 8 - 9 | NAO | Year | 35 to 39 |
| 10 - 11 | 10 - 11 | NO | Month | 01 to 12 |
| 12 - 13 | 12 - 13 | NO | Day of Month | 01 to 31 |
| 14 - 16 | 14 - 16 | NO | Day of Week | MON to SUN |
| 17 - 18 | 17 - 18 | NO | Hour | 00 to 24 |
| 19 - 22 | 19 - 22 | NO | Latitude | 000 to 900 |
| 23 | 23 | AO | Hemisphere | N or S |
| 24 - 28 | 24 - 28 | NO | Longitude | 0000 to 1800 |
| 29 | 29 | AO | Hemisphere | E or W |
| 30 - 33 | 30 - 33 | NAR | Course | 000 to 360 |
| 34 - 35 | 34 - 35 | NR | Speed | 00 to 99 |
| 36 - 39 | 36 - 39 | NAR VAR | Wind Direction | N to N/W, 000 to 360, CALM or |
| 40 - 42 | 40 - 42 | NR | Wind Force | 0 to 012 or ./. |
| 43 - 46 | 43 - 46 | NR | Pressure as read | 0-520, 2700-3200 or 9800-9999 mb/in |
| 47 - 48 | 47 - 49 | N | Attached thermometer | -5 to 99 (ie degs C and F) |
| 49 - 52 | 50 - 53 | N | Pressure true | 0-520, 2700-3200 or 9800-9999 mb/in |
| 53 - 54 | 54 - 56 | N | Air Temperature | -20 to 99 (ie degs C and F) |
| 55 - 56 | 57 - 59 | N | Sea Temperature | -2 to 99 (ie degs C and F) |
| 57 - 59 | 60 - 62 | NA | Present weather | Alpha or 0 to 9 |
| 60 - 62 | 63 - 65 | NA | Past Weather | Alpha or 0 to 9 |
| 63 - 65 | 66 - 68 | N | Visibility | 0 to 9 or ./. |
| 66 - 69 | 69 - 72 | A | Low Cloud type | Alpha |
| 70 - 71 | 73 - 74 | N | Amount of Low Cloud | 0 to 10 |
| 72 - 75 | 75 - 78 | A | Middle Cloud Type | Alpha |
| 76 - 79 | 79 - 82 | A | Upper Cloud Type | Alpha |
| 80 - 81 | 83 - 84 | N | Total Cloud Amount | 0 to 10 |
| 82 - 85 | 85 - 88 | A | Sea Wave Direction | N to N/W, CALM, VAR or CONF |
| 86 - 88 | 89 - 91 | N | Sea Wave Amount | 0 to 9 or ./. |
| 89 - 92 | 92 - 95 | A | Swell Wave Direction | N to N/W, CALM, VAR or CONF |
| 93 - 95 | 96 - 98 | N | Swell Wave Amount | 0 to 9 or ./. |
| 96 | 99 | N | Remark Indicator | 1 |
| 97 -150 | 100 -150 | | Not Used | |

./. - a report in a range. E.g. Wind force 4/5 means force estimated between force 4 and 5.

| | | |
|---|---|---|
| N - Numeric Characters | } | |
| A - Alphabetic Characters | } | These descriptions are only an indication of how |
| R - Right Adjusted | } | the field may be formatted. They should not be relied |
| L - Left Adjusted | } | upon. |
| O - Value fills the field | } | |

## Formats used in Metform Data Files

The manuscript records were digitized onto files MED1.EEMETF01.DATA to MED.EEMETF81.DATA using the following formats.

| | Header Format 1 | Header Format 2 | Header Format 1 | Header Format 2 |
|---|---|---|---|---|
| EEMETF01.DATA | X | - | X | - |
| EEMETF02.DATA | - | X | X | - |
| EEMETF03.DATA }<br>To }<br>EEMETF81.DATA } | X | - | - | X |

All subsequent concatenated and manipulated data sets were formatted as:

| | | | |
|---|---|---|---|
| X | - | - | X |

**Conversion Subroutines**

The meteorological elements are each converted from EBCDIC to integer format for inclusion in the Flatfile. The subroutine used is shown and a short description of the process is given. The main program and all the subroutines are stored as one module in: MED1.EEPROGLB.FORM(CREATFT2).
The subroutine READ is an enhanced Fortran read subroutine, which returns -32768 if the field is blank and returns two values if the field contains /

**Year, Month Day and Time:** Uses READ. 1900 is added to the year, otherwise no conversion is necessary.

**Latitude and Longitude:** Uses LATCON and LONCON. Converts to minutes for the Flatfile. The sign is changed to negative when hemisphere S or W is found. If invalid positions (i.e. -32768 or 99999) are found the record is not copied to the Flatfile record.

**Ship's Course:** Subroutine SHPCOR. Converts the ship's course in degrees to a single digit:

| Crse degs: | 0 | 023-067 | 068-112 | 113-157 | 158-202 | 203-247 | 248-292 | 293-337 | 338-022 |
|---|---|---|---|---|---|---|---|---|---|
| Code: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

The results using this subroutine have not been fully checked.

**Ship's Speed:** Subroutine SHPSPD. Converts ship's speed from knots to a single digit:

| Speed kts: | 0 | 1 - 3 | 4 - 6 | 7 - 9 | 10 - 12 | 13 - 15 | 16 - 18 | 19 - 21 | 22 - 24 | >24 |
|---|---|---|---|---|---|---|---|---|---|---|
| Code: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

The results using this subroutine have not been fully checked.

**Surface Wind, Sea and Swell Wave Direction:** Subroutine COMCON. Converts direction to 360-point compass. The input is either 32 character compass direction or degrees in 36-point compass.

360-point compass = 32-point compass ∗ 360/32

CONF (confused), VAR (variable) and CALM are accepted. Confused and Variable are set to 990 (Standard MDB code). Calm is set to 0.
Markers - Flatfile item 93 - set when a surface wind direction report is found.
Markers - Flatfile item 138 - set when a sea or swell wave direction report is found.
The results for Sea and Swell conversion have not been fully checked.

**Wind Force:** Subroutine F2SPD. Converts Beaufort force to knots.

| Force: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Speed kts: | 0 | 2 | 5 | 9 | 13 | 19 | 24 | 30 | 37 | 44 | 51 | 59 | 64 |

If two force values are found (e.g.1/2) then the speed is stored as the average value rounded up (e.g.4 knots).

**Sea Level Pressure:** Subroutine MSPL. Converts pressure in inches or whole millibars to millibars and tenths. The subroutine allows for the missing 1000 millibar value. 10000 is added if the value as read is less than 500. If the value as found is outside normal limits, the Flatfile is set to -32768. No use was made of the Pressure value as read and the attached thermometer reading.
Marker - Flatfile item 137 - is set to show when the units were not originally in millibars.
Marker - Flatfile item 108 - is set to show when the pressure was measured in whole units.

13

**Air and Sea Temperature:** Subroutine TEMP2C. Converts temperature in whole degrees Fahrenheit or Fahrenheit and tenths to Centigrade degrees and tenths.
Marker - item Flatfile item 102 - is set to show that the Air Temperature was measured in Fahrenheit.
Marker - Flatfile item 107 - is set to show that the Sea Temperature was measured in Fahrenheit.
Marker - Flatfile item 99 - is set to show that the Air Temperature was measured in whole degrees.
Marker - Flatfile item 105 - is set to show that the Sea Temperature was measured in whole degrees.

**Present and Past Weather:** Subroutine WX2CD. Converts Present and Past Weather character values to modern 2 digit code. This routine has not been fully developed.

**Visibility:** Subroutine VISIBL. Converts visibility to decametres.

| Code: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Visibility Decs: | 0 | 5 | 20 | 50 | 100 | 200 | 400 | 1000 | 2000 | 5000 |

If two visibility values are found (e.g. 1/2) then the average value rounded up (e.g. 13 decametres) is stored in the Flatfile record. This routine has not been fully developed.

**Total Cloud amount and amount of Low Cloud:** Subroutine TEN28T. Converts tenths to oktas.

| Tenths: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oktas: | 0 | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 |

Marker – Flatfile item 135 – is set to show that cloud amount was originally measured in tenths.

**Type of Low Cloud:** Subroutine LOWCLD. To converts low cloud type to modern digit code. This routine has not bee fully developed.

**Type of Medium Cloud:** Subroutine MEDCLD. To converts medium cloud type to modern digit code. This routine has not bee fully developed.

**Type of High Cloud:** Subroutine HGHCLD. To converts high cloud type to modern digit code. This routine has not bee fully developed.

**Sheet Number:** Subroutine LOGNUM. Converts sheet number to integer*10 to allow for character suffix. E.g. 12345 converts to 123450, 12345A to 123451 and 12345B to 123452. 123451 converts to 123459. Suffixes after this remain as 123459. However suffixes beyond G have not been found.

**Subroutines which are believed to contain errors.**
Ship's Course and Speed
Present and Past Weather
Visibility
Types of Low, Medium and High Cloud
Sea Swell direction and amount

**Elements which have not been copied to the Flatfile format.**
Pressure as read
Attached Thermometer
Amount of sea wave
Amount of swell wave

14

**Format for Flatfile**

Item    Description
Number

1.    Month
2.    Year
3.    Day
4.    Hour
5.    Latitude
6.    Longitude
7.    Wind Direction
8.    Wind Speed
9.    Present Weather
10.    Past Weather
11.    Total amount of Cloud
12.    Type of Low Cloud
13.    Type of Medium Cloud
14.    Type of High Cloud
15.    Amount of Low Cloud
16.    Height of Low Cloud
17.    Visibility
18.    Dry Bulb Temperature
19.    Wet Bulb Temperature
20.    Dew Point
21.    Vapour Pressure
22.    Relative Humidity
23.    Sea-Level Pressure
24.    Sea Surface Temperature

Significant Cloud (Max 4 groups)
25.
to      Not used by Metforms
36.

Vertical Visibility
37.    Not used by Metforms

Visually Observed Wave reports (max 3 groups)

| 38. | 41. | 44. | Direction |
|-----|-----|-----|-----------|
| 39. | 42. | 45. | Period (Half seconds) |
| 40. | 43. | 46. | Height (Half metres) |

Ship Identification
47.    UK Series Number or Country of Origin i.e. 216 for Metforms
48.    Ship, Logbook or Metform sheet.

Markers
49.
to        Not used by Metforms
51.

Sea Ice
52.
to        Not used by Metforms
56.

Miscellaneous reports
57.    ds    Ship's course
58.    vs    Ship's speed
59.
to        Not used by Metforms
88.

Ships's Time
89.
to        Not used by Metforms
92

Indicators – 0(False) or 1(True)
93.    Wind Direction converted from 32 point compass.
94.    Not used by Metforms
95.    Not used by Metforms
96.    Not used by Metforms
97.    Not used by Metforms
98.    Not used by Metforms
99.    Air Temperature (dry) measured in whole degrees
100.   Not used by Metforms
101.   Not used by Metforms
102.   Air Temperature originally in degrees Fahrenheit
103.   Not used by Metforms
104.   Not used by Metforms
105.   Sea Temperature measured in whole degrees
106.   Not used by Metforms
107.   Sea Temperature originally in degrees Fahrenheit
108.   Pressure reported in whole units (mm or mbs)

Quality Control Flags
109.
to        Not used by Metforms
124.

16

Markers (expanded from item 50)

| | |
|---|---|
| 125. | |
| to | Not used by Metforms |
| 134. | |
| 135. | Cloud amount originally in tenths |
| 136. | Not used by Metforms |
| 137. | Pressure known not to be measured by barometer, not calibrated in millibars or from barograph |
| 138. | Sea and Swell not originally in 36 point compass |
| 139. | Not used by Metforms |
| 140. | Sea and Swell reports originally in units other than half metres and seconds codes. |
| 141. | |
| to | Not used by Metforms |
| 156. | |
| | |
| 157. | |
| to | NCARD - Not used by Metforms |
| 181. | |
| | |
| 182. | Non-matching indicators – Not used in Metforms |
| | |
| 183. | |
| to | Metform in EBCDIC (see Appendix 4) |
| 220. | |
| | |
| 221. | |
| to | Not used by Metforms |
| 312. | |

Ship identifiers

| | |
|---|---|
| 313 | Metform Number |
| 314 | Set to blank |
| 315 | Set to blank |

## Listing of sample Flatfiles created from Metforms

The sequential record number is shown. The items shown are the first 156 items from the basic Flatfile record. The decoded values from the Card Image (in items 157 to 181) and Non-matching indicators (in item 182) are not used in Metforms and are not shown. The Metform EBCDIC image is shown after CARD : This is 99 characters long with + indicating a blank column. The Metform identifiers are shown after SHIP : i.e. Sheet number and blank Call Sign (printed as Hex 40).

```
RECORD NUMBER:       1
          8    1935      24      12     495     -53     360      13       0       0
          8       8  -32768  -32768       8  -32768    1000     189  -32768  -32768
     -32768  -32768   10132  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768     360  -32768  -32768
        293  -32768  -32768  -32768  -32768  -32768     216  330010  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768       5       5  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
     -32768       1  -32768  -32768  -32768  -32768  -32768       0  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768       1  -32768       1       1  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768
CARD :233001+350824SAT124930N00521W242+13N+++4++2995+672992+66+++0++0V+7++STCU10+++++++++1ON+++3++WNW+3+++
SHIP : 330010  40404040  40404040

RECORD NUMBER:       9
          8    1935      27       6     425    -230     270      13      50      50
          8       8  -32768  -32768       8  -32768     400     200  -32768  -32768
     -32768  -32768   10237     206  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768     270  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768     216  330010  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768       5       5  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
     -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768       1  -32768       1       0  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768
CARD :233001+350827TUE064233N02302W242+13W+++4++3030+703023+68+69OCDOD+6++STCU10+++++++++10W+++2++*+++4+++
SHIP : 330010  40404040  40404040

RECORD NUMBER:    1004
          8    1935      31      12     189     395      11       2       5       0
          7       8  -32768  -32768       7  -32768     400     339  -32768  -32768
     -32768  -32768   10030     300  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768       0  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768     216  330190  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768       3       5  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
     -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768       1  -32768       1       0  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
     -32768  -32768  -32768  -32768  -32768  -32768
CARD :233019+350831SAT121854N03930E150+13N/E+1++2965+962962+93+862++B++6++STCU09++++++++090+++1++++++++++
SHIP : 330190  40404040  40404040
```

```
RECORD NUMBER:     1005
          8    1935     31      18     178     402       0       0       5       5
          7       8 -32768 -32768       7 -32768     400     317 -32768 -32768
     -32768 -32768   10024     317 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768     216  330190 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       3       5 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :233019+350831SAT181745N04011E145+130+++0++2961+912960+89+89Z++Z++6++STCU09+++++++++090+++0++++++++++
SHIP : 330190  40404040  40404040

RECORD NUMBER:     1006
          9    1935      1       0     167     409       0       0       5       5
          7       8 -32768 -32768       7 -32768     400     317 -32768 -32768
     -32768 -32768   10020     300 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768     216  330191 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       3       5 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :233019A350901SUN001640N04055E147+130+++0++2961+922959+89+86Z++Z++6++STCU09++++I+++090+++0+++++++0+++
SHIP : 330191  40404040  40404040

RECORD NUMBER:     1007
          9    1935      1      12     145     424     315       2       0       5
          0 -32768 -32768       7       0 -32768    2000     333 -32768 -32768
     -32768 -32768   10017     311 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768     216  330191 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       3       5 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :233019A350901SUN121432N04224E144+13NW++1++2961+952958+92+88B++Z++8++++++00+++CISTO30+++1+++++++0+++
SHIP : 330191  40404040  40404040
```

```
RECORD NUMBER:    1188
         9   1935     17       0     516    -201     315      24       0       0
         4       2 -32768 -32768       4 -32768    2000     133 -32768 -32768
    -32768 -32768    9970     150 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768     315 -32768 -32768
       293 -32768 -32768 -32768 -32768 -32768     216  330240 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768       6       5 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
    -32768       1 -32768 -32768       1 -32768       1       1 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768       1 -32768       0       1 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768
CARD :233024+350917TUE005135N02008W269+13NW++6++9947+290997+56+59BC+BC+8++CU++05O+++O+++05NW++5++WNW+4++1
SHIP : 330240  40404040  40404040


RECORD NUMBER:    1227
        10   1935      4      18     518    -211     349      13       0       0
         8       8 -32768 -32768       8 -32768    2000     117 -32768 -32768
    -32768 -32768   10150     139 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768     349 -32768 -32768
        23 -32768 -32768 -32768 -32768 -32768     216  330241 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768       2       5 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
    -32768       1 -32768 -32768       1 -32768       1       1 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768       1 -32768       0       1 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768
CARD :233024A351004FRI185148N02107W089+15N/W+4++0125+281015+53+57O++C++8++STCU10+++++++++1ON/W+3++NNE+5+++
SHIP : 330241  40404040  40404040


RECORD NUMBER:   11001
         9   1935     23      12     117    -244     270       9       0      18
         1       2 -32768       1       1 -32768    2000     289 -32768 -32768
    -32768 -32768   10119     267 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768     270 -32768 -32768
        45 -32768 -32768 -32768 -32768 -32768     216  332240 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768       5       5 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
    -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768       1 -32768       1       1 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
    -32768 -32768 -32768 -32768 -32768 -32768
CARD :233224+350923MON121140N02422W+20715W+++++33003081298884+80+B++CQ+++8CU++01++++CI++02W++++2NE++++1+
SHIP : 332240  40404040  40404040
```

20

```
RECORD NUMBER:  111000
         6    1936      23      12     162     601     225      30       5       5
         0  -32768  -32768       7       0  -32768    2000     272  -32768  -32768
    -32768  -32768    9997     256  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768     225  -32768  -32768
       225  -32768  -32768  -32768  -32768  -32768     216  353801  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768       2       6  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
    -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768       1  -32768       0       1  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768
CARD :235380A360623TUE121614N06006E+07716SW++++70028301999781+78+OZ+OZ+++8++++00++++CIST1OSW++++7SW++++7+
SHIP : 353801  40404040  40404040

RECORD NUMBER:  111002
         6    1936      24       0     170     634     248      30       5      18
         0  -32768       3  -32768       0  -32768    1000     283  -32768  -32768
    -32768  -32768   10011  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768     248  -32768  -32768
       236  -32768  -32768  -32768  -32768  -32768     216  353801  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768       2       6  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
    -32768       1  -32768  -32768  -32768  -32768  -32768       0  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768       1  -32768       0       1  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768
CARD :235380A360624WED001659N06326E+07716WSW+++70042302001183++++CZ+CQ+++7++++00AC++++++09WSW+++7SW/W++71
SHIP : 353801  40404040  40404040

RECORD NUMBER:  111006
         6    1936      26       6     167     730     248      30      80      80
         8       7  -32768  -32768       8  -32768     400     272  -32768  -32768
    -32768  -32768   10032     272  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768     248  -32768  -32768
       248  -32768  -32768  -32768  -32768  -32768     216  353801  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768       4       6  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
    -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768       1  -32768       0       1  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
    -32768  -32768  -32768  -32768  -32768  -32768
CARD :235380A360626FRI061642N07258E+17016WSW+++70061300003281+81+OPQOPQ++6NB++10++++++++10WSW+++7WSW+++81
SHIP : 353801  40404040  40404040
```

**Listing of Flatfiles created from Metform Sheet number 37267** (shown in Appendix 2)

The sequential record number is shown. The items shown are the first 156 items from the basic
Flatfile record. The decoded values from the Card Image (in items 157 to 181) and Non-matching
indicators (in item 182) are not used in Metforms and are not shown. The Metform EBCDIC
image is shown after CARD : This is 99 characters long with + indicating a blank column. The
Metform identifiers are shown after SHIP : i.e. Sheet number and blank Call Sign (printed as Hex
40).

```
RECORD NUMBER:   200145
             5    1937      19      18     129    -752      68      19       0       0
             2       2  -32768       1       2  -32768    2000     278  -32768  -32768
        -32768  -32768   10081     283  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768      68  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768     216  372670  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768       1       3  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
        -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768       1  -32768       1       0  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768
CARD :237267+370519WED181255N07511W+056+8ENE+++52995084297782+83+C++C++++8CU++03++++CICIO7ENE+++3++++++++
SHIP :372670  40404040  40404040

RECORD NUMBER:   200146
             5    1937      20      18     149    -725     113      19       0       0
             4       2  -32768       1       4  -32768    2000     278  -32768  -32768
        -32768  -32768   10095     283  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768     113  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768     216  372670  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768       1       3  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
        -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768       1  -32768       1       0  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768
CARD :237267+370520THU181455N07230W+059+8ESE+++52998083298182+83+O++C++++8CU++05++++CICIO9ESE+++3++++++++
SHIP :372670  40404040  40404040

RECORD NUMBER:   200147
             5    1937      21      12     169    -695      45      19      60      19
             8  -32768  -32768  -32768       8  -32768     400     233  -32768  -32768
        -32768  -32768   10132     267  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768      45  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768     216  372670  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768       1       3  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
        -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768       1  -32768       1       0  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
        -32768  -32768  -32768  -32768  -32768  -32768
CARD :237267+370521FRI121657N06929W+060+8NE+++53008299299274+80+OR+OQ+++6CUST10+++++++++1ONE+++3++++++++
SHIP :372670  40404040  40404040
```

22

```
RECORD NUMBER:  200148
        5    1937     23     12     208    -653     146       2       0       0
        4       3       2       7       4  -32768    2000     256  -32768  -32768
   -32768  -32768   10166     261  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768     146  -32768  -32768
       90  -32768  -32768  -32768  -32768  -32768     216  372670  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768       1       3  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
   -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768       1  -32768       1       1  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768
CARD :237267+370523SUN122045N06519W+041+9SE/S++13017080300278+79+C++C++++8CUNB05AS++CIST07SE/S++1E+++++1+
SHIP :372670  40404040  40404040

RECORD NUMBER:  200149
        5    1937     24     12     234    -625      79       5      80      80
        6       8  -32768  -32768       6  -32768    2000     228  -32768  -32768
   -32768  -32768   10159     250  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768      79  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768     216  372670  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768       1       3  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
   -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768       1  -32768       1       0  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768
CARD :237267+370524MON122325N06232W+044+9E/N+++23014078300073+77+PC+PC+++8STCU08+++++++08E/N+++1++++++9+
SHIP :372670  40404040  40404040

RECORD NUMBER:  200150
        5    1937     25     12     264    -599       0       0       0       0
        1       2       3       1       1  -32768     400     239  -32768  -32768
   -32768  -32768   10156     244  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
      360  -32768  -32768  -32768  -32768  -32768     216  372670  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768       1       3  -32768  -32768.
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768       1  -32768  -32768  -32768  -32768  -32768       1  -32768
   -32768       1  -32768  -32768       1  -32768       1       0  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768       1  -32768       1       1  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768  -32768
   -32768  -32768  -32768  -32768  -32768  -32768
CARD :237267+370525TUE122624N05952W+043+9+++0++03013077299975+76+BC+C++++6CU++01AC++CI++04+++++++++N++++++1+
SHIP :372670  40404040  40404040
```

```
RECORD NUMBER:  200151
          5    1937      26      12     291    -567       0       0       0       0
          3 -32768       3       1       3 -32768    1000     222 -32768 -32768
     -32768 -32768   10173     222 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
        360 -32768 -32768 -32768 -32768 -32768     216  372670 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       1       3 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       1 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :237267+370526WED122909N05644W+043+9+++0++03016074300472+72+C++0++++7CUST04AC++CI++07++++++N++++1+
SHIP :372670  40404040  40404040

RECORD NUMBER:  200152
          5    1937      27      12     318    -538     304       9       0       0
          2       2 -32768       7       2 -32768    2000     211 -32768 -32768
     -32768 -32768   10166     211 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768     315 -32768 -32768
        360 -32768 -32768 -32768 -32768 -32768     216  372670 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       1       3 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       1 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :237267+370527THU123150N05346W+046+9NW/W++33013074300270+70+0++0++++8CU++02++++CIST08NW++++2N+++++4+
SHIP :372670  40404040  40404040

RECORD NUMBER:  200153
          5    1937      28      12     341    -506     315       5       0       0
          2       2 -32768 -32768       2 -32768    5000     211 -32768 -32768
     -32768 -32768   10149     206 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768     315 -32768 -32768
        315 -32768 -32768 -32768 -32768 -32768     216  372670 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       1       3 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       1 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :237267+370528FRI123405N05038W+048+9NW+++23008074299770+69+BC+BC+++9CU++02+++++++++02NW+++2NW++++4+
SHIP :372670  40404040  40404040
```

```
RECORD NUMBER:  200154
          5    1937      29      12     366    -472     293       5       0       0
          2       2       3       9       2 -32768    2000     228 -32768 -32768
     -32768 -32768   10149     200 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768     293 -32768 -32768
         45 -32768 -32768 -32768 -32768 -32768     216  372670 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       1       3 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       1 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :237267+370529SAT123637N04713W+048+9WNW+++23007072299773+68+BC+C++++8CU++02AC++CICU04WNW+++2NE++++7+
SHIP :372670  40404040  40404040

RECORD NUMBER:  200155
          5    1937      30      12     393    -437     203      13       0       0
          6       8       2 -32768       6 -32768    2000     217 -32768 -32768
     -32768 -32768   10163     200 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768     203 -32768 -32768
         90 -32768 -32768 -32768 -32768 -32768     216  372670 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       1       3 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       1 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :237267+370530SUN123916N04343W+052+9SSW+++43010073300171+68+O++C++++8STCU07AS++++++09SSW+++3E++++++4+
SHIP :372670  40404040  40404040

RECORD NUMBER:  200156
          5    1937      31      12     415    -395     180      19       0       0
          6       2       2 -32768       6 -32768    2000     189 -32768 -32768
     -32768 -32768   10166     189 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768     180 -32768 -32768
        135 -32768 -32768 -32768 -32768 -32768     216  372670 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768       1       4 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768       1 -32768 -32768 -32768 -32768 -32768       1 -32768
     -32768       1 -32768 -32768       1 -32768       1       0 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768       1 -32768       1       1 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768 -32768
     -32768 -32768 -32768 -32768 -32768 -32768
CARD :237267+370531MON124130N03928W+05410S+++++53010070300266+66+O++C++++8CUCU07AS++++++09S+++++4SE++++1+
SHIP :372670  40404040  40404040
```

**Contract awarded to Atlantic Data Services Ltd.**

# Requirement for a contract to key marine meteorological data to a computer format.

## 1. Introduction.

1.1 Large amounts of previously unkeyed meteorological data from merchant ships for the period 1935 to 1939 have been found in the Met Office Archives at Scott House, Bracknell. Approximately 20,000 sheets (50m characters) containing meteorological observations are required to be keyed.

## 2. Data Keying Requirements.

2.1 The observations are to be transcribed to computer compatible data. It will not be necessary to re-key (verify) these data. The contractor should state the ability of the Company to transcribe these data and should quote the price for data entry program set-up and the all-in price in terms of 1,000 key depressions.

2.2 Data entry programs are required to perform quality control (as described in Appendix IV) and reformat the data to an agreed pattern. The QC limits listed in Appendix IV check values within a field. The contractor should state whether or not the data transcription system to be used will allow quality control routines to make validation checks between records. eg sequential date checks. Maintenance of these programs and occasional amendments detailed by the Met Office shall be the responsibility of the contractor.

## 3. Description of data to be provided for keying.

3.1 The data are held by the Met Office under the terms of the Public Record Act (1958) and are irreplaceable. These records must therefore be treated with utmost care. They must never be marked in any way and only pencils (never pens) should be used in the vicinity of these records.

3.2 There are 80 cardboard boxes of data and around 250 sheets are stored in each box. The sheets to be keyed are numbered from 33000 to 42999. Additional sheets have been numbered between existing numbers eg 34576, 34576A, 34576B, 34577 etc. The full total is estimated to be 20,000 sheets. Each sheet can contain up to 48 observations but between 20 and 30 is the usual range. Each observation is made up of 96 characters which gives approximately 50m key depressions.

3.3 An example of the Metform F911 is given in Appendix I. All the forms have the same format. The example has been reduced in photocopying from A2 to A4 size.

3.4 Data from both sides of the form is required for the "header" record, but the observational data is found on one side

only.

3.5 Appendix II describes the required format of the header.

3.6 Appendix III describes the required format of each observation.

4. Data Courier Service.

4.1 The contractor will be responsible for the safe and secure transport of these archive data to and from their offices on an agreed timescale.

4.2 The contractor should use his own courier service to collect and return data from the Met Office at agreed weekday times.

4.3 The charges for this courier service should be included in the contract price.

4.4 The contractor must meet the stated security and confidentiality needs of the Met Office.

5. Method of data transcription.

5.1 The contractor will need to write data entry and quality control programs. The quality control program should follow the requirements as set out in Appendix IV.

5.2 The contractor should state the cost of the set up programs required to provide data transcription to the required accuracy, quality and format that these limits require.

5.3 The method of data transcription, the equipment and software to be used must be stated and any changes/amendments agreed with the Met Office prior to implementation.

5.4 Compliance with UK and EC regulations for fast keying areas must be stated. ie Annex to Council Directive 90/270/EEC.

6. Format and quality control changes.

6.1 Occasional changes may be made to the quality control programs. The contractor should state his willingness to accommodate these changes and state any extra charge that may be levied.

6.2 The contractor should undertake completion of such amendments with 4 weeks of receipt of a written request to change.

6.3 The Met Office will need to agree all program changes and examine source code listings and data tests of format/quality control.

## 7. Accuracy.

7.1 The data sheets contain both alphabetic and numeric characters. Single digit errors are highly significant. Data transcription rates of less than 0.005% are required. This translates to less than 5 errors per 100,000 characters, where a character can be any non-blank alpha numeric character correctly positioned in the output format.

7.2 An illegible or doubtful figure should be transcribed as an asterisk *. The original paper copy should never be marked in any way.

## 8. Security and confidentiality.

8.1 The work is to be undertaken within the U.K.

8.2 The data are public records and remain the property of the Met Office. They must not be communicated to or held by a third party or to any subcontractor.

8.3 The contractor must confirm that he is accredited with ISO 9000 certification or its equivalent.

8.4 Met Office staff will wish to visit the contractors premises to check conditions.

## 9. Description of data to be returned to the Met Office.

9.1 The contractor should state his ability to return the computer compatible data on 6250bpi, No Label, IBM compatible, magnetic tape in EBCDIC but other formats (except CD ROM) can be considered.

9.2 The data should be returned as multiple files on a single volume.

9.3 The block size should not be greater than 27,000 bytes.

9.4 The archive paper copy must be returned in the same condition as it was received, in numbered batches consistent with the data sequence on the data media.

## 10. Time scales for data transcription.

10.1 Weekly data collections will be required.

10.2 Each collection should be completed and returned in 7 days. A reduction in turn round to 10 calendar days is permissible due to Christmas Public Holidays.

10.3 After returning the transcribed data to the Met Office, the contractor should arrange to hold a back up of all data keyed for a minimum of two months. Any additional charge for data recovery

should be stated.

10.4 The task must be completed by the end February 1996.

M.Jackson.
Hadley Centre
H003
x6238/01344-420926

OCEAN CURRENT OBSERVA...

(Sig and Steam or Steam) ........ Ship. "City of ........" Captain ........ Voyage—From ........

to ........ London.

Particulars of Instruments:—(Please write word *Ship* in each case where not M.O.)

Barometer, (Mercury or Aneroid)?.....Mercury.....

Maker of Instrument and No. (if any).....................  Error?  { Tun High.........— }  { Tou Low. .01 } 21.25.71 in.

Numbers and Description of other Instruments— *1. Certified Thermometer. Ship.*

When and where last compared ?.....11.6.17. Calcutta.

Height above Sea level.....26.....ft.

Requirements for next voyage may, with advantage, be notified direct to the appropriate Port Meteorological Officer or Merchant Navy Agent. See list in "Marine Observer."

The observations recorded herein have been carefully made, and the Register, Form 138 attached, contains a true record of the coded messages sent by W.T., together with particulars of communication.

(If not a Selected Ship, cross out words in italics).

Signature and Rank of Principal Observing Officer.

Date.....July 1937.....

Approved....................... Signature of Captain.

FORM 911.

AIR MINISTRY.

METEOROLOGICAL OFFICE, LONDON.

SHIP'S METEOROLOGICAL RECORD OF SYNCHRONIZED OBSERVATION

METEOROLOGICAL OFFICE, AIR MINISTRY, W.C.2.
1st MAY, 1930.

ON HIS MAJESTY'S SERVICE.

The Director,
Meteorological Office (M.O.1.),
Air Ministry,
Kingsway,
LONDON, W.C.2.

LETTERS TO INDICATE THE STATE
OF THE WEATHER.

FOG AND VISIBILITY SCAL

DOUGLAS SEA AND SWELL SCALES SEPARATELY.

SEA SCALE.

SWELL SCALE.

# Header Record for each sheet.

|  | Field size characters | Field type |
|---|---|---|
| **From Side I** | | |
| Sheet Number | 6 | A/N |
| Ship Type | 7 | A |
| Ship Name | 20 | A |
| Captains Name | 20 | A |
| Voyage – From | 20 | A |
|      – To | 20 | A |
| Was the speed measured by log or revolution: | 3 | A (Log/Rev) |
| State of Loading – Light or Deep: | 5 | A (Light/Deep) |
| Was the propeller immersed: | 1 | A (Y/N) |
| General Remarks: | Not required | |
| **From Side II** | | |
| Barometer (Mercury or Aneroid): | 3 | A (Mer/Ane) |
| Maker of Instruments: | Not required | |
| Error – Too High: | 5 | N |
|     – Too Low: | 5 | N |
|     – at: | 5 | N |
| When and where last compared: | Not required | |
| Height above Sea Level: | 5 | N |
| Numbers and description of other instruments: | Not required | |
| Date (dd/mm/yyyy) | 2/2/4 | N |

# Meteorological Observations.

| Sheet Item Number | Length of field | Alpha and/or Numeric | Description |
|---|---|---|---|
| . | 6 | A/N | Sheet Number |
| . | 2 | N | Year |
| 1 | 2 | N | Month |
| 2 | 2 | N | Day of month |
| 3 | 3 | A/N | Day of week |
| 4 | 2 | N | Hour GMT |
| Position field course speed field | | | |
| 4 | 4 | N | Latitude (decimal not keyed) |
|  | 1 | A | Latitude N or S |
| 5 | 5 | N | Longitude(decimal not keyed) |
|  | 1 | A | Longitude W or E |
| 7 | 3 | A/N | True Course |
| 8 | 2 | N | Average Speed |
| Wind field | | | |
| 9 | 4 | A/N | Direction |
| 10 | 3 | N | Force |
| Barometer field | | | |
| 11 | 4 | N | Uncorrected reading (decimal not keyed) |
| 12 | 2 | N | Attached thermometer |
| 13 | 4 | N | True atmospheric pressure (decimal not keyed) |
| 14 | Not required | | |
| Temperature | | | |
| 15 | 2 | N | Air |
| 16 | 2 | N | Sea |
| Weather | | | |
| 17 | 3 | A | At the time of observation |
| 18 | 3 | A | Past |
| Visibility | | | |
| 19 | 3 | N | Visibility by scale |
| Cloud | | | |
| 20 | 4 | A/N | Low - Type |
| 21 | 2 | N | - Amt |
| 22 | 4 | A/N | Middle - Type |
| 23 | 4 | A/N | Upper - Type |
| 24 | 2 | N | Total clouded |
| Sea | | | |
| 25 | 5 | A/N | Direction |
| 26 | 3 | N | Amount |
| Swell | | | |
| 27 | 5 | A/N | Direction |
| 28 | 3 | N | Amount |
| Remarks | | | |
| 29 | 1 | N | Set 1 if Remarks are found. |

Total characters: 96

# Range limits of parameters for quality control

Sheet Number:   33000 to 42999.   A,B,C,D,E may be added
Year:           1935 to 1939
Month:          1 to 12
Day of month:   1 to 31
Day of week:    SUN to SAT or 1 to 7
Hour:           00 to 23
Latitude:       0 to 9000
                N or S
Longitude:      0 to 18000
                W or E
True course:    0 to 360 degrees or 32 point compass - N, N by E,
                                NNE, NNE by E, NE, NE by S etc
Average Speed: 0 to 25
Wind
     Direction:As "True course"
     Force:     0 to 12 One or two numbers may be given (eg 4/5)
Barometer
     Uncorrected reading:      2800 to 3200
     Attached thermometer:     -5 to 40
     True Atmospheric Pressure: 2800 to 3200
Temperature:
     Air:       -20 to 40
     Sea:       -5 to 39
Weather:
     At time of observation:   b,c,f,g,h,l,m,o,p,q,r,s,t,v
     Past:      As "At time of observation"
Visibility:
                0 to 9 or two numbers may be given (eg 4/5)
Cloud:
     Low - Type:    Cu St Sc Cb Nb
     Low - Amt:     0 to 10
     Middle - Type: As, Ac
     Upper  Type:   Cs, Ci, Cc
     Total Clouded: 0 to 10
Sea:
     Direction:     As "True Course"
     Amount:        As "Visibility"
Swell:
     Direction:     As "True Course"
     Amount:        As "Visibility"
Remarks:          0 or 1

## Hadley Centre Technical Notes

| | | |
|---|---|---|
| HCTN 1 | Sept 1998 | The simulation of SST, sea ice extents and ocean heat transport in a version of the Hadley Centre coupled model without flux adjustments. C Gordon, C Cooper, C A Senior, H Banks, J M Gregory, T C Johns and J F B Mitchell and R A Wood. |
| HCTN 2 | Nov 1998 | The transient response to increasing greenhouse gases using models with and without flux adjustment. J F B Mitchell, T C Johns and C A Senior. |
| HCTN 3 | Dec 1998 | The salinity drift of HadCM3: Description, analysis and a scheme to correct the global average. Jason A Lowe and M Gregory. |
| HCTN 4 | Jan 1999 | Characterising GCM land surface schemes to understand their responses to climate change. N Gedney, P M Cox, H Douville, J Polcher, P J Valdes. |
| HCTN 5 | Jan 1999 | An analogue model to derive additional climate change scenarios from existing GCM simulations. C Huntingford and P M Cox |
| HCTN 6 | Mar 1999 | A review of recent studies of the influence of solar changes on the Earth's climate. R G Harrison and K P Shine |
| HCTN 7 | Apr 1999 | Representation of the Radiative Effect of Convective Anvils. Julie Gregory |
| HCTN 8 | May 1999 | Simulating climatic change of the southern Asian monsoon using a nested regional climate model (HadRM2). David Hassell and Richard Jones. |
| HCTN 9 | June 1999 | A Lagrangian Climatology for the North Atlantic. John Methven, Paul Berrisford and Brian Hoskins |
| HCTN 10 | August 1999 | The impact of new physical parametrizations in the Hadley Centre climate model - HadAM3. Vicky Pope, M.L.Gallani, Peter Rowntree and Rachel Stratton. |
| HCTN 11 | October 1999 | Digitization of Metform data and Conversion to Flatfile Integer Format. M Jackson |

**The Met.Office**