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NATIONAL CLIMATIC DATA CENTER

(1063)

TD-1100
MARINE SURFACE OBSERVATIONS -
US NAVY GLOBAL

Documentation Manual

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

PROJECT DESIGN

SURFACE MARINE PROCESSING SYSTEM

PROJECT MANAGER:	Theodore Terpstra
PROJECT LEADER:	Marc Plantico
PROJECT MEMBERS:	Dan Fulbright Dan Manns
USER REPRESENTATIVES:	Gus Shumbera, DO Ken Davidson, DO Frank Quinlan, CAD Ward Sequin, DOD

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Project Design Sign-off Sheet

	DATE
Gus Shumbera, DO	8-6-81
for Kenneth Davidson, DO	8-10-81
Frank Quinlan, Chief, CAD	8-7-81
Ward Sequin, Chief, DOD	8-7-81

The proposed surface marine processing system was approved by the review committee (August 4, 1981) pending the inclusion of the following items in the design documentation.

1) Alternative IV has been added in the marine project design document. Taking into consideration NCC's basic goal of improving all data sets processed in the center, it was decided that the features discussed in Alternative IV would be considered as enhancements once the proposed system is implemented. Current investigation has shown that in using the proposed system in which the selection of an observation is based on source code, less than 1% of the observations to be archived would be of lower quality than the duplicate observation which was eliminated. Further investigation in this area will be performed before enhancements are made to the proposed system.

2) The Data Administrator will finalize the format to be used for the archived data. It was proposed that the current TDF-1127 format be modified to include the additional data reported in the new synoptic format. The TDF-1127 format will be unchanged from tape positions 1-129 (see Table 1).

The following changes are proposed:

Tape Positions	
130-133	Date (year, month) the data are passed through the Quality Assessment Module
130-131	Year (82 = 1982, etc.)
132-133	Month (01, 02, ..., 12)
134	Second most significant past weather
135-140	Second most significant swell data
135-136	Second most significant swell direction
137-138	Second most significant swell period
139-140	Second most significant swell height

3) The Data Administrator confirmed that he is responsible for having the software available for updating the marine archive file once the proposed system is implemented.

4) Members of the review committee agreed that in order to provide timely access to the data, the telecommunications data and NDBO's buoy data would be converted to the TDF-1127 format upon its receipt at NCC. The data will then be available to service user requests, although the individual sources will not be merged, checked for duplicate observations, or assigned quality flags until the manuscript data are available.

I. Conceptual Design for the Proposed Surface Marine Processing System

A. Introduction

The basic processing flow and input sources for the proposed system are illustrated in Figure 1. This system will begin processing surface marine data reported after December 31, 1981 in accordance with the new synoptic code. In reality the change from the old to the new format will be gradual; therefore, the proposed system must have the capability to handle both data formats.

The objective of the proposed system is to convert all data to a single format, efficiently remove duplicate observations, uniformly edit the data, and merge all data into a single archive file. Benefits of the system include a more manageable data base from which to more economically service marine data requests.

To insure uniform processing, all data will be converted to the Tape Data Family (TDF) - 1127 format* (see Table 1). Duplicate observations will be identified and eliminated before the data are passed through the Quality Assessment Module (QAM) where data quality flags are assigned. Data will be passed to the data base group for archiving as three separate files: the main monthly file, the monthly buoy file, and the delayed data file. Applications for the Mariners Weather Log and the WMO Exchange Program will be derived from the 'keyed 927' monthly file and the monthly buoy file.

B. Description of Manual Procedures

1. Form Preparation

This function involves opening the mail, grouping forms by 'old' (Table 2) or 'new' (Table 3) format, sorting forms by CALL-MONTH, and checking completeness of the identification block.

2. Key Data

All data will be keyed into a modified CD-127 format (Table 4). Illegible forms will be returned to the Primary Data Branch for review.

3. Review Listings and Update File

A listing consisting of flagged data will be created during the computer edit of the keyed data. This listing will be reviewed by a meteorological technician (met-tech) who will perform any updates or corrections either interactively on the computer or via batch using a disc file containing 'field' corrections. The listings will contain observations which were determined to contain observer entry errors or key-entry errors. Systematic observer entry errors (e.g. omitting the tenths value from the temperature and pressure fields) will be automatically corrected by the computer and listed for review. Key-entry errors will be identified in the

*References to the TDF-1127 format in this document imply changes required by the 'new' synoptic code to be implemented January 1, 1982. All future references will be to a 'modified' TDF-1127 format.

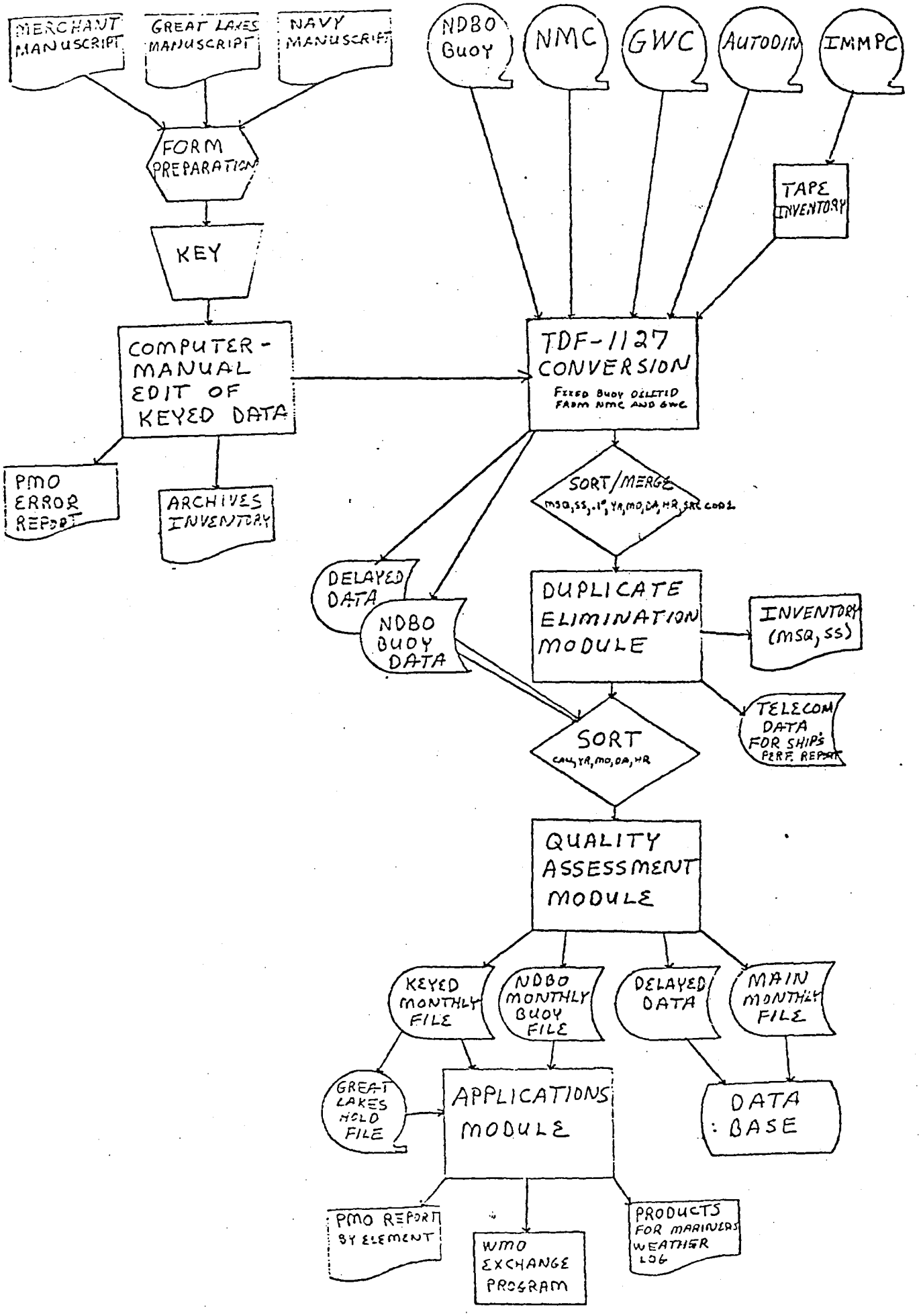


FIGURE 1. Data input sources, basic processing flow, and output products for the proposed surface marine system.

same manner used by the current system. Those values that fall outside the accepted range of values will be flagged for review. The met-tech will check the error listing against the original manuscript forms and correct any key entry errors and other observer entry errors.

4. Runstream Submission and File Management

Program runstreams for executing the computer modules and a scheme for file management will be developed by the Marine Development Group. After the system becomes operational these functions will become the responsibility of the Data Operations Division (DOD).

C. Computer Procedures

1. Computer Edit of Keyed Data

The computer edit will identify, correct, and list systematic observer entry errors. Key entry errors will be detected if the miscue causes an 'illegal' value. These values will be listed for review by a meteorological technician before any changes are made. An error report will be produced for the Port Meteorological Officers (PMO) to provide feedback to the observers on erroneous coding practices. Also, an archives inventory will be created and a count will be made of the number of observations received by ship. This information will be used in generating the Ship's Performance Report published in the Mariners Weather Log.

Program RM1B76 is currently used to edit the keyed data and will be modified to handle the added features. Program documentation will also be updated.

2. IMMPC Inventory

An inventory will be performed on the WMO foreign exchange data to determine the period of record and area of coverage contained on the tape. This program is operational and will require only a slight modification to account for a possible change in format.

3. Modified TDF-1127 Conversion

All data will be converted to a modified TDF-1127 format. The current conversion programs will be used with modifications required for the new format. Fixed buoy data from NMC and GWC will not be converted to avoid duplication with NDBO buoy data. The program to convert the NDBO buoy data will be modified to include an inventory which will be combined with the inventory created during the Duplicate Elimination Module.

The following programs are used to convert surface marine data to the TDF-1127 format:

RS1B05 - WMO Exchange Data (IMMPC Format)
P01D28 - NMC Telecommunications Data
P01D48 - GWC Datsav Data
N01B21 - AUTODIN (Navy's Telecommunications Data)

U01B20 - NDBO Buoy Data
RM1B83 - NCC's Keyed Data (Merchant, Navy and Great Lakes)

4. Duplicate Sort/Merge

Data will be sorted by marsden square (MSQ), 1° subsquare (SS), .1° latitude/longitude, year, month, day, hour and source code before being merged for the Duplicate Elimination Module.

5. Duplicate Elimination Module (DEM)

Duplicate observations will be identified using the fields MSQ, SS, .1° latitude/longitude, year, month, day and hour. Acceptance of observations satisfying these criteria will be based on the quality of the data source. In the past, it was intended that the higher the quality of the data source, the higher the source code assigned. Results from the analysis of telecommunications data (see attachment 1) and NCC marine data users agree that the current hierarchy used for source code is acceptable with the exception of NDBO buoy data which are placed below the telecommunication sources. The source code for NDBO buoy data should be changed to fit into the proposed hierarchy as follows:

1) IMMPC and NCC keyed data (927)
2) NDBO Buoy (currently 882)
3) NMC (890)
4) AUTODIN (889)
5) GWC (888)

Thus, the duplicate observation with the highest source code will be the archived observation (e.g. 927 would be selected over 890). When duplicates occur within a source (less than 0.5 % of the time), the first observation will be retained. This decision was reached after a thorough study revealed that duplicate observations within a source are identical more than 90% of the time.

The Ship's Performance Report published in the Mariners Weather Log (MWL) requires a count of observations received at the National Climatic Center (NCC) by ship's CALL for both mail and/or radio receipts. This requires that a count be taken before the radio and mail receipts are compared for duplicate elimination.

After all data have been compared for duplicate observations, an inventory will be produced based on MSQ-SS for all data retained for archiving.

6. Sort for Quality Assessment Module

To perform the time series checks in the Quality Assessment Module, the data must be sorted by ship's CALL, year, month, day and hour.

7. Quality Assessment Module (QAM)

The current 'Quality Control' program (MARINX.QC140) and flagging scheme (see Table 5) will be used for the proposed system. Modifications

are required to quality check the additional data included in the new synoptic code and to create the additional output files. Minor modifications may be necessary to increase the program's overall efficiency.

Output from this module will consist of four files:

1) Main Marine Monthly File - contains all data for the primary month being processed.

2) Monthly Buoy File - contains only NDBO buoy data. These data will also be included as part of the Main Marine Monthly File.

3) Keyed 927 Monthly File - contains all keyed data which will be used in the applications for the WMO Exchange Program and for the Mariners Weather Log. It is more efficient to create this file during the QAM than to select off the approximately 30,000 observations from the main file containing nearly 175,000 observations.

4) Delayed Data File - contains late data which will not be used in the applications module but will be added to the data base archive file.

All four files will be in a common format and sort (ship's CALL, year, month, day, and hour). The Main Monthly File, the Monthly Buoy File, and the Delayed Data File will be passed to the data base group for archiving.

8. Applications Module

Applications consist of products for the Mariners Weather Log (Gales Reports, Ship's Performance Report, Great Lakes Annual Report, and the Buoy Tables), the WMO Exchange Program and the PMO Report. The Gales Report, Great Lakes Annual Report, and the WMO Exchange data are derived from the 'keyed-927' file. Each month the Great Lakes data will be selected off the 'keyed-927' file and added to the annual Great Lakes hold file. This file will be processed once a year for the Mariners Weather Log's Great Lakes Annual Report. The Ship's Performance Report and the PMO Report are created using both manuscript and telecommunications data.

The Buoy Tables for the MWL will be produced directly from the NDBO monthly buoy file. Data for the WMO exchange program must be sorted by region (areas of responsible countries) and converted to the IMMPC format.

Most applications for the current processing system are derived from work files. As a result, the data have undergone various stages of processing. The applications module for the proposed system will be executed using data which have undergone uniform processing. Consequently, most of the programs used in the applications module will be rewritten. This will also allow more useful inventories and data quality reports to be added. The marine project team recommends that only data flagged 'R' (determined to be of acceptable quality) be used in applications. Use of data with suspect flags may lead to poor data being published in the MWL.

D. Organizational Resource Limits for the Proposed Solution

1. Required Personnel

Open and sort mail (clerk) - 20 hours/month
Job submission and file management (computer technician) - 20 hours/month
Key entry (form layout similar to current form) - 225 hours/month
(proposed form by NWS) - 295 hours/month
Review listings and correct keyed data (Met-tech) - 160 hours/month

2. Required Computer Hardware and Software

Current hardware will be adequate.

A computer terminal will be utilized approximately 80 hours per month for updating records and initiating job runstreams.

Required software changes are identified in Section C - computer procedures.

3. Anticipated Limitations due to Personnel, Hardware and Software

No limitations are seen at the present time.

II. Alternate Solutions

Several alternate solutions have been considered by the marine development group. Keeping in mind the basic program objectives and the requirements of a marine processing system (see Project Initiation), the following alternatives are presented.

Alternative I

The conceptual flow diagram for Alternative I is the same as that for the proposed solution (Figure 1), the only difference being the omission of the GWC telecommunications data. An investigation of the two major telecommunication sources, GWC and NMC, has revealed a large amount of redundant data. See Attachment 1 for details of the investigation. By dropping GWC entirely from the processing, an estimated savings of 110 minutes per month of computer time will be seen over the proposed solution. This savings can be broken down as follows:

Functions Omitted	Time Saved (min)
Conversion to TDF (130K obs)	30
Duplicate Sort/Merge (130K obs)	40
Duplicate Elimination (130K obs)	30
Sort for QAM (6K obs)	4
QAM (6K obs)	6
Total	110

The disadvantage of this alternative is that approximately 5% of the data will be lost.

Resource requirements are the same as stated for the proposed solution.

Alternative II

The conceptual flow diagram for Alternative II is also the same as that for the proposed solution with the exception that only Ocean Station Vessel (OSV) data are selected from GWC. GWC provides the only 'real' time source for the majority of hourly OSV data. OSV data account for approximately 25% of the unique GWC data.

This alternative is estimated to save approximately 75 minutes of computer time over the proposed system (assuming all GWC data must first be converted to the modified TDF-1127; if not the savings would be 105 minutes). The disadvantage of this alternative is that 3-4% of the data are lost.

Resource requirements are the same as defined for the proposed solution.

Alternative III

This alternative consists of enhancements to the current processing system (Figure 2). As many or as few of the various options could be implemented depending on the degree of upgrading required and the funding available for development. The options are:

Option 1. Reduce the manual pre-key edit of the manuscript forms. The current practice involves reviewing all observations and manually identifying and correcting errors. The proposed option involves passing all data through an automated edit and listing out only the erroneous data for review.

Estimated development time for modifying the current computer edit program for keyed data: 160 hours personnel time
10 hours computer time

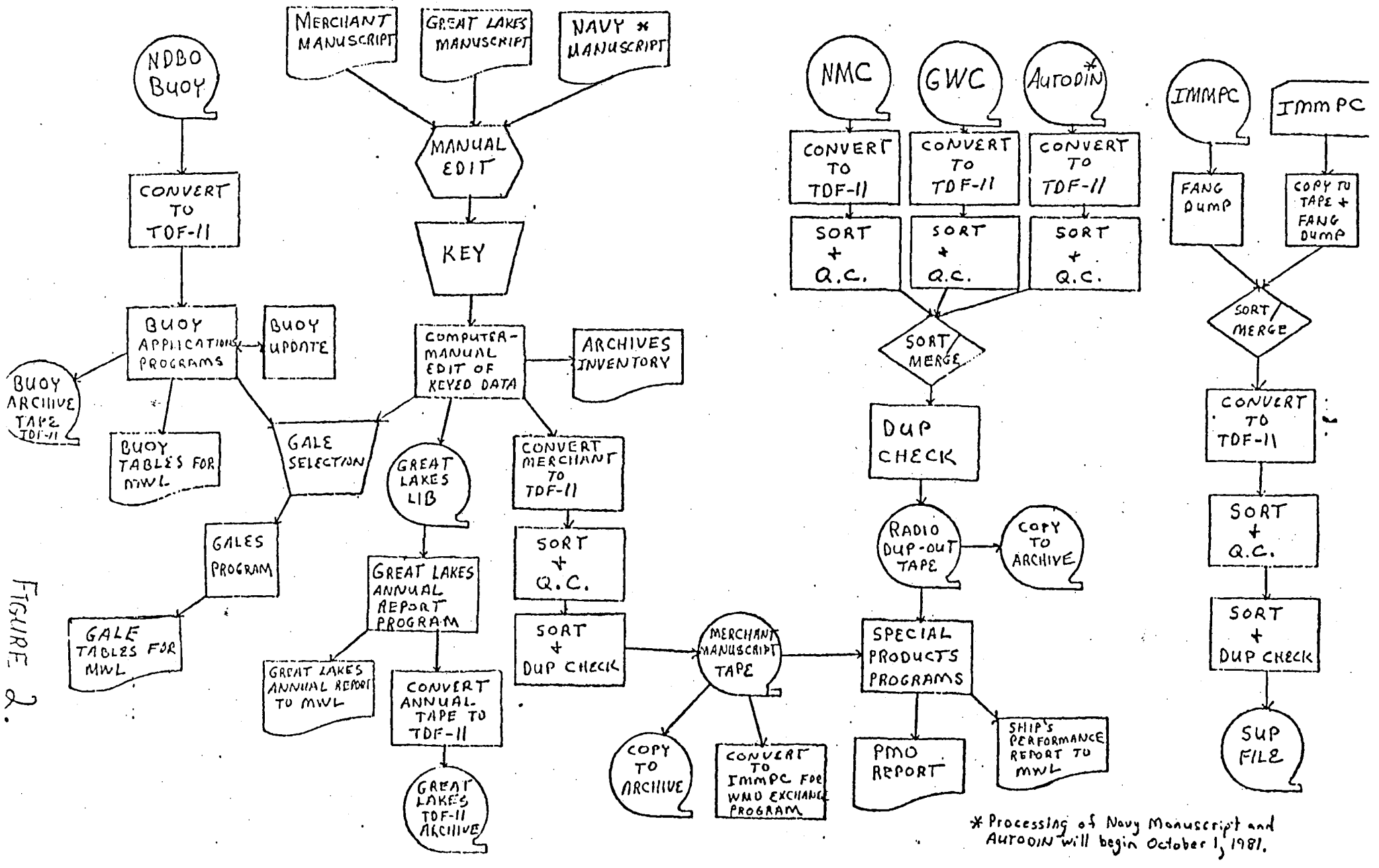
Estimated savings for operations: 150 hours personnel time per month from the current system.

Option 2. Select only GWC and AUTODIN unique observations based on time and location, (same as described for the proposed system) before the data are passed to the quality assessment program. This option would save redundant processing on approximately 95% of the GWC data.

Estimated development time: 40 hours personnel time
6 hours computer time
Estimated savings for operations: 90 minutes of computer time per month from the current system.

Option 3. Omit all GWC observations from processing. The disadvantage of this option is that 5% of the data are lost. Development work would involve changing ECL runstreams and making minor modifications to the applications programs.

Current Surface Marine Processing System



* Processing of Navy Manuscript and Autodin will begin October 1, 1981.

FIGURE 2.

Estimated development time: 40 hours personnel time
4 hours computer time

Estimated savings for operations: 210 minutes of computer time per month from the current system.

Option 4. Delete all exact duplicate observations between the telecommunications sources (NMC, GWC and AUTODIN) before the data are run through the quality assessment program.

Estimated development time: 40 hours personnel time
5 hours computer time

Estimated savings for operations: 75 minutes of computer time per month from the current system.

Option 5. Merge all sources into a single file after the monthly processing is completed.

Estimated development time: 32 hours personnel time
6 hours computer time

Estimated savings for operations: The benefits of this option are not seen as monetary savings during operational processing. Rather the advantages lie in creating a more manageable data base from which to more economically service marine data requests.

The disadvantage of this option is that the final file will contain a considerable amount of redundant data unless the duplicate elimination module is executed after all data have been merged.

Option 6. Work files will be contained on disc instead of on tape as is currently done. The keyed data file will be edited either interactively on the computer or via batch using a disc file containing 'field' corrections. Development work will involve changing all programs to handle disc instead of tape for input/output operations. A program to perform updates interactively or via batch needs to be written.

Estimated development time: 80 hours personnel time
20 hours computer time

Advantages: By having the work files on disc the processing system will be more manageable for operations. Data transfer to or from disc is more efficient than to or from tape so total access time will be reduced. Performing the data corrections interactively on the computer will also be more efficient than the current card-update method.

Disadvantages: Storing files on disc is more costly than storing them on tape. This could be remedied by copying the disc to tape when the file is not in use. Also, updating the file using the text editor could potentially introduce additional errors into the data. Using 'field' corrections would be a safer and more reliable method for updating.

Alternative IV

The conceptual flow diagram for Alternative IV is basically the same as the proposed solution (Figure 1); the only difference being the Duplicate Elimination Module (see Figure 3). When duplicate observations are identified based on time and place, this alternative will accept the observation with the highest quality based on a check of selected parameters within the observation. Recall that the proposed system selects an observation from two or more duplicates based on the quality of the data source which was determined during a preliminary study (see Attachment 1).

In Alternative IV, after the data are converted to the TDF-1127 format and sorted by time and place, exact duplicate observations will be removed. Duplicate time and place observations will be passed through a preliminary quality assessment routine which will assign a quality code for each observation. This 'pre-quality assessment' will not be as comprehensive as the final quality assessment program, but it will provide a means of identifying the 'best' quality observation. The duplicate time and place observations will then be selected based on this quality code. The remainder of the data processing flow for Alternative IV is the same as shown in Figure 1.

Advantages: This alternative will select the best quality observation from all available sources when duplicate time and place observations occur. With the proposed solution, less than 1% of the archived data would be selected in favor of data of higher quality since selection is based on source code. This percentage was determined using the current processing system which performs a quality assessment of the data before duplicate observations are removed.

Disadvantages: Alternative IV would require an additional 170 hours of programmer's time to develop the necessary software for the Duplicate Elimination Module. At $15 per hour for the programmer's time (average for the marine development group) and estimating 5 hours of computer time for testing at $175 per hour, this amounts to a one time cost of $3,425 for developing the software. The software for the Duplicate Elimination Module to be used for the proposed system is already available so no additional development costs are necessary. Also, the 170 hours of programming time could have an impact on the scheduled completion of the project since this time was not considered in constructing the current milestone chart.

This alternative will increase the monthly computer processing time by an additional 90 minutes above the time required for the proposed system. Based on the computer cost of $175 per hour this amounts to an increased cost of $3,150 per year.

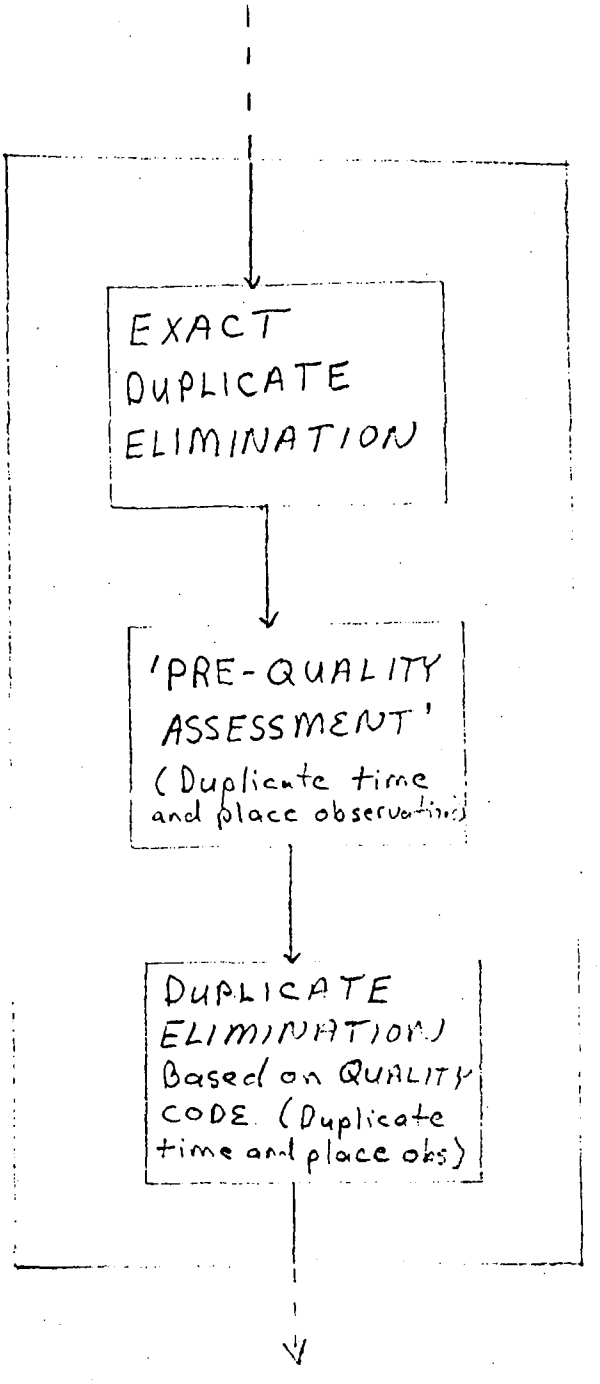


Figure 3. Duplicate Elimination Module for Alternative IV. Substitute this module for the Duplicate Elimination Module of the proposed system (see Figure 1).

III. Reasons for Choosing the Proposed Solution

The proposed solution has been selected because it will accomplish the program objectives in the most cost-effective and efficient manner. This system will satisfy all user requirements and will be more manageable than the current system.

The advantage of the selected solution over Alternatives I and II is that all unique data from the input sources specified in Figure 1 will be utilized.

The advantage of Alternative I is that 110 minutes of computer time per month will be saved compared to the selected solution. The disadvantage of Alternative I is that approximately 5% of the data are lost.

The advantage of Alternative II is a savings of 75 minutes per month of computer time over the selected solution. The disadvantage of this alternative is that 3-4% of the data are lost.

The advantage of Alternative III is that in the case of limited funding, as many or as few of the various options can be implemented depending on the degree of upgrading required. This alternative has the disadvantage of not meeting all the program objectives or user requirements unless enough options are selected so that in effect the 'enhancements' add up to the proposed solution.

IV. Updated User Requirements

1) A requirement has been added by the Data Administrator that the NDBO buoy data be kept as a separate file in the NCC archives. These data will also be included in the main marine file.

2) The responsibility for writing the software to be used by DOD for updating (adding delayed data to the archive file) the marine file has been assigned to the data base group. DOD will update the archive file with the delayed data and then provide the updated file to the Data Base Administrator (DBA).

3) One of the requirements stated in the Surface Marine Project Initiation document is that the users of marine data require timely and economic access to the data after its arrival at NCC. Currently the telecommunication data (GWC, NMC, and AUTODIN) and NDBO's buoy data arrive at NCC within 3 to 4 weeks after the last day of the month being reported. The cut-off for processing manuscript data is 55 days from the last day of the month and it takes another 4 weeks before the data are completely processed. This means that a user would have to wait approximately 3 months before all data could be merged.

A proposed solution is to convert the telecommunication data and NDBO's buoy data to the TDF-1127 format and not do any further processing until the manuscript data are available for merging. The very small number of user requests (approximately 1 per month) for current data (8-12 weeks old) could then be serviced with the converted data. The individual sources would not be merged, checked for duplicate observations, or assigned quality flags until the manuscript data are available.

V. Conclusion

The advantages of the proposed marine processing system over the current system are reviewed. These advantages are:

1) Reduced computer cost by eliminating redundant processing

The proposed system should use 25% less computer time than the current system in the removal of duplicate observations and in the assignment of quality flags to the data. This will be accomplished by executing the duplicate elimination program before the quality assessment module. There will be a reduction in the amount of redundant data sent to archives by removing fixed buoy data from the telecommunications sources (these data are duplicated by NDBO buoy data), and by comparing all data for duplicate observations. Currently the telecommunications data are not compared with the manuscript data.

2) Reduced manual effort

The proposed system will reduce the amount of pre-key manual review of the manuscript forms. Many of the manual checks currently performed are redundant since the computer edit performs the same checks. Also, many of the manual changes involve changing 'original' data. A requirement for the new marine processing system is to not change 'original' data. Only systematic observer entry errors will be changed; all other identifiable errors will be flagged. By relying on the computer edit to identify manuscript errors, the keyed data will receive more uniform editing and the total manual effort will be reduced 40%.

3) A more manageable system

All data will be merged into a single, common file. Data flow through the system will be carefully monitored through the use of data counts and inventories. A disc environment will be easier to manage and operate than a tape environment. The flexibility of the system and the consistency of the application products will be enhanced by running the applications module off the archive file.

4) Improved feedback to the observing network

Through the detection of systematic observer errors in the early stages of processing and by providing more complete element inventories to the PMOs, the quality of the raw data should be upgraded.

ATTACHMENT #1

Subject: Analysis of GWC and NMC Marine Data

The objective of the analysis was to determine the optimum utility of the two primary telecommunication sources for marine data. In the current operations, both the GWC and NMC data are converted to TDF-11 format, passed through the quality control program, merged, and then the duplicate observations are eliminated. Statistics from the monthly processing indicate that these two sources are nearly identical; therefore a potential savings exists if more efficient use of these data sources could be initiated.

To assist in this analysis, a program was written to select the unique observations, the exact duplicate observations (identical columns 4-96), and the duplicates with respect to only time and place (differences in columns 27-96 exist). This third group of observations will be referred to as duplicate time and place observations. It was determined through testing by the marine development group that exact time and place fields (year, month, day, hour, quadrant, latitude, longitude) would best define a duplicate observation (refer to Attachment 2). Therefore a unique observation is defined as one with a unique time and place.

Table 1a contains statistics compiled from GWC and NMC data for February and March 1981. This table illustrates three significant statistics: 1) the combined total of GWC and NMC unique observations represents 22% of the output file; 2) approximately 52% of the output observations meet the definition of duplicate time and place observations; 3) 56% of the initial telecommunications data (GWC and NMC) are retained. The first statistic is considerably higher that was expected based on the assumption that GWC and NMC receive their data from the same source. The second point indicates that somewhere within the time of receipt at NMC and GWC, and the conversion to TDF-11 format at NCC, greater than 50% of the observations are changed from their original form. This suggests that the changes are due to decoding, quality control, and/or conversion of the data to a common format. Other differences may exist due to communication line noise. The third statistic illustrates the high amount of redundancy between NMC and GWC data; only 56% of the incoming data are archived.

	A Number of Input Observations	B Number of Output Observations	C % of Input Observations Retained (B/A)X100	D % of Total Output Observations (B/266213)X100
Total Unique	57,998	57,998	100.0	21.8
(GWC)	(22,397)	(22,397)	---	(8.4)
(NMC)	(35,601)	(35,601)	---	(13.4)
Exact Duplicate Observations	138,580	69,290*	50.0*	26.0*
Time and Place Duplicate Observations	277,850	138,925*	50.0*	52.2*
Total	474,428	266,213*	56.1*	100.0

* Approximate value

Table 1a. Combined statistics for February and March 1981 GWC and NMC data.

The following are fourteen discrepancies, printed in TDF-1127 format (see Table 1 in the main text), that have been identified in the data samples. If the cause for a discrepancy is described as "unknown," the problem is not in the TDF-11 conversion programs. Examples of each of the first five discrepancies will be given to ETAC - OLA (Joe Boyte) to determine if GWC is responsible.

1) - GWC reports a missing sea level pressure, while NMC sends a valid pressure

-cause: The pressure is normally entered in 3 digits. Ships using the SHRED (SHip REDuced) format enter 2 digits and a solidus (/). NMC converts the solidus to zero. GWC considers it an invalid code and replaces the pressure with blanks. Jim McDonald of NMC referred to these as "whole millibar stations".

88811664136207471981011100	340026	98032		1000	6	00	GHZK
89011664136207471981011100	340026	98032	10250	1000	6		GHZK
89011655135107531981011106	350018	98022	10270	1000	6		GHZK
88811655135107531981011106	350018	98022		1000	6	00	GHZK
89011646134307631981011112	350018	98022	10260	1010	6		GHZK
88811646134307631981011112	350018	98022		1010	6	00	GHZK
88811637133507741981011118	360011	98022		1000	6	00	GHZK
89011637133507741981011118	360011	98022	10230	1000	6		GHZK
88811619131907741981011206	200020	98022		1070	9	00	GHZK
89011619131907741981011206	200020	98022	10200	1070	9		GHZK
89011700130908011981011212	290020	98032	10210	1040	8		GHZK
88811700130908011981011212	290020	98032		1040	8	00	GHZK
89008180120508021981011300	350022	98022	10230	1070	7		GHZK
88808180120508021981011300	350022	98022		1070	7	00	GHZK
89008170127308001981011306	320033	98001	10230	1070	1		GHZK
88808170127308001981011306	320033	98001		1070	1	00	GHZK
88808140124908061981011318	340018	98020		1120	3	00	GHZK
89008140124908061981011318	340018	98020	10240	1120	3		GHZK

2) - NMC reports a valid D_sV_s entry, while GWC has blanked it out

-cause: D_sV_s is missing from GWC only when the call for GWC is "SHIP". The exact cause is not understood since D_sV_s is not always missing when the GWC call is "SHIP".

89010961136200191981011100	27 017	98020101711130	16003)000	90027304	23 7033	SHIP
88810961136200191981011100	27 017	98020101711130	16003)000	90027304	7033	SHIP
89010963136200351981011100	27 014	98032101831140	15001)665	60-27304	00 7030	SHIP
88810963136200351981011100	27 014	98032101831140	15001)665	60027304	7030	SHIP
89011664136107491981011100	330026	9701210245100801L05)	11210M772	5003320501410	12 4000	SHIP
88811664136107491981011100	330026	9701210245100801L05)	11210M772	5003320501410	4000	SHIP
89011665136207541981011100	330025	9801110259101K03M08)	06107L3--	---33 0436-06	712026	SHIP
89012147134312751981011100	150012	98022101551165145130160005632		4311520127806	642025	SHIP
89012173137512351981011100	080019	98050101711128099070138901J020		7740820329106	327019	SHIP
89012241134913121981011100	180019	97216101301185159140160025667		22-1820126704	240003	SHIP
88812255135213501981011100	180015	98032100901170153140	888	1820218402	7020	SHIP
89012255135213501981011100	180015	98032100901170153140	888	---1820218402	23 7020	SHIP

3) - NMC reports D_sV_s as missing, while GWC reports zeroes representing a stationary ship

-cause: The exact cause is not known, although since the position of the ship indicates movement in the past 6 hours, we assume GWC is incorrect with a report of zero for D_sV_s.

88819407150113731981011113 33 003 96011 1080	3	00	JXBC
89019407150113731981011113 33 003 96011100501080	3		JXBC
88819417151513901981011200 17 003 00010070	1	00	JXBC
89019417151513901981011200 17 003 08000100701	1		JXBC
8881952115221414198101 1206 98020 1060	1	00	JXBC
8901952115221414198101 1206 0 98020101001060,	1		JXBC
89019537153014711981011218 08 027 98021099801050	8		JXBC
88819537153014711981011218 08 027 98021 1050	8	00	JXBC
89019539153214951981011300 05 030 97022098901	8		JXBC
88819539153214951981011300 05 030 97022	8	00	JXBC
89019632153315231981011306 02 030 97022098301050	8		JXBC
88819632153315231981011306 02 030 97022 1050	8	00	JXBC
88819638153715801981011318 02 020 97515 1030	8	00	JXBC
89019638153715801981011318 02 020 97515097801030	8		JXBC
89019743154116381981011406 36 012 99022097901030	8		JXBC
88819743154116381981011406 36 012 99022 1030	8	00	JXBC
88819749154216951981011418 35 020 98022 1010	7	00	JXBC
89019749154216951981011418 35 020 98022098101010	7		JXBC

4) - NMC indicates wind speed measured (Ø), while GWC indicated wind speed estimated, missing, or indeterminant (blank)

-cause: unknown

Although this will not solve the problem noted, an adjustment must be made with the GWC and NMC conversion to TDF-11 in order to distinguish between estimated, missing and indeterminant wind indicators.

8900774212480425198101 1212	000004	98021101721230	25002)521 5500320105603	144000	ULBI
8880774212480425198101 1212	0 004	98021101721230	25002)521 5500320105603	144000	ULBI
8900775112560410198101 1218	000012	98011101401228	25002K551 5000830500-00	147010	ULBI
8880775112560410198101 1218	0 012	98011101401228	25002K551 5000830500-00	147010	ULBI
8880767912730391198101 1306	10 029	98000102241220	25003)3	131015	ULBI
8900767912730391198101 1306	100029	98000102241220	25003)39- ----	131015	ULBI
42728:DP 10					
8900767912730391198101 1306	100029	98000102241220	25003)[illegible]- ----	131015	ULBI
8900767912770390198101 1318	100019	98020102511209	08012944 1 500	120005	ULBI
8880767912770390198101 1318	10 019	98020102511211	08013144 1 500	120005	ULBI
8900769812900381198101 1406	130027	98021102911198	23003K39- ----	124000	ULBI
8880769812900381198101 1406	13 027	98021102911198	23003K3	124000	ULBI
8900769712900377198101 1412		98020103111199	23003J331 500 30900-00	123010	ULBI
8881120713060370198101 1418	04 029	98021102981210	23002)220 8500630705908	120006	ULBI
8901120713060370198101 1418	040029	98021102981210	23002)220 8500630705908	120006	ULBI
8901121613170363198101 1500	040023	98022103241205	23002N79- ----	133010	ULBI
8881121613170363198101 1500	04 023	98022103241205	23002N7 ?	133010	ULBI

5) - GWC omits wind speed and direction for a fraction of the 'BUOY' observations

-cause: unknown

8901510814080685198103011 5	310017	099961049	044005	31404	002005	44003
8881510814080685198103011 5		099961049	044005	404082	2005	BUOY
8901582014251300198103011 5	030014	101551106	11500R	03604	002010	46002
8881582014251300198103011 5		101551106	11500R	604132	2010	BUOY

The next four discrepancies are caused by GWC's quality control before the data arrive at NCC.

6) - if total cloud amount is less than 9 and low cloud amount is equal to 9, GWC will omit all cloud fields except for total cloud amount

```
88807892129705231981011100 09 010 98021101751240      290050 4                          143020   ULBI
89007892129705231981011100 090010 98021101751240      290050 49- ---                    143020   ULBI
88807800120605091981011106 06 010 98   0101621250      280039 2                          144000   ULBI
89007800120605091981011106 060010 98000101621250      280039 29- ---                    144000   ULBI
89007717121604701981011112 060010 98020101621240      280049 300 904 0620300-00         144000   ULBI
88807717121604701981011112 06 010 98020101621240      280049 300 904 0620300-00         144000   ULBI
89007736123104601981011200 180006 98020101591240      280049 49- ---                    144000   ULBI
88807736123104601981011200 18 006 98020101591240      280049 4                          144000   ULBI
89007734123904451981011206 230010 98000101641222      270040 29- ---                    141005   ULBI
88807734123904451981011206 23 010 98000101641222      270040 2                          141005   ULBI
```

7) - GWC will omit the 'appp' group if it is invalid

```
89041101330103141981030318 350019 98602101801260        260000665 4563520622106   114008 0000EWJT
88841101330103141981030318 350019 98602101801260        260000665 4563520622106   11     0000EWJT
89041251335804131981030318 05 006 97216101291340        220120999 5700520018302   334000     UGGZ
88841251335804131981030318 05 006 97216101291340        220120999 97005 0018302   334000     UGGT
88845201340108111981030318 170012 98022101831170        17500N885 5001720200 00   33     0000UIRV
89045201340108111981030318 170012 98022101831170        17500N885 5001720200 00   334003 0000UIRV
89045011341506151981030318 02 008 97020101531240202180200040220 9400220118902   534003     LRAF
88845011341506151981030318 02 003 97020101531240202180200040220 9400220118902   53         LRAF
```

8) - GWC will omit an invalid visibility

```
88892040284016051981030312 120010    02010488139)            000 900                  2007   SHIP
89092040284016051981030312 120010 71 02010488139)            000 900                912007   SHIP
1257:>P 2
88800217101001701981030318 320014    020101191220        22500N000  003230135601   00     0000EMXF
89000217101001701981030318 320014 18 020101191220        22500N000 -003230135601   0040140000EMXF
1377:>P 2
88804473117507351981030318 06 006    031101521275237220270005443 4410620110501   331022    P3JQ
89004473117507351981030318 06 006 78 031101521275237220270005443 4410620110501   331022    P3JQ
1413:>P 2
88892040284116021981030318 140010    02010502139)            000 900             20079176SHIP
89092040284116021981030318 140010 73 02010502139)            000 900           9120079176SHIP
```

9) - for ship observations, GWC changes a garbled or undefined call and any call greater than 4 digits to 'SHIP'; for buoy observations all bits are turned on resulting in a blank call

```
890008003120507331981030306 100008 98020101371250        270023335 50010201              734000   USW*
888080003120507331981030306 100008 98020101371250        270023335 50010201                4000   SHIP
219:>P 2
88803930113602051981030312 01 014 98032102601232        221011778 6   0150102101        5020   SHIP
89003930113602051981030312 01 014 98032102601232        221011778 6---0150102101      435020   U*T*
787:>
88807659125003981981030312 260008 98012101561226        24001M331 55626203             3010   SHIP
89007659125003981981030312 260008 98012101561226        24001M331 55626203           233010   UNG*
807:>P 2
88808069126407921981030312 36 010 9803110145121519318025003N651 7 13620101703        2010   SHIP
89008069126407921981030312 36 010 9803110145121519318025003N651 7-13620101703      122010   WYS326
```

The next five discrepancies are caused by the NCC programs used to convert the data to TDF-11 format.

10) - whenever past weather is missing, the TDF-11 conversion for NMC data also omits the present weather

```
88817904240801421981011106 030013 9705 10181105202003J15610M215 50503-00          001030      NHOV
89017904240801421981011106 030013 97   10181105202003J15610M215 50503200          001030      NHOV
88817904240801421981011112 040008 9605 10195109806302015005K824 50704-00          000000      NHOV
89017904240801421981011112 040008 96   10195109806302015005K824 50704200          000000      NHOV
88817904240801421981011200 030012 9705 10224109105902014405L885 5   03201         002003      NHOV
89017904240801421981011200 030012 97   10224109105902014405L885 5--03201          002003      NHOV
89017904240801421981011206 040010 70   102001              139   868 50704201     005000      NHOV
88817904240801421981011206 040010 98   10200               13904N868 50704201     005000      NHOV
89017904240801421981011218 040006 97   098411              128   858 60704201     007007      NHOV
88817904240801421981011218 040006 9705 09841               12802N858 60704201     007007      NHOV
4006:>P 20
88817904240801421981011218 040006 9705 09841               12802N858 60704201     007007      NHOV
88817904240801421981011306 180018 9705 10074113210608014401K828      18202        007031      NHOV
89017904240801421981011306 180018 97   10074113210508014401K828 ---18202          007031      NHOV
88817904240801421981011406 200008 9750 10035108606504012804K778 4002020124502     003010      NHOV
89017904240801421981011406 200008 97   10035108606504012804K778 4002020124502     003010      NHOV
88817904240801421981011506 000000 9658 10043108105803012204J887 4   00-00         006010      NHOV
89017904240801421981011506 000000 96   10043108105803012204J887 4--00200          006010      NHOV
```

11) - the TDF-11 conversion for GWC data inserts blanks instead of dashes into the cloud fields for indeterminant data

12) - when the sea period is reported as zero, the TDF-11 conversion for NMC data places a '2' in the period instead of a '-'

```
89030819301308901981030300 00 000 98020100701265248240243022100 -0000200013501  344000     VJAE
88830019301308901981030300 00 000 98020100701265248240243022100  0000-0013501    344000     VJAE
89030298309302861981030300 130016 9802110156125 3           02822599- ---13203     832008     UYIR
88830298309302861981030300 130016 9802110156125 3           02822599     13203     832008     UYIR
88834318311007811981030300 18 008 960221005812092262202110286628 43 1820119602   340010     WLGR
89034318311007811981030300 18 008 960221005812092262202110206628 43-1820119602   340010     WLGR
89034426312708601981030300 140012 9802210099126 6           27500R889 45-14202     837010     EWAE
88834426312708601981030300 140012 9802210099126 6           27500R889 45 14202     837010     EWAE
89033879317202971981030300 090012 98001103191260            26500N99- ---0920110301 432040    UVUD
88833879317202971981030300 090012 98001103191260            26500N99     0920110301 432040    UVUD
89007540324703061981030300 360004 98022101711280            260020551 4--3420100-00 1240000000UIBR
88807540324703061981030300 360004 98022101711280            260020551 4  3420100-00 1240000000UIBR
89041101330603181981030300 200012 98002101841260            27001J99- ---2020022206 1140000000EWJT
88841101330603181981030300 200012 98002101841260            27001J99     20-0022206 1140000000EWJT
89041645334108571981030300 000000 98020101821190            190000111 00000200000-00 8340000000UBYR
88841645334108571981030300 000000 98020101821190            190000111 00000-0000-00 8340000000UBYR
89041246334304621981030300 05 006 98020101861280            240040331 8--0520200-00 334000    UGSZ
88841246334304621981030300 05 006 98020101861280            240040331 8  0520200-00 334000    UGSZ
89041175337703581981030300 270019 98002101051214            20301199- ---27304      122013    UUZK
88841175337703581981030300 270019 98002101051214            20301199     27304      122013    UUZK
```

13) - when the swell direction is '99' (indeterminant), the TDF-11 conversion for GWC replaces the swell period with a dash rather than the value indicated

```
20:>
89044136433702681981030300 23 006 97010101151165145130190002N55-- ---2340299003   134003     HBMG
88844136433702681981030300 23 006 97010101151165145130190002N55      234029903     13         HBMG
85:>
88802857205908711981030306 06 028 936411012812632612602800 1F9 7 1  0620399-02   260010     GOYD
89002857205908711981030306 06 028 936411012812632612602800 1F9-7 1---062039502   260010     GOYD
421:>
89012815231216501981030306 340027 980221013511201201201900 7J897 300342069509   642015     3EYN
88812815231216501981030306 340027 980221013511201201201900 7J887 3003420699 09   642015     3EYN
```

14) - The TDF-11 conversion for GWC inserts invalid swell data for a fraction of the 'BUOY' observations. This problem occurs for buoy observations when wind speed and direction are missing but sea wave data have been reported. See discrepancy #5.

```
888116251323075319810301 15            101351208    194014      405087     7011    BUOY
890116251323075319810301 15  250017    101351208    194014    25405      007011    41002
890116901390070019810301 15  300025    100371091    167070    30405      002019    44004
888116901390070019810301 15            100371091    167070      405087     2019    BUOY
1407:>
```

Considering that the policy for archiving marine data at NCC is to maintain originality and to flag suspect data, it seems mandatory to select an NMC observation over a GWC duplicate. This is based on the fact that GWC does perform some quality control type changes to original data. In reviewing the first nine discrepancies, it is evident that NMC data are more reliable than GWC data. However, a portion of the GWC data are unique and requires further investigation. The remaining portion of our analysis will give insight as to which type of observations are unique to each source.

Unique observation files for February and March 1981 were examined to determine the type of observations present in each file. Table 2a below shows important features of the unique files.

	February		March	
Source	GWC	NMC	GWC	NMC
Total Unique	9306	18932	13091	16669
% OSV	14.6	1.5	11.4	1.7
% Buoy	49.5	78.3	44.4	69.9
% Other	35.9	20.2	44.2	28.4

Table 2a. Observation contributions to unique files by source

Further analysis of the buoy data from each source reveals that a large quantity of buoy data is present in the NMC component which does not appear in the GWC files. For March 1981 alone, there were almost 8500 floating buoy (non-NDBO) observations in the NMC constituent which were not found in the GWC files. Fixed buoy data from telecommunications may be disregarded since these data will be derived from NDBO buoy tapes sent routinely to the NCC. Therefore, the unique file shows primary contributions from Ocean Station Vessels (OSV), unique ship observations and floating buoy data. Of particular interest is the relatively high contribution of OSV observations obtained from GWC in comparison to NMC.

In the final analysis, NMC's contribution of unique observations to the output file is expected to exceed 10% while the GWC contribution would be near 5%. These estimates were derived by eliminating the fixed buoy observations from the unique file for each source (see Table 1a).

In view of this analysis of the contributions from the unique files and from previous examinations of the two principal sources of telecommunications data (NMC and GWC) in terms of quality, the following actions are recommended:

1) Use NMC as the primary telecommunications source excluding the fixed buoy data which are available from NDBO

2) Use GWC data (DATSAV) only to the extent necessary to retrieve all unique observations

The above recommendation assures an optimum data base in terms of data volume and overall quality provided that source characteristics remain relatively stable after the synoptic code changes in 1982.

The objective of this study was to analyze the primary telecommunication sources (GWC and NMC). However the quality and contribution of each telecommunications source must be analyzed to determine its relative quality for duplicate elimination. In order to complete the study of these sources, the AUTODIN (Navy's telecommunications) data for February 1981 were compared with NMC and GWC data.

Out of a total of 6535 observations (351 of the original observations could not be converted to TDF-11 format), 3165 or about 48% of the AUTODIN data would be archived.

As with the GWC data, the AUTODIN format does not allow for a ship's CALL exceeding four characters. With that exception, the quality of the AUTODIN data is comparable to that of the NMC data (distinctly better than GWC data).

ATTACHMENT #2

Subject: Selection of Fields for Identifying Duplicate Observations

For this study a data sample of 51,621 observations covering the period January 11-17, 1981 were used from both NMC and GWC. First, the data were sorted by year, month, day, hour, quadrant, latitude and longitude. The fields for identifying duplicate observations were the same as used for the sort. Results were:

	% unique	# observations
GWC	1.4	722
NMC	12.6	6512

Next, the data were sorted by CALL, year, month, day, hour, quadrant, latitude and longitude with the corresponding fields used for identifying duplicates. Results were:

	% unique	# observations
GWC	10.2	5260
NMC	21.7	11203

Results from this study show that the fields to consider for identifying duplicate observations should be "time" and "place" (i.e., year, month, day, hour, quadrant, latitude, and longitude). We have found that the station call is an unreliable field for the duplicate check and if used results in many observations (225% more) being considered unique when they are actually duplicates. Primary reasons for station call unreliability are: 1) GWC permits only 4 characters for the station call while NMC permits 7 letter calls, 2) when the station call is garbled, GWC replaces the field with the word "SHIP", while NMC replaces the garbled letter with an asterisk, giving a call such as "UGW*", 3) IMMPC receipts do not include ship call in the observations, and 4) the Navy uses 'dummy' codes (e.g., NNXX) for classified ships.

Table 1. TDF-1127 Format

TAPE POSITIONS	ELEMENT AND ELEMENT SYMBOL
01-03	CARD DECK NUMBER
04-06	MARSDEN 10° SQUARE (MMM)
07-08	MARSDEN 1° SUB-SQUARE
09	QUADRANT (Q_c)
10-12	LATITUDE ($L_aL_aL_a$)
13-16	LONGITUDE ($L_oL_oL_oL_o$)
17-20	YEAR - GMT (AAAA)
21-22	MONTH - GMT (MM)
23-24	DAY - GMT (YY)
25-26	HOUR - GMT (GG)
27-29	WIND SCALE INDICATOR AND WIND DIRECTION (idd)
30-33	INDICATOR AND WIND SPEED (iff)
34-36	INDICATOR AND VISIBILITY (ivv)
37-38	PRESENT WEATHER (ww)
39	PAST WEATHER (W)
40-44	SEA LEVEL PRESSURE (PPPPP)
45-48	TEMPERATURES INDICATOR AND AIR TEMPERATURES (iTTT)
49-51	WET BULB TEMPERATURE
52-54	DEW POINT TEMPERATURE ($T_dT_dT_d$)
55-57	SEA SURFACE TEMPERATURE ($T_wT_wT_w$)
58-60	AIR-SEA TEMPERATURE DIFFERENCE ($T_sT_sT_s$)
61	TOTAL CLOUD AMOUNT (N)
62	LOWER CLOUD AMOUNT (N_h)
63	TYPE OF LOW CLOUD (C_L)
64	CLOUD HEIGHT INDICATOR (i)
65	CLOUD HEIGHT (h)
66	TYPE OF MIDDLE CLOUD (C_M)
67	TYPE OF HIGH CLOUD (C_H)
68-69	DIRECTION OF WAVES (d_wd_w)
70	PERIOD OF WAVES (P_w)
71-72	HEIGHT OF WAVES (H_wH_w)
73-74	DIRECTION OF SWELL (d_wd_w)
75	PERIOD OF SWELL (P_w)
76-77	HEIGHT OF SWELL (H_wH_w)
78-79	COUNTRY INDICATOR (see table 3A)
80	SHIP DIRECTION (D_s)
81	SHIP SPEED (V_s)
82	BAROMETRIC TENDENCY (a)
83-85	AMOUNT OF PRESSURE CHANGE (ppp)
86	TYPE OF ICE ACCRETION ON SHIPS (I_s)
87-88	THICKNESS OF ICE ON SHIPS (E_sE_s)
89	RATE OF ICE ACCRETION (R_s)
90-96	SHIP, BUOY, OR OSV CALL SIGN

Table 1 (continued)

TAPE POSITIONS	ELEMENT AND ELEMENT SYMBOL
97	ORIGINAL WIND SPEED UNITS INDICATOR (i_w)
98	ORIGINAL TEMPERATURE UNITS INDICATOR (table 3B)
99	SEA TEMPERATURE (BUCKET OR INTAKE) Began 1968
100-101	WAVE PERIOD (SEA) SECONDS (Began 1968)
102	DESCRIPTION OF ICE TYPE (C_z)
103	EFFECT OF ICE ON NAVIGATION (K)
104	BEARING OF PRINCIPAL ICE EDGE (D_i)
105	DISTANCE TO ICE EDGE FROM SHIP (r)
106	ORIENTATION OF ICE EDGE (e)
107-108	AMOUNT OF PRECIPITATION (RR)
109-110	TIME PERIOD FOR PRECIPITATION AMOUNT (jj)
111	SIGNIFICANT CLOUD AMOUNT (N_s)
112	SIGNIFICANT CLOUD TYPE (C_s)
113-114	SIGNIFICANT CLOUD HEIGHT ($h_s h_s$)
115	SHIP POSITION (LAT, LON) - flag
116	WIND - flag
117	VISIBILITY - flag
118	PRESENT WEATHER - flag
119	PAST WEATHER - flag
120	PRESSURE - flag
121	DRY BULB - flag
122	DEW POINT/WET BULB - flag
123	SEA TEMPERATURE - flag
124	CLOUDS - flag
125	SEA WAVES - flag
126	SWELL WAVES - flag
127	ppp (Pressure Tendency) - flag
128-129	QUALITY CODE
130-134	JULIAN DATE (YRDAY)
135-136	BLANK
137-140	AREA (for NCC use only)

SHIP'S NAME	CALL SIGN	NOAA FORM 72-1 (9-78) U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
MONTH AND YEAR 19__ / VOYAGE FROM:	BAROMETER NO.	**SHIP'S WEATHER OBSERVATIONS**
COUNTRY OF REGISTRY / VOYAGE TO:	CORRECTION APPLIED	

GENERAL INSTRUCTIONS

1. Fill in all blanks on upper left-hand side of this form.
2. Check appropriate box for sea temperature observing method.
3. Before entering, convert:
   a. all temperatures to °C.
   b. all pressures to millibars.
4. Begin a new sheet each month.
5. Complete all blocks substituting slashes "/ " for unobserved elements. Groups preceded by an INDICATOR may be omitted if none of the elements are observed.
6. See Weather Service Observing Handbook No. 1, Marine Surface Observations, for complete observing and coding details.

	LATITUDE (Degrees and tenths, 3 figures)	QUADRANT OF GLOBE	LONGITUDE (Degrees and tenths, 4 figures)	DAY OF MONTH GMT (2 figures)	TIME GMT (Coded 00-23)	WIND INDICATOR (Coded)	TOTAL CLOUD AMT. (Coded)	WIND: DIRECTION (True) (tens of degrees) (00 = calm)	WIND: SPEED (True knots) (00 = calm)	VISIBILITY (Coded 90-99)	PRESENT WEATHER (Coded)	PAST WEATHER (Coded)	SEA LEVEL PRESSURE (millibars and tenths)	AIR-TEMP. DATA °C: DRY BULB °C (Whole degrees)	AIR-TEMP. DATA °C: TENTHS OF DRY BULB °C	AIR-TEMP. DATA °C: WET BULB °C (Degrees and tenths)	AMOUNT OF LOWEST CLOUDS	TYPE OF LOW CLOUD	HEIGHT OF LOWEST CLOUDS	TYPE OF MIDDLE CLOUD	TYPE OF HIGH CLOUD	COURSE OF SHIP (Coded)	SPEED OF SHIP (Coded)	3-HOUR PRESS. CHANGE: CHARACTER OF CHANGE	3-HOUR PRESS. CHANGE: AMOUNT OF CHANGE (mb and tenths)	INDICATOR	DEW POINT FROM TABLE	INDICATOR	SEA TEMPERATURE °C (Degrees and tenths 3 figures) CHECK ONE [ ] BUCKET [ ] INTAKE	TENTHS OF AIR TEMP. °C	INDICATOR	WAVES: WIND WAVES: PERIOD (Avg. seconds 2 figures)	WAVES: WIND WAVES: HEIGHT (Half meters)	WAVES: SWELL (Make as many groups as patterns observed): DIRECTION (tens of degrees)	WAVES: SWELL: PERIOD (Coded)	WAVES: SWELL: HEIGHT (Half meters)	ADDITIONAL MESSAGE GROUPS AND REMARKS (More small groups, $2T_sE_sE_sR_s$, ICE, Wind Shifts, Freak waves, etc.)	SHORE RADIO STATION CALL SIGN TO WHICH MESSAGE WAS SENT
99	$L_aL_aL_a$	Q_c	$L_oL_oL_oL_o$	YY	GG	i_w	N	dd	ff	VV	ww	W	PPP	TT	–	–	N_h	C_L	h	C_M	C_H	D_s	v_s	a	pp	0 / /	T_dT_d	1	$T_wT_wT_w$	i_T	3	P_wP_w	H_wH_w	d_wd_w	P_w	H_wH_w	–	–
99																										0 / /		1			3							
99																										0 / /		1			3							
99																										0 / /		1			3							
99																										0 / /		1			3							
99																										0 / /		1			3							
99																										0 / /		1			3							
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99																										0 / /		1			3							
99																										0 / /		1			3							
99																										0 / /		1			3							
99	$L_aL_aL_a$	Q_c	$L_oL_oL_oL_o$	YY	GG	i_w	N	dd	ff	VV	ww	W	PPP	TT	–	–	N_h	C_L	h	C_M	C_H	D_s	v_s	a	pp	0 / /	T_dT_d	1	$T_wT_wT_w$	i_T	3	P_wP_w	H_wH_w	d_wd_w	P_w	H_wH_w		

NOAA FORM 72-1 SUPERSEDES PREVIOUS EDITION.

Table 2. NOAA Form 72-1 (9/78)

Table 3. Proposed Form to Replace NOAA Form 72-1

SHIP'S WEATHER OBSERVATIONS
(PRINT ALL ENTRIES)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
[illegible]

MONTH AND YEAR

19__

SHIP	MASTER	RADIO OFFICER	GENERAL INSTRUCTIONS
CALL	COUNTRY OF REGISTRY	PRINCIPAL OBSERVER	OBSERVER
BAROMETER CORRECTION	DATE OF LAST P.M.O. VISIT / /	OBSERVER	OBSERVER

GENERAL INSTRUCTIONS

1. Fill in all blanks on upper left-hand side of this form.
2. Check appropriate box for sea temperature [illegible] method [illegible].
3. Begin a new sheet each month.
4. Complete all blocks substituting slashes "/" for unobserved elements. [illegible] may be [illegible] observed.
5. See the Marine Surface Observations [illegible] for observing and coding details.

TIME GMT	WIND INDICATOR (Coded)	INDICATOR	LATITUDE (Degrees and tenths)	QUADRANT OF GLOBE	LONGITUDE (Degrees and tenths)	PRECIPITATION NOT REPORTED	WEATHER GROUP INDICATOR	HEIGHT OF LOWEST CLOUDS	VISIBILITY (Coded 90-99)	TOTAL CLOUD AMT. (Coded)	WIND DIRECTION (True) tens of degrees (00 = calm)	WIND SPEED (Knots)	INDICATOR	SIGN Zero or Plus = 0 Minus = 1	AIR TEMPERATURE In degrees and tenths Celsius	WET BULB °C (Degrees and tenths)	INDICATOR	SIGN Zero or Plus = 0 Minus = 1	DEW POINT TEMPERATURE In degrees and tenths Celsius	INDICATOR	SEA LEVEL PRESSURE (Millibars and tenths)	3-HOUR PRESSURE CHANGE INDICATOR	CHARACTER OF CHANGE	AMOUNT OF CHANGE	INDICATOR	PRESENT WEATHER	PAST WEATHER	AMOUNT OF LOWEST CLOUD	TYPE OF LOW CLOUD	TYPE OF MIDDLE CLOUD	TYPE OF HIGH CLOUD
Y Y G G	i_w	99	$L_a L_a L_a$	Q_c	$L_o L_o L_o L_o$	4	i_x	h	V V	N	d d	f f	1	s_n	T T T	— — —	2	s_n	$T_d T_d T_d$	4	P P P P	5	a	p p p	7	w w	$W_1 W_2$	8 N_h	C_L	C_M	C_H
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
		99				4							1				2			4		5			7			8			
Y Y G G	i_w	99	$L_a L_a L_a$	Q_c	$L_o L_o L_o L_o$	4	i_x	h	V V	N	d d	f f	1	s_n	T T T	— — —	2	s_n	$T_d T_d T_d$	4	P P P P	5	a	p p p	7	w w	$W_1 W_2$	8 N_h	C_L	C_M	C_H

COURSE OF SHIP	SPEED OF SHIP	SIGN	SEA TEMPERATURE °C In degrees and tenths	WIND WAVES: INDICATOR	WIND WAVES: PERIOD	WIND WAVES: HEIGHT	SWELL: INDICATOR	SWELL: DIRECTION OF MOST SIGNIFICANT	SWELL: DIRECTION OF SECOND MOST SIGNIFICANT	SWELL: INDICATOR	MOST SIGNIFICANT: PERIOD	MOST SIGNIFICANT: HEIGHT	SWELL: INDICATOR	SECOND MOST SIGNIFICANT: PERIOD	SECOND MOST SIGNIFICANT: HEIGHT	ICE ACCRETION: INDICATOR	ICE ACCRETION: ON SHIP	ICE ACCRETION: THICKNESS	ICE ACCRETION: RATE	SEA ICE: INDICATOR	SEA ICE: Concentration	SEA ICE: Stage of development	SEA ICE: [illegible]	SEA ICE: Bearing of principal ice edge	SEA ICE: Present situation	REMARKS	DATE	SHORE RADIO STATION CALL SIGN

U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE
NATIONAL WEATHER RECORDS CENTER

Table 4

Layout Form — 80 Column Card

JOB # 71302128

EFFECTIVE: 12/78 DATA

Card columns	Field	Notes
1–8		
9–10	Month	
11–12	Year	
13–15	Latitude La La La	
16	Quadrant Qc	
17–20	Longitude Lo Lo Lo Lo	
21–22	Day YY	
23–24	Hour GG	
25	Wind Indicator iw	
26	Total Cloud Amt. N	
27–28	Wind Direction dd	
29–30	Wind Speed ff	
31–32	Visibility VV	
33–34	Present Weather ww	
35	Past Weather W	
36–40	Sea Level Pressure ppp	09 or 10
41–44	Dry Bulb Temp.	Pos = 0 Neg = -
45–48	Wet Bulb Temp.	Pos = 0 Neg = -
49	Ice on Wet Bulb	Blank if not reported
50	Amt. of Lowest Cloud Nh	
51	Type of Low Cloud CL	
52	Height of Low Cloud h	
53	Type of Middle Cloud Cm	
54	Type of High Cloud	
55	Indicator 6 or 2	2 = Ice Group
56	Ds	
57	Vs	
58	a	0, 1, 2, 3
59–61	pp	
62–65	Sea Temp. Tw Tw Tw	Pos = 0 Neg = -
66–67	Period of Wind Wave Pw Pw	
68–69	Height of Wind Waves Hw Hw	
70–71	Direction of Swell Waves dw dw	
72	Period of Swell Waves Pw	
73–74	Height of Swell Waves Hw Hw	
75	Temp. Indicator	1 = Blank
76	Blank	
77–78	Dew Point	Whole °C
79–80		

Table 5. Definition of Flags Assigned in Quality Assessment Program

Error Type	Flags		
	Systematic Observer Error or Bias Detected (Original Observation Not Changed)	Suspect	Erroneous
Illegal Code	A*	I	M
Failed Internal Consistency	B	J	N
Failed Time Continuity	C	K	P
Exceeds Extreme Value	D	L	Q
Correct Element	R		
Missing Element	S		

*For cloud fields, flag 'A' indicates cloud types, total cloud, and/or low cloud amount have failed internal consistency check.

CONTENTS

INTRODUCTION

The Weather Bureau was established in the Department of Agriculture by an act of Congress, approved October 1, 1890 (26 Stat. 653). By the President's Reorganization Plan No. 4, it was transferred to the Department of Commerce, effective June 30, 1940. It is the latest in a succession of Federal agencies that have engaged in the collection, compilation, and interpretation of meteorological observations. The earlier agencies were the Surgeon General's Office of the Army, the General Land Office, the Smithsonian Institution, and the Office of the Chief Signal Officer of the Army.

In 1814 the regulations of the Army provided that a hospital surgeon at each military post should keep a diary of the weather, but the War of 1812 prevented efficient compliance with this order. In 1819 Surgeon General Joseph Lovell remarked that "every physician who makes a science of his profession or arrives at eminence in it will keep a journal of this nature as the influence of weather and climate upon diseases, especially epidemic, is perfectly well known. . . . To this end every surgeon should be furnished with a good thermometer, and in addition to a diary of the weather, should note everything relative to the topography of his stations, the climate, complaints prevalent in the vicinity, etc. that may tend to discover the causes of diseases, to the promotion of health, and the improvement of medical science."[1]

Organized meteorological observations were attempted also by Josiah Meigs, who, when Commissioner of the General Land Office in 1817, petitioned Congress to pass a resolution looking to the keeping of meteorological registers at the several land offices throughout the country. Congress failed to provide the necessary instruments or to have the observations taken under the sanction of public authority. Meigs, however, solicited the aid of the registers at the various land offices, inducing them to forward with their official monthly report observations of temperature, wind, other weather phenomena taken in the morning, at 2 p.m., and in the evening.

The meteorological work of the Smithsonian Institution began in 1847 under the leadership of Joseph Henry. The Institution collected all the records of extant observations that it could find and instituted throughout the country its own system of obtaining weather data from voluntary observers. It obtained the cooperation of the Patent Office, under whose frank the weather data were then forwarded to Washington and under whose auspices compilations of them were published; and it received and analyzed reports of weather observations made by other

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[1]Charles Smart, "The Connection of the Army Medical Department with the Development of Meteorology in the United States," in Weather Bureau Bulletin 11, p.209.

agencies, namely, the Coast Survey of the Department of the Treasury, begun in 1843, and the Corps of Topographical Engineers, whose observations along the shorelines of the Great Lakes were initiated in 1859.

With the establishment of the meteorological service of the Signal Corps in 1870, the work of the Smithsonian Institution declined, and in 1874 Joseph Henry proposed to transfer to the Signal Office the institution's extensive collection of meteorological reports made by voluntary observers in all parts of the United States. This transfer of observations was approved by the Secretary of War, and the accumulated reports of 383 observers were placed in the custody of the Signal Office.[2] On February 4, 1870, the Secretary of War was directed to have meteorological observations made at military stations and at other points in the interior of the continent and to give warnings about storms on the northern lakes and along the seaboard (16 Stat. 369). This weather service was also assigned to the Signal Office.

The Signal Office soon began to collect marine reports also, similar to those collected by the Navy Department and, in 1871, it sent out circulars to navigators and shipowners requesting that daily simultaneous observations be made at sea and transmitted to its Weather Service whenever a vessel arrived in port. Scientists from different countries meeting in Vienna in 1873 agreed to record daily simultaneous observations throughout the world. In 1875 the Signal Office began issuing a printed bulletin embodying these international simultaneous observations, and a copy of the bulletin was furnished to each cooperative observer. The scope of the weather observations now extended practically around the northern hemisphere. In 1888 the Signal Office discontinued the collation of marine observations, which were thereafter forwarded to the Hydrographic Office of the Navy Department.

The meteorological work became more extensive and important with each succeeding year and by 1889 absorbed practically all the time of the Signal Corps. Apart from weather forecasts the work involved (1) the issuing of storm warnings and displaying of storm signals on the northern lakes and along the eastern seacoast; (2) gaging and reporting on water levels of important rivers, for the benefit of shipping; (3) maintaining and operating telegraph lines along the seacoast for the benefit of commerce and navigation and in the interior for the use of the army; (4) reporting temperature and rainfall for information for the cotton industry; (5) displaying frost warnings in the interest of agriculture; and (6) sending out advance warnings of cold waves for the benefit of the general public.

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[2] Report of the Secretary of War, vol. 1, p. 506-507 (Washington 1874).

Agitation for the transfer of the Weather Service to a civilian agency began as early as 1882. By an act approved on October 1, 1890 (25 Stat. 653), the Weather Bureau was officially recognized and was transferred to the Department of Agriculture, effective July 1, 1891.

The Weather Service was now reorganized so that it might better carry out the expressed wish of Congress, namely, to develop and broaden its activities in the interest of agriculture. The most experienced and competent local weather forecasters were assigned to the larger cities and authorized to make weather predictions for their areas, enabling them to furnish a more detailed description of local weather conditions than was possible from the Washington office. More emphasis was placed on the use of weather maps in forecasting. Stations located at military posts were abolished, and new stations were established. The Weather Bureau resumed the work of collecting and publishing meteorological reports from vessels, thus supplementing the work of the Hydrographic Office. In 1904, upon the recommendation of an interdepartmental Board appointed by the President, the records and meteorological work of the Hydrographic Office were transferred to the Climatology Division of the Weather Bureau. In 1920 a Marine Division was established to supervise the work of processing meteorological information received from voluntary observers on ocean-going vessels, prepared charts of the meteorology of the ocean, and supply data used in the preparation of pilot charts issued by the Hydrographic Office. This Division was abolished in 1940 and the work was assigned to the Marine Climatology Section of the Climatological Services Division and Radio Marine Section of the Synoptic Reports and Forecasts Division.

Various other developments followed. The accumulated data were more thoroughly analyzed, the influence of weather upon animal and plant life was more intensely studied, and the public was kept better informed about results of weather studies. In cooperation with other Federal agencies, with state and municipal institutions, and with cooperative observers the Weather Bureau began to issue widespread and special warnings in the Caribbean Sea and the Gulf of Mexico; through the cooperation of other bureaus of the Department it sent out special warnings in areas producing fruit and truck crops, cold wave warnings to shippers and carriers of perishable agricultural products, harvest weather forecasts in important grain, hay, cotton, tobacco, and rice districts; it issued spraying-weather forecasts for fruit industries, special rain warnings in the fruit drying season, heavy snow warnings to livestock growers, shippers, and carriers; and it gave drought warnings in grazing and irrigation areas, and fire weather warnings in forest areas. The gaging of streams and flood research was carried on with the assistance of the Bureau of Reclamation, the Corps of Army Engineers, and the Bureau of Geological Survey.

The development of aviation imposed upon the Weather Bureau a major new responsibility in the field of air transportation. By 1926 the Bureau was already providing this new industry with weather data, collected by means of radiosonde and other instruments. New stations for pilot balloon and surface observations were progressively established, communication facilities were increased, and field forecasting staffs were strengthened. This trend continued until, by 1956, the Aviation Weather Service was operating in the continental United States, Alaska, and over transocean routes. The domestic service then consisted of about 241 airport stations, connected by nationwide teletype circuits operated by the Civil Aeronautics Administration.

By the President's Reorganization Plan IV, effective June 30, 1940, the Weather Bureau was transferred to the Department of Commerce. Its functions were carried out by three services: technical, scientific, and administrative. Supervision over the field stations was exercised through seven (currently five) regional offices that were established in 1941.[3] A tabulating center was maintained at New Orleans.

Shortly after its transfer the Weather Bureau had to adjust its functions to meet the exigencies of the approaching war. In cooperation with the Armed Forces it established, on July 1, 1940, a committee, later known as the Defense Meteorological Committee, to coordinate the nation's meteorological work, setting up for that purpose a special working committee on which the Civil Aeronautics Administration was also represented. By Executive Order 8991 of December 26, 1941, the Weather Bureau was designated a war agency.

To obtain greater efficiency and more rigid security in the handling of weather data the Defense Meteorological Committee was replaced in 1941 by the Joint Meteorological Committee, under authority of Executive Order 8991. The main function of the new committee was to assemble and interpret weather data for the Joint Chiefs of Staff. To this end it established a subcommittee for each of the following activities: meteorological and radio propagation, research and development, weather communications, weather plans, oceanography, climatology, and procurement and maintenance of instruments and other equipment.

As cooperation between the military forces of America and its Allies broadened, the Combined Meteorological Committee, consisting chiefly of American and British members, was established toward the end of 1942. Its relationship to the Combined Chiefs of Staff was similar to that of the Joint Meteorological Committee to the Joint Chiefs of Staff. It received and coordinated plans and data received from the

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[3]Annual Report of the Secretary of Commerce, 1942, p. 132.

Records pertaining to meteorology may be found in other record groups in the National Archives. In Record Group 78, Records of the Naval Observatory, there is correspondence of Matthew Fontaine Maury, Superintendent of the Depot of Charts and Instruments, 1854-61, that supplements the abstract ship logs ("Maury Logs") and other records pertaining to his work in charting ocean currents; Record Group 112, Records of the Office of the Surgeon General, includes certain correspondence and instructions issued to the post surgeons whose reports on weather phenomena are among the records described in this inventory; and Record Group 37, Records of the Hdyrographic Office, contains records of hydrographic surveys that are closely related to the records of marine observations that are described in entries 119-133 of this inventory.

In Record Group 16, Records of the Office of the Secretary of Agriculture, there are records that reflect the early cooperation in climatological work between the Patent Office and the Smithsonian Institution.

Personnel records for separated employees of the Weather Bureau have been transferred to the Federal Records Center at St. Louis, Mo.

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May 31, 1985 E/CC11:RSC

TO: W/DB - Jerry C. McCall

FROM: E/CC - Kenneth D. Hadeen

SUBJECT: Microfiche Copies of NDBC Data (Your Memo of May 7, 1985)

Data for Coastal Marine Automated Network (C-MAN) stations are archived and written to microfiche in our present system, (see attachment). Sea surface temperature and wave data will be included on the fiche whenever they appear on the data tape.

Our Applied Climatology Branch is developing computer programs to provide wind gust, dominant wave period and other parameters from the NDBC buoy tapes on fiche. Discussions will be held with our data administrator concerning the establishment of a digital archive file for the NDBC buoy data.

Attachment

cc:
Dick Cram
Mike Changery
Bill Propest

Ex2 Clip
CLIP

E/CC11:RSCram:0283:jas 5-31-85

TD 1100

SEE FAØØØØ7

DA Stop 30

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL DATA AND INFORMATION SERVICE
National Climatic Center
Federal Building
Asheville, N.C. 28801

TD 11

March 31, 1982 OA/D511:DC:sr

TO: Distribution

FROM: OA/D511 - Dick Cram

SUBJECT: Summary of errors detected in the 70's Decade Marine Data

1. Erroneous Marsden Squares. Deck 555 (Monterey data, 1970-June 1973) and Deck 889 (Autodin data, July 1973-1979) data were assigned to incorrect Marsden Squares in a few special cases. The conversion program erroneously placed all data with latitude greater than 80°N in the 0°-10°S latitude band (Marsden Squares 300-335). These data will be placed in the correct Marsden Square location when they are combined with the Atlas files at the Cooperative Institute for Research in Environmental Sciences (CIRES).

Deck's 849 and 850 (FGGE and German FGGE, November 1978 - November 1979) have data located at the poles 90°N or 90°S. The calculation of Marsden Square from latitutde and longitude was incorrect whenever the latitude was 90°. These polar data were placed in erroneous or invalid Marsden Squares. CIRES will relocate the data to the proper area.

Observations from all decks that have impossible latitude (greater than 90°) or longitude (greater than 180°) were placed in erroneous or invalid Marsden Squares. The ship position flag was set for erroneous values in all cases. CIRES will delete these data as they are merged with the Atlas files.

2. Erroneous Characters. An unrecognizable character (printed as "?" on the UNIVAC 1100) appears in data fields within records in a limited number of cases. The exact number of records has not been determined. It is estimated that less than 3% of the records and less than 0.1% of the data fields are affected. Tape position 45 (air temperature indicator), 90-96 (ship or buoy call), 107-108 (amount of precipitation) and 98 (original temperature units indicator) have been identified from data dumps but other fields may also be involved. Any field with an unrecognizable character should be blank filled. CIRES will blank fill these fields.

3. Erroneous Flags. Algorithms for checking wind, period and wave fields in the quality control program were improperly coded. This caused the flags for wind and waves to be set to indicate correct data (flag R) when the suspect or erroneous flags (J, K, L, N or Q) should have been set; i.e., correct data were flagged as correct in all cases, erroneous or suspect wind and wave data may have been flagged as correct. The tape documentation will inform users not to rely on wind and wave flags. The Digital Products Branch should inform users

to disregard the flag R for wind and waves. CIRES is not using the flags generated for the 70's Decade data.

4. FGGE Buoy Data. (Deck 849 November 1978 - November 1979) Drifting buoy data from the FGGE file was inadvertently placed in the 70's Decade file. Since the input format for buoy data is different than for ship data, the buoy data was improperly converted. FGGE buoy data, identified by a 5 digit call, will be removed from the 70's Decade tapes. CIRES will also remove these data during the merge with the Atlas files. An inventory of the number of buoy observations removed from each 70's Decade tape will be provided to Steve Doty.

A March 11, 1982 memo from Rob Quayle indicated that all observations in Deck 849 were in error. This was an incorrect assumption. Only FGGE drifting buoy data were converted incorrectly.

Distribution:
D532 - Joe Elms
D5x4 - Mark Plantico
D5x4 - Mike Crowe
D531 - Rob Quayle
✓ D5x5 - Gus Shumbera
D5x51 - Bill Propest
D532 - Pete Steurer
D54 - Jack Suits
D5421 - Steve Doty
Ralph Slutz, CIRES
Steve Pazan, Scripps Institute
OA/W352 - Tom Carpenter

TD1100

September 18, 1981 OA/D531:JE

Mr. Scott Woodruff
Cooperative Institute for Research
in Environmental Sciences
University of Colorado
Campus Box 449
Boulder, CO 80309

Dear Scott,

Attached is a list of all ~~deck~~ (source) numbers that NCC has assigned to marine observations to date. As CIRES gathers additional data sets (German Atlantic USST, English Historical, South African), which NCC does not possess but hopes to acquire through your efforts, then unique source numbers will have to be assigned before converting to TDF-11. To ensure that unique deck numbers are assigned, NCC has set aside a block of numbers for CIRES use only (700-799). This will prevent duplication and allow you to assign numbers as necessary. Then, all NCC will require is the necessary documentation to update our files as we receive this additional information.

Please let us know if we can be of any further help.

Sincerely,

Joe Elms
Applied Climatology Branch

Enclosure

cc: D531 - Quayle
D5x5 - Shumbera
D5x51 - Blankenship
D51 - Seguin
CLIP
ACB Read File
D531:JElms:344:pt:9/18/81

ALL IN TD1100

TAPE DECK LIST all in TD-1100

110	- U.S. Navy Marine Observations
116	- U.S. Merchant Marine
118	- Japanese Ship Observations No. 1
119	- Japanese Ship Observations No. 2
128	- International Marine Observations
281	- U.S. Navy MAR Marine Observations
184	- Great Britain Marine Observations
185	- USSR Marine Synoptic Observations
187	- Japanese Whaling Fleet Observations
188	- Norwegian Whaling Fleet Observations
189	- Netherlands Marine Observations
192	- Deutsche Seewarte Marine Observations
193	- Netherlands Marine Observations
194	- Great Britain Marine Observations
195	- U.S. Navy Ship Logs
196	- Deutsche Sewwarte Marine Observations
197	- Danish Marine Observations (Arctic and Antarctic)
150	- Dutch HSST Observations
151	- German HSST Observations
152	- United Kingdom HSST Observations
186	- USSR Ice Island Observations
902	- Great Britain Marine Observations
901	- Reconstructed Observations from FOSDIC (eliminated extremes from the library of the following decks: 110, 116, 118, 119, 184, 189, 192, 193, 194, 195, and 281)
890	- NMC Observations
891	- NODC Observations
666	- Tuna Observations
888	- GWC Observations
889	- Autodin Observations
555	- Monterey Observations
999	- ETAC Observations
875-887	- NDBO Buoy Observations
927	- International Marine Observations (Mod TDF-11 Format)
928	- OSV Observations
850	- German FGGE Data

INTRODUCTION

SOURCE

Tape Data Family - 11 was derived from a variety of punched card decks. Observations were obtained from Ship Logs, Ship Weather Reporting Forms, published Ship Observations, Automatic Observing Bouys, Teletype Reports, and on cards purchased from several foreign Meteorological Services.

The quality of instruments ranges from those found aboard a 19th century Whaling Ship to the most sophisticated electronic equipment used on today's Ocean Weather Ships. Observer qualifications vary from Deck Hand to trained Meteorologist.

From this conglomeration, an effort was made to bring to the researcher of oceanic weather patterns and sea conditions, a common observational format, designed for use with modern electronic data processing equipment. The International Marine punched card (Deck 128), established in 1963, was used as the basic input format to Tape Data Family - 11. Some modifications were made so that previously recorded observations could become an integral part of this Family.

QUALITY CONTROL AND CODE CONVERSIONS

The starting point for programming was the individual card deck. No attempt was made to "second guess" conversion or coding procedures employed in punching each of the various decks. This did lead to instances of double conversions. ie: Elements converted from the 1929 to the 1942 codes for punching, were then converted to the current codes for inclusion in the tape.

All conversion procedures used were devised or reviewed by professional meteorologists. Occasionally it was necessary to resort to subjective conversions based on observational experience as well as knowledge of instruments and observing techniques.

In cases where it was felt that elements were acceptable for conversion without significant loss of resolution, the new values were placed in the common portion of the observation. Elements or meteorological phenomena which did not lend themselves to conversion were retained in the supplemental portion of the observation.

During the taping, additional quality control checks were made. These checks flagged or rejected observations that did not meet specified conditions or limits. Extreme temperatures were established for each Marsden Square and individual observations were compared against these limits. Pressures were also checked against a set of extreme values. Ship positions had to be in ocean, sea, or lake areas. Wind directions, visibility, weather, sea conditions etc. had to be valid punches as defined by each card deck.

USE OF THE MANUAL

This manual was designed so that recourse to additional reference material should be unnecessary. Occasionally, however, the researcher may wish to obtain a copy of the original Card Deck reference manual. This may be done by writing to the Director, National Weather Records Center, Asheville, North Carolina.

Care should be taken to read carefully the statements pertaining to observational quality, general tape notations, common coding practices and conversion procedures used for the individual decks.

THE DATA FILE

Over 31 million Surface Marine observations are currently in Tape Data Family - 11. They are filed by 10° Marsden Square, Year, Month without regard to individual deck number. ie: All observations for January 1962 in Marsden Square 051 would be found together, followed by all observations for February 1962 etc. The period 1800- June,1968 is held on 293 reels of 9 channel, 800 bpi tape. It is not anticipated that future acquisitions will be merged into this group, but will be placed on tape in the TDF-11 format and retained as a separate file.

Observations from Ocean Weather Staions were placed in the TDF-11 format but not merged into the common file mentioned above. Currently operating Weather Ships are kept, individually, by station number (See Tape Field 029), while those ships no longer actively reporting have been filed together. Observations are filed by Ocean Weather Station number, Year, Month. These reports were also taken from a variety of card decks.

Funding for the development of TDF-11 was provided jointly by the Naval Weather Service Command, the Environmental Science Services Administration, and the Department of Defense.

SPECIAL NOTE

Although every effort was made to assure conformity, the user is cautioned that discrepencies in original punching procedures and conversion schemes occasionally occurred. Validity checks should be applied to all elements as they are used.

Reporting practices for individual decks sometimes varied during the applicable period. It must not be assumed that all elements are available for each observation. For example: A specific deck may report Present Weather for only 15 years out of a 40 year period of record. Documentation of these vagaries was not sufficient enough to allow us to include such items in this manual.

Not all ships changed their reporting practices to conform to the codes effective January 1, 1968, on that date. In many cases it was impossible to determine whether the new or old codes were being reported. This situation continued for the first few months of 1968. The Wave and Swell groups, in particular, should be examined closely during this period.

MANUAL AND TAPE NOTATIONS

FORMAT

Each observation is 140 characters in length. Positions 001-082 and 89-93 are common to all decks. Positions 083-088 vary according to the indicator found in position 082. Positions 094-140 are reserved for Supplemental Data and may be different for each deck. Because of the wide variety of elements and coding vagaries inherent in the Supplemental Data Fields, it is expected that most users will restrict themselves to working with the common portion of the observations.

For quick reference, each element or group of similar elements is identified by a Field Number. Thus, Fields 001-032 and 037-038 are common to all decks, Fields 033-036 vary according to the indicator found in Field 032, and Fields 039-onward are reserved for Supplemental Data.

The manual consists of five basic parts:

1. General Information
2. The Standard Format with definitions of Tape Fields and Positions
3. The basic codes used for all elements in the common portion of the observations
4. Explanations of Unique Characteristics, Conversion Procedures and Supplemental Data Fields by individual deck
5. General coding practices, conversions and formulae used during the conversion from cards to tape. (Section 4).

When an element is shown as being available but no conversion procedure is noted - the codes were deemed compatible and the punched values transferred directly to the tape.

TAPE

The following notations are used throughout the manual:

x = any numeric digit or alpha numeric character

i = same as x but used to show that the character is an indicator rather than part of the recorded element

\- = an "11" punch in the card or the equivalent tape configuration

\+ = a "12" punch in the card or the equivalent tape configuration. Both the - and + may appear by themselves or in combination with a numeric digit to indicate an overpunch or signed tape field.

Δ = Blank - no card punch or blank configuration on tape

Low order = *Rightmost position of a field*

High order = *Leftmost position of a field*

When elements were not reported, not readily convertible to the common portion, or did not pass the various quality control checks, the respective tape positions in the common portion appear as blanks.

STANDARD FORMAT CODES

TAPE FIELD NUMBER	TAPE POSITIONS	ELEMENT	TAPE CONFIGURATION	CODE DEFINITION AND REMARKS
001	01-03	CARD DECK NUMBER	000-999	Number of the punched card deck from which the observation came.
002	04-06	10° MARSDEN SQUARE	001-936	See explanation of Marsden Square system in the Introduction.
003	07-08	1° MARSDEN SUB-SQUARE	00-99	See explanation of Marsden Square system in the Introduction.
004	09	QUADRANT	1-4	1 = N Latitude and W Longitude 2 = N Latitude and E Longitude 3 = S Latitude and W Longitude 4 = S Latitude and E Longitude
005	10-12	LATITUDE	000-900	00.0° - 90.0° North or South
006	13-16	LONGITUDE	0000-1800	000.0° - 180.0° East or West
007	17-20	YEAR	18xx-19xx	xx = Any number.
008	21-22	MONTH	01-12	01 = January, 07 = July 02 = February, 08 = August 03 = March, 09 = September 04 = April, 10 = October 05 = May, 11 = November 06 = June, 12 = December
009	23-24	DAY	01-31	Day of the month
010	25-26	HOUR - GMT	00-23	0000 GMT - 2300 GMT
011 i	27	WIND DIRECTION INDICATOR	A,0,1,2	A = 36 point scale 0 = 32 point scale 1 = 16 of 36 point scale 2 = 16 of 32 point scale
011	28-29	WIND DIRECTION	00-36,99	Direction from which the wind is blowing.

	36Pt	32Pt	16of36Pt.	16of32Pt
00 =	Calm	Calm	Calm	Calm
01 =	005-014°	006-016°		
02 =	015-024°	017-028°	012-033°	012-034°
03 =	025-034°	029-039°		
04 =	035-044°	040-050°		035-056°
05 =	045-054°	051-061°	034-056°	
06 =	055-064°	062-073°		057-079°
07 =	065-074°	074-084°	057-078°	
08 =	075-084°	085-095°		080-101
09 =	085-094°	096-106°	079-101°	
10 =	095-104°	107-118°		102-124°
11 =	105-114°	119-129°	102-123°	
12 =	115-124°	130-140°		125-146°
13 =	125-134°	141-151°		
14 =	135-144°	152-163°	124-146°	147-169°
15 =	145-154°	164-174°		
16 =	155-164°	175-185°	147-168°	170-191°
17 =	165-174°	186-196°		
18 =	175-184°	197-208°	169-191°	192-214°

TAPE FIELD NUMBER	TAPE POSITIONS	ELEMENT	TAPE CONFIGURATION	CODE DEFINITION AND REMARKS
022 1	64	CLOUD HEIGHT INDICATOR	A, 0	A = Height not measured 0 = Height measured
022	65	CLOUD HEIGHT (h)	0-9	Height above sea surface of the base of the lowest cloud or fragment thereof.

	Approximate Height in Feet	Height in Meters
0 =	0-149	0-49
1 =	150-299	50-99
2 =	300-599	100-199
3 =	600-999	200-299
4 =	1000-1999	300-599
5 =	2000-3499	600-999
6 =	3500-4999	1000-1499
7 =	5000-6499	1500-1999
8 =	6500-7999	2000-2499
9 =	> 8000 or no clouds	> 2500 or no clouds

022	66	MIDDLE CLOUD TYPE (C_M)	0-9, -	0 = No altocumulus, Altostratus or Nimbostratus. 1 = Altostratus, the greater part of which is semi-transparent; through this part the sun or moon may be weakly visible, as through ground glass. 2 = Altostratus, the greater part of which is sufficiently dense to hide the sun or moon, or Nimbostratus. 3 = Altocumulus, the greater part of which is semi-transparent; the various elements of the cloud change only slowly and are all at a single level. 4 = Patches (often in the form of almonds or fishes) of Altocumulus, the greater part of which is semi-transparent; the clouds occur at one or more levels and the elements are continually changing in appearance. 5 = Semi-transparent Altocumulus in bands, or Altocumulus in one or more fairly continuous layers (semi-transparent or opaque), progressively invading the sky; these Altocumulus clouds generally thicken as a whole. 6 = Altocumulus resulting from the spreading out of Cumulus (or Cumulonimbus). 7 = Altocumulu in two or more layers, usually opaque in places, and not progressively invading the sky; or opaque layer of Altocumulus, not progressively invading the sky; or Altocumulus together with Altostratus or Nimbostratus. 8 = Altocumulus with sproutings in the form of small towers or battlements; or Altocumulus having the appearance of cumuliform tufts. 9 = Altocumulus of a chaotic sky, generally at several levels. - = Altocumulus, Altostratus and Nimbostratus invisible owing to darkness, fog, blowing dust or sand or other similar phenomena, or more often because of the presence of a continuous layer of lower clouds.

STANDARD FORMAT

CARD DECK	MAR SQ	SUB SQ	Q	LAT	LONG	YEAR	MO	DA	HR	WIND DIR	WIND SPD	VIS	WX	W	PRESS	T I	AIR TMP	WET BLB	DEW PT	SEA TMP	A-S DIF
xxx	xxx	xx	x	xxx	xxxx	xxxx	xx	xx	xx	ixx	ixxx	ixx	xx	x	xxxxx	i	xxx	xxx	xxx	xxx	xxx
FIELD NUMBER	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021

CLOUDS N	N_h	C_L	I	h	C_M	C_H	WAVE DIR	PER	WAVE HGT	SWL DIR	PER	SWL HGT	OSV NO.	CD	SH
x	x	x	i	x	x	x	xx	x	xx	xx	x	xx	xx	x	x
FIELD NUMBER							022	023	024	025	026	027	028	029	030	031

ADD	ICE	ICE THK	ACC	
1	x	xx	x	ΔΔ
032	033	034	035	036

ADD	DIR	SPD	a	ppp
6	x	x	x	xxx
032	033	034	035	036

ADD	SIG N	SIG T	SIG HGT		
8	x	x	xx	Δ	Δ
032	033	034	035	036	

ICE	SHIP NO.
x	xxxx
037	038

SUPPLEMENTAL DATA FIELDS

FIELD NUMBER

TAPE FIELD NUMBER	TAPE POSITIONS	ELEMENT
001	01-03	CARD DECK NUMBER
002	04-06	MARSDEN 10° SQUARE
003	07-08	MARSDEN 1° SUB-SQUARE
004	09	QUADRANT
005	10-12	LATITUDE
006	13-16	LONGITUDE
007	17-20	YEAR
008	21-22	MONTH
009	23-24	DAY
010	25-26	HOUR-GMT
011	27-29	WIND DIRECTION AND INDICATOR
012	30-33	WIND SPEED AND INDICATOR
013	34-36	VISIBILITY AND INDICATOR
014	37-38	PRESENT WEATHER
015	39	PAST WEATHER
016	40-44	SEA LEVEL PRESSURE
017	45-48	TEMPERATURES INDICATOR AND AIR TEMPERATURE
018	49-51	WET BULB TEMPERATURE
019	52-54	DEW POINT TEMPERATURE
020	55-57	SEA SURFACE TEMPERATURE
021	58-60	AIR-SEA TEMPERATURE DIFFERENCE

TAPE FIELD NUMBER	TAPE POSITIONS	ELEMENT
022	61	TOTAL CLOUD AMOUNT
022	62	LOWER CLOUD AMOUNT
022	63	TYPE OF LOW CLOUD
022	64	CLOUD HEIGHT INDICATOR
022	65	CLOUD HEIGHT
022	66	TYPE OF MIDDLE CLOUD
022	67	TYPE OF HIGH CLOUD
023	68-69	DIRECTION OF WAVES
024	70	PERIOD OF WAVES
025	71-72	HEIGHT OF WAVES
026	73-74	DIRECTION OF SWELL
027	75	PERIOD OF SWELL
028	76-77	HEIGHT OF SWELL
029	78-79	OCEAN WEATHER STATION NUMBER
030	80	CARD INDICATOR
031	81	OSV OR SHIP INDICATOR
032	82	ADDITIONAL DATA INDICATOR
WHEN ADDITIONAL DATA INDICATOR = A		
033-036	83-88	BLANK
WHEN ADDITIONAL DATA INDICATOR = 1		
033	83	TYPE OF ICE
034	84-85	THICKNESS OF ICE
035	86	RATE OF ICE ACCRETION
036	87-88	BLANK
WHEN ADDITIONAL DATA INDICATOR = 6		
033	83	SHIP DIRECTION
034	84	SHIP SPEED
035	85	BAROMETRIC TENDENCY
036	86-88	AMOUNT OF PRESSURE CHANGE
WHEN ADDITIONAL DATA INDICATOR = 8		
033	83	SIGNIFICANT CLOUD AMOUNT
034	84	SIGNIFICANT CLOUD TYPE
035	85-86	SIGNIFICANT CLOUD HEIGHT
036	87-88	BLANK
037	89	ICE INDICATOR
038	90-93	SHIP NUMBER
039 -	94-140	SUPPLEMENTAL DATA FIELDS

STANDARD FORMAT

CARD DECK	MAR SQ	SUB SQ	Q	LAT	LONG	YEAR	MO	DA	HR	WIND DIR	WIND SPD	VIS	WX	W	PRESS	T I	AIR TMP	WET BLB	DEW PT	SEA TMP	A-S DIF
xxx	xxx	xx	x	xxx	xxxx	xxxx	xx	xx	xx	ixx	ixxx	ixx	xx	x	xxxxx	i	xxx	xxx	xxx	xxx	xxx
FIELD NUMBER	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021

CLOUDS							WAVE DIR	WAVE PER	WAVE HGT	SWL DIR	SWL PER	SWL HGT	OSV NO.	CD	SHP
N	N_h	C_L	I	h	C_M	C_H									
x	x	x	i	x	x	x	xx	x	xx	xx	x	xx	xx	x	x
FIELD NUMBER							022	023	024	025	026	027	028	029	030	031

ADD	ICE	ICE THK	AC	
1	x	xx	x	ΔΔ
FIELD NUMBER	032	033	034	035	036

ADD	DIR	SPD	a	ppp
6	x	x	x	xxx
FIELD NUMBER	032	033	034	035	036

ADD	SIG N	SIG T	SIG HGT		
8	x	x	xx	Δ Δ	
FIELD NUMBER	032	033	034	035	036

ICE	SHIP NO.
x	xxxx
FIELD NUMBER	037	038

SUPPLEMENTAL DATA FIELDS

FIELD NUMBER

TAPE FIELD NUMBER	TAPE POSITIONS	ELEMENT
001	01-03	CARD DECK NUMBER
002	04-06	MARSDEN 10° SQUARE
003	07-08	MARSDEN 1° SUB-SQUARE
004	09	QUADRANT
005	10-12	LATITUDE
006	13-16	LONGITUDE
007	17-20	YEAR 4
008	21-22	MONTH 2
009	23-24	DAY 2
010	25-26	HOUR-GMT 2
011	27-29	WIND DIRECTION AND INDICATOR
012	30-33	WIND SPEED AND INDICATOR
013	34-36	VISIBILITY AND INDICATOR
014	37-38	PRESENT WEATHER
015	39	PAST WEATHER
016	40-44	SEA LEVEL PRESSURE
017	45-48	TEMPERATURES INDICATOR AND AIR TEMPERATURE
018	49-51	WET BULB TEMPERATURE
019	52-54	DEW POINT TEMPERATURE
020	55-57	SEA SURFACE TEMPERATURE
021	58-60	AIR-SEA TEMPERATURE DIFFERENCE

TAPE FIELD NUMBER	TAPE POSITIONS	ELEMENT	TAPE CONFIGURATION	CODE DEFINITION AND REMARKS
029	78-79	OCEAN WEATHER STATION NUMBER ΔΔ, 01-26 (Used when Field 031 = 2 or $\bar{2}$) NOTE: Other configurations may appear in this Field. These were used for control and edit procedures and have no valid meaning to the user.		Station No. — Station No. A = 01 — N = 14 B = 02 — O = 15 C = 03 — P = 16 D = 04 — Q = 17 E = 05 — R = 18 F = 06 — S = 19 G = 07 — T = 20 H = 08 — U = 21 I = 09 — V = 22 J = 10 — W = 23 K = 11 — X = 24 L = 12 — Y = 25 M = 13 — Z = 26
030	80	CARD INDICATOR	Δ, 0-5, $\bar{0}$	Δ = All card decks except 128 0-5 = Card deck 128. Codes are World Meteorological Organization codes effective at time of observation. $\bar{0}$ = Card deck 128. Observations punched by U.S.
031	81	OSV OR SHIP INDICATOR	Δ, 0, 2, $\bar{2}$, 4	Δ = Navy and Deck Log Observations 0 = Merchant ships 2 = OSV - off station $\bar{2}$ = OSV - on station 4 = Lightship
032	82	ADDITIONAL DATA INDICATOR	Δ, 1, 6, 8	Δ = No additional data 1 = Ice information follows 6 = Ship direction and speed and 3 hour pressure change follows 8 = Significant cloud information follows
WHEN ADDITIONAL DATA INDICATOR = 1				
033	83	TYPE OF ICE	1-5	1 = Icing from ocean spray 2 = Icing from fog 3 = Icing from spray and fog 4 = Icing from rain 5 = Icing from spray and rain
034	84-85	ICE THICKNESS	00-99	Ice thickness in centimeters
035	86	RATE OF ICE ACCRETION	0-4	0 = Ice not building up 1 = Ice building up slowly 2 = Ice building up rapidly 3 = Ice melting or breaking up slowly 4 = Ice melting or breaking up rapidly
036	87-88	BLANK		
WHEN ADDITIONAL DATA INDICATOR = 6				
033	83	SHIP DIRECTION	0-9	Ship's course (true) made good during the 3 hours preceding the time of observation. 0 = Ship hove to — 5 = SW 1 = NE — 6 = W 2 = E — 7 = NW 3 = SE — 8 = N 4 = S — 9 = Unknown

TAPE FIELD NUMBER	TAPE POSITIONS	ELEMENT	TAPE CONFIGURATION	CODE DEFINITION AND REMARKS
034	84	SIGNIFICANT CLOUD TYPE	0-9, -	Cloud Genus 0 = Cirrus 1 = Cirrocumulus 2 = Cirrostratus 3 = Altocumulus 4 = Altostratus 5 = Nimbostratus 6 = Stratocumulus 7 = Stratus 8 = Cumulus 9 = Cumulonimbus - = Cloud not visible owing to darkness, fog, duststorms, sandstorm, or other analogous phenomena.
035	85-86	SIGNIFICANT CLOUD HEIGHT	00-50 56-99	Height of the base of the cloud layer or mass whose genus was reported in Field 034. 00 = <30 meters 01-50 = 30-1500 meters in increments of 30 meters 56-80 = 1800-9000 meters in increments of 300 meters 81-88 = 10,500-21,000 meters in increments of 1500 meters 89 = >21,000 meters 90 = <50 meters 91 = 50-100 meters 92 = 100-200 meters 93 = 200-300 meters 94 = 300-600 meters 95 = 600-1000 meters 96 = 1000-1500 meters 97 = 1500-2000 meters 98 = 2000-2500 meters 99 = >2500 meters or no clouds
036	87-88	BLANK		
037	89	ICE INDICATOR	+	Indicates that the sea ice group (C_2KD_1re) was entered on the original reporting form. This indicator used only for Card Deck 128.
038	90-93	SHIP NUMBER	0001-9999 -001--999 †000-†000	Identifying number of individual ships.
039-	94-140	SUPPLEMENTAL DATA FIELDS		

0001-0500 = OSV's, Special Ships, Ice Floe Stations

0501-0999 = Light Stations

1000-9800 = Merchant Ships

9800-9999 = Great Lakes

-001--999 = Navy Ships

†1000-†9999 = Deck log

ENVIRONMENTAL DATA BUOY
(TDF-11) EDIT/ARCHIVE

TDF-11 (TD-1140) DOC File

Tape Field Number	Tape Positions	Element
001	01-03	Deck Name
002	04-06	Marsden 10 degree square
003	07-08	Marsden 1 degree sub-square
004	09	Quadrant
005	10-12	Latitude
006	13-16	Longitude
007	17-20	Year
008	21-22	Month
009	23-24	Day
010	25-26	Hour-GMT
011	27-29	Wind direction and indicator
012	30-33	Wind speed and indicator
013-014	34-38	BLANK
015	39	Past weather (blank or code 6)
016	40-44	Sea level pressure
017	45-48	Temperature indicator and air temperature (Tenths of Deg. C)
018	49-51	Wet bulb temperature (computed from fields 17 and 19)
019	52-54	Dew point temperature
020	55-57	Sea surface temperature
021	58-60	Air-sea temperature difference (computed from fields (17 and 20)
022-023	61-69	BLANK
024	70	Period of Waves
025	71-72	Wave Height 1/2 meters
026-030	73-80	BLANK
031	81	GST or ship indicator (set to 5)
032	82	Additional data indicator (set to 6)
033-034	83-84	BLANK
035	85	Barometric tendency (code 2 or 4 or 7)
036	86-88	Amount of pressure change
037	89	BLANK
038	90-93	Ship number
*039-058	94-140	Supplemental data fields (refer to table 2)

NOTE: Tape positions 34-38, 61-69, 73-80, 83, 84, and 89 will be blank.

Deck No.	Buoy Type	Requires Supplemental Field
876	HCB	YES
877	LCB	NO
878	PEB	NO
879	5 meter Continental Shelf Buoys	NO
880	10 meter Continental Shelf Buoys	NO
881	Offshore Platforms	NO

TABLE 2. SUPPLEMENTAL DATA FIELD

Tape Field No.	Tape Positions	Element	Tape Configuration	Code Definition And Remarks
39	94-96	Rainfall since last valid report	000-999	000= No precipitation 001-999= Millimeters rain
40	97	Solar Radiation Averaging	0-7	0 = Instantaneous Sampling Averaged Samples 1 = 1-5 Min. 2 = 6-10 Min. 3 = 11-15 Min. 4 = 16-20 Min. 5 = 21-30 Min. 6 = 31-40 Min. 7 = 41-50 Min.
41	98-100	Solar Radiation	000-200	0.00-2.00 calories/square centimeter/minute
42	101	Global Radiation Averaging	0-7	Same as Radiation averagin
43	102-103	Global Radiation	00-99	.00-.99 calories/square centimeter/minute
44	104	Current speed and direction, averaging at 2 meter	0-7	Same as radiation averagin
45	105-107	Current speed at 2 meter	001-999	001-999 = 0.01-9.99 Knots
46	108-110	Current direction at 2 meter	000-360	0-360 degrees true North; direction towards which current is traveling
47-58	111-140	Blank		

(Revised 2/1/79)

JOB #71302

KEYING INSTRUCTIONS FOR FORMS NWSC 3144/1, NWSC 3140/8 (REV 1-76) AND OPNAV FORM 3140/8 (1-68), SHIP'S WEATHER OBSERVATIONS (SYNOPTIC)

STANDARD FORMAT CODES FOR REVISED CARD DECK-127 (EFFECTIVE 12/78)

Form NWSC 3144/1* Field Position	CD-127 Tape Position	Form/Tape Field Element (Form ID)*	Configuration to Key	Code Definition and Remarks
ALL	ALL	Data Missing or Illegible	N O T T O B E K E Y E D	
-	1	Temperature Indicator	1	1=°C and tenths, key as constant for all observations.
1	2-8	CALL SIGN of Ship (IRCS)	Alpha-numeric (A001-I999 or numeric X001- 999)	Use the four character CALL SIGN noted in red above date on forms. Entry "0" is always numeric.
Upper area of form	9-10	MONTH	01-12	January-December
	11-12	YEAR (19__)	00-99	Last two digits of year
2	-	INDICATOR (99)	N O T T O B E K E Y E D	
3	13-15	LATITUDE ($L_aL_aL_a$)	000-900	00.0°-90.0°, NORTH or SOUTH
4	16	QUADRANT OF GLOBE (Q_c)	1,3,5,7	1=NORTH latitude, EAST longitude 3=SOUTH latitude, EAST longitude 5=SOUTH latitude, WEST longitude 7=NORTH latitude, WEST longitude
5	17-20	LONGITUDE ($L_oL_oL_oL_o$)	0000-1800	000.0°-180.0°, EAST or WEST
-	-	PRINTED INDICATOR (00-18)	NOT TO BE KEYED (Only on NWSC Form 3140/8,1/76)	
6	21-22	DAY OF MONTH (YY)	01-31	Day of Month
7	23-24	TIME GMT (GG)	00-23	Nearest whole hour, 00 GMT-23 GMT
8	25	WIND INDICATOR (i_w)	0,1,3,4,	0=Estimated meters per second (mps) 1=Measured mps 3=Estimated knots 4=Measured knots } usual entries
9	26	TOTAL CLOUD AMOUNT (N)	0-9	Code for total sky cover
10	27-28	WIND DIRECTION (dd)	00-36, 99; 51-86 (rare)	01-36=True direction from which wind is blowing, tens of degrees; 00=Calm; 99=Variable. If entry is 51-86, 50 has been added to dd to indicate wind speed ≥ 100 knots - key as noted.

*Form 3140/8 FIELD POSITIONS are found in (Form ID).

Form NWSC 3144/1* Field Position	CD-127 Tape Position	Form/Tape Field Element (Form ID)*	Configuration to Key	Code Definition and Remarks
11	29-30	WIND SPEED (ff)	00-99	Knots. See dd remarks above.
12	31-32	VISIBILITY (VV)	90-99	Code. Col.31 = 9, constant
13	33-34	PRESENT WEATHER (ww)	00-99	Code
14	35	PAST WEATHER (W)	0-9	Code
15	36-40	SEA LEVEL PRESSURE (PPP)	09000-10700	Millibars and tenths, 900.0 mb-1070.0 mb. Cols.36-37=09 if Col 38=7,8, or 9; Cols.36-37=10 if col.38=0,1,2, or 3; if col.38=4, 5, or 6, see supervisor.
	36-37 X don't punch			
16 A_1	41-44	DRY BULB AIR TEMP (TT) (t_T)	x459-0459; 0501-0959 (rare)	°C and tenths. Col.41 = 0 for positive, numeric x for negative. Positive, 0.0°C to 45.9°C: key as 0000-0459. Negative, -0.1°C to -45.9°C: key as x001-x459. If entry is 50.1 to 95.9°C, 50.0 has been added to absolute value of negative observation; key as 0501-0959 (e.g., | -11.7°C| + 50.0 = 61.7°C entry, key as 0617). On NWSC Form 3140/8 (REV. 1-76) pick up tenths from t_T column. On OPNAV Form 3140/8 (1-68) DRY BULB and tenths are in col 41.
A_2	45-48	WET BULB AIR TEMP. (-)	Same instructions as for DRY BULB.	On NWSC Form 3140/8 (REV. 1-76) WET BULB is not given, leave BLANK. On OPNAV Form 3140/8 (1-68) WET BULB and tenths are in col 42.
-	49	Ice on Wet Bulb	BLANK, X	Reported in col. 43 of OPNAV 3140/8 (1-68) only. Key numeric "X" if col. 43 is checked.
17	50	AMOUNT OF LOWEST CLOUD (N_h)	0-9	Code. If "/" or "x", leave BLANK.
18	51	TYPE OF LOW CLOUD (C_L)	0-9	Code. If "/" or "x", leave BLANK.
19	52	HEIGHT OF LOWEST CLOUDS (h)	0-9	Code. If "/" or "x", leave BLANK.
20	53	TYPE OF MIDDLE CLOUD (C_M)	0-9	Code. If "/" or "x", leave BLANK.
21	54	TYPE OF HIGH CLOUD (C_H)	0-9	Code. If "/" or "x", leave BLANK.

Form NWSC 3144/1* Field Position	CD-127 Tape Position	Form/Tape Field/Element (Form ID)*	Config-uration to Key	Code Definition and Remarks
-	55	INDICATOR (-)	6 or 2	Key 6 as constant. Defines $D_s V_s$ app group, cols.56-61. When 2 is entered it denotes that (ICE) has been transfered into cols.55-59 and col.61 = BLANK.
22	56	COURSE OF SHIP (D_s)	0-9	Code.
23	57	SPEED OF SHIP (V_s)	0-9	Code.
24	58	CHARACTER OF 3-HOUR PRESSURE CHANGE (a)	0-8	Code.
25	59-61	AMOUNT OF 3-HOUR PRESSURE CHANGE (pp)	000-399	Millibars and tenths, 0.0 mbs - 39.9 mbs. Millibars and tenths, 0.0 mbs - 39.9 mbs. Key col.59 = 0, when pp $\leq$ 9.8 (9.8 mbs). Note: A "99" entry indicates amount of pressure change may be > 9.8 mbs. Refer to right margin on Form 3144/1 and in the "Remarks" section of Form 3140/8 for 99ppp entry; i.e.: ppp > 9.8. If not available key 099. (Note: Editor will normally make notation on form of proper entry to be made.
26	-	INDICATOR (0)	N O T	T O B E K E Y E D
27	-	AIR-SEA TEMP. OF DIFFERENCE ($T_s T_s$)	N O T	T O B E K E Y E D
28	(77-78)	DEW POINT TEMPERATURE ($T_d T_d$)	N O T	T O B E K E Y E D (See tape positions 77-78)
29	-	INDICATOR (1)	N O T	T O B E K E Y E D
30	62-65	SEA TEMPERATURE ($T_w T_w T_w$)	0000-0400; 0501-0540 (rare)	°C and tenths. Col.62=0 constant. Key entry as noted (000-400=0.0°C to 40.0°C, key 0000-0400, 501-540= -0.1°C to -4.0°C, key as 0501-0540)
31	(44)	TENTHS OF AIR TEMP. (t_T)	0-9	To be keyed for NWSC 3140/8 (REV. 1-76) only. See tape position 44.
32-35	-	ICE ACCRETION ($2 I_s E_s E_s re$)	N O T	T O B E K E Y E D
36	-	INDICATOR (3)	N O T	T O B E K E Y E D

Form NWSC 3144/1* Field Position	CD-127 Tape Position	Form/Tape Field Element (Form ID)*	Config-uration to Key	Code Definition and Remarks
37	66-67	PERIOD WIND WAVES (P_wP_w)	00-99	Period of wind waves in seconds; 00=calm; 99=confused. If "//" or "xx", leave BLANK.
38	68-69	HEIGHT WIND WAVES (H_wH_w)	00-98	Code for feet. If "//" or "xx", leave BLANK.
39	70-71	DIRECTION SWELL WAVES (d_wd_w)	00-36, 99	Tens of degrees, 99=confused sea. If "//" or "xx", leave BLANK.
40	72	PERIOD SWELL WAVES (P_w)	0-9	Coded. If "/" or "x", leave BLANK.
41	73-74	HEIGHT SWELL WAVES (H_wH_w)	00-98, 99	Code for feet. 99=confused sea. If "//" or "xx", leave BLANK.
-	75	Temperature Indicator	BLANK	BLANK = Temperature in °C and tenths.
-	76	Sea Temperature Observational Method	BLANK	INTAKE = BLANK
(28)	77-78	Dew Point Temperature (T_dT_d)	00-46 or 50-96	Whole °C. Key for NWSC Form 3140/8 (REV. 1-76) ONLY. 00-46=0°C to 46°C (Positive); 50-96 = -0.1°C to -46°C (Negative).
42	-	INDICATOR (ICE)	N O T T O B E K E Y E D	

NOTE: When "ICE" group is entered on form, it will be transfered by editor to form field positions 22-25 and is to be keyed as follows:

	55	INDICATOR	2	Indicates "ICE" group follows.
43	56	KIND OF ICE (C_2)	0-9	Code. Key as entered.
44	57	EFFECT ON NAVIGATION (K)	0-9	Code. Key as entered.
45	58	BEARING OF ICE LIMIT (D_1)	0-9	Code. Key as entered.
46	59	DISTANCE TO ICE LIMIT (r)	0-9	Code. Key as entered.
47	60	ORIENTATION OF ICE LIMIT (e)	0-9	Code. Key as entered.
	61	BLANK	BLANK	BLANK

OTE: ALL CONFIGURATIONS TO KEY ARE ALL NUMERIC EXCEPT FOR CALL SIGN, COL. 2-8 WHICH IS ALPHA-NUMERIC.

U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE
NATIONAL WEATHER RECORDS CENTER

Layout Form — 80 Column Card

JOB # 71302128

EFFECTIVE: 12/78 DATA

Columns	Field	Notes
1	Temp. Indicator	1 = °C and tenths
2–8	Ship Call Letters/Numbers	A001 = A001ΔΔΔ -746 = -746ΔΔΔ
9–10	Month	
11–12	Year	
13–15	Latitude La La La	
16	Quadrant Qc	
17–20	Longitude Lo Lo Lo Lo	
21–22	Day YY	
23–24	Hour GG	
25	Wind Indicator Iw	
26	Total Cloud Amt. N	
27–28	Wind Direction dd	
29–30	Wind Speed ff	
31–32	Visibility VV	
33–34	Present Weather ww	
35	Past Weather W	
36–40	Sea Level Pressure ppp	09 or 10
41–44	Dry Bulb Temp.	Pos = 0 Neg = -
45–48	Wet Bulb Temp.	Pos = 0 Neg = -
49	Ice on Wet Bulb	Blank if not reported
50	Amt. of Lowest Cloud Nh	
51	Type of Low Cloud CL	
52	Height of Low Cloud h	
53	Type of Middle Cloud CM	
54	Type of High Cloud	
55	Indicator 6 or 2	2 = Ice Group
56	Ds	
57	Vs	
58	a	
59–61	PP	0, 1, 2, 3
62–65	Sea Temp. Tw Tw Tw	Pos = 0 Neg = -
66–67	Period of Wind Wave Pw Pw	
68–69	Height of Wind Waves Hw Hw	
70–71	Direction of Swell Waves dw dw	
72	Period of Swell Waves Pw	
73–74	Height of Swell Waves Hw Hw	
75	Temp. Indicator	°C = Blank
76	Blank	
77–78	Dew Point	Whole °C
79–80		

Check Instructions for 1009.
To Check state (cols 1-2) and year, month (cols. 7-10):

START FS; PPSSTP (XXX)
DBL/SEARCH
SEARCH 0017 00 ⧗ ⧗⧗ ⧗ 7901
Enter

auto Dup + skips off

XXX = your Batch number
7 = Numeric G
00 = State # = Key state # to be checked
⧗ = Hold DBL Key and space bar.

The hour glass sign signals the system to bypass the Stn # and check only the state, yr and month.

after corr. enter
dbl search forward record

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, NORTH CAROLINA 28801

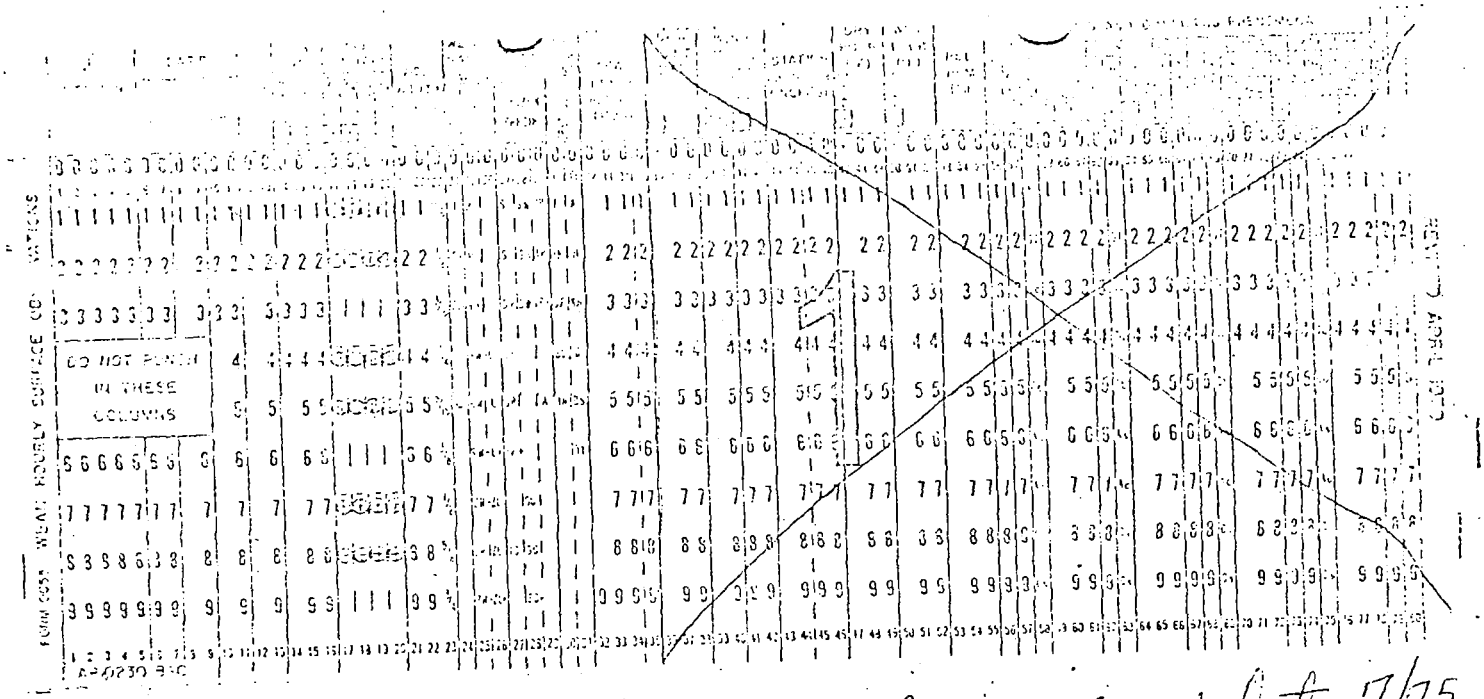
HDR = N01 W(M O)

NAVY WBAN REV. EFF. JAN. 1979

LAYOUT FORM - 125 POSITIONS

71101 N01

Field	Positions
STATION NUMBER	1–5
DATE: YEAR	6–7
DATE: MONTH	8–9
DATE: DAY	10–11
HOUR	12–13
CEILING HEIGHT (HUNDREDS OF FEET)	14–16
SKY CONDITION	17–20
VISIBILITY	21–23
WEATHER AND/OR OBSTRUCTION TO VISION: THUNDER TORNADO	24
WEATHER AND/OR OBSTRUCTION TO VISION: LIQUID PRECIPITATION	25–26
WEATHER AND/OR OBSTRUCTION TO VISION: FROZEN PRECIPITATION	27–29
WEATHER AND/OR OBSTRUCTION TO VISION: OBSTRUCTIONS	30–31
SEA-LEVEL PRESSURE (MBS. & TENTHS)	32–35
TEMPERATURE (°F)	36–38
DEW POINT (°F)	39–41
WIND: DIRECTION	42–43
WIND: SPEED	44–45
STATION PRESSURE (INCHES)	46–49
	50–52
TOTAL SKY COVER	53
	54–75
TOTAL OPAQUE SKY COVER	76
	77–80



WBAN-10's Hourly Surface Observations

Beginning with Data 7/75
05008 NO1

Column	Identification
1-5	Station Number
6-7	Year Last 2 digits
8-9	Month January - December 01 - 12
10-11	Day 01 - 31
12-13	Hour: 3 HRLY

00	03	06	09	12	15	18	21
01	04	07	10	13	16	19	22
02	05	08	11	14	17	20	23

Punch R (Record) and RS (Record Special) only.
Round off to the nearest hour.
Examples: 0050 punch 01
0150 punch 02
0957 punch 10
1958 punch 20
2355 punch 00 on next day.

14-16 Ceiling Height:
Ceiling height will be punched in hundreds of feet as reported in the ceiling and sky columns on form WBAN-10A.
Unlimited ceilings will be indicated by punching "XXX"

888 Obsolete Beginning with April 1, 1970 Data

~~j 5 05~~

05008 N01 P5

New York Central Park 94728

check program changed

05008 N03 P6

Program 6 for # 3 on New York Central Park

Column	Identification
17-20	Sky Condition: Provision is made for punching four sky symbols, exactly as recorded in the sky column of form WBAN-10. Heights reported on WBAN-10 will not be punched (except for ceiling height punched in Col. 14, 15, and 16). When less than four sky cover symbols are reported, punch the first (lowest) symbol in Col. 17, the second (if reported) in Col. 18, the third (if reported) in Col. 19. Any columns remaining to the right of the highest symbol reported will be punched "0". When more than four sky symbols are reported, punch 1st, 2nd, 3rd, and last, unless it delets your ceiling, then punch 1st, 2nd, ceiling, and last. Partial obscuration (-X), leave Col. 17 blank for reports of partial obscuration. Punch succeeding sky symbols in Col. 18-20; if (-X) is reported alone, punch "000" in Cols. 18-20. When clear is reported, punch "0000" in Cols. 17-20.

Cloud Symbols

			Ceiling Layers	
0	Clear	○ CLR		
1	Thin Scattered	−◐− SCT		
2	Scattered	◐ SCT	⊕ BKN	
4	Thin Broken	−◍− BKN	⊕ OVC	
5	Broken	◍ BKN	X	
7	Thin Overcast	−⊕− OVC		
8	Overcast	⊕ OVC	Not Ceiling Layers	
Blank	Partial Obscuration	-X	○ CLR	
X	Obscuration	X	−◐− SCT	
			◐ SCT	
			−◍− BKN	
			−⊕− OVC	
			−X	

EXAMPLES: CEILING HEIGHT AND SKY CONDITION

	Ceiling Height	Sky Conditions
Code	14, 15, 16	17, 18, 19, 20
○	X X X	0 0 0 0
20 ◐	X X X	2 0 0 0
5- ◍	X X X	4 0 0 0
20- ◍ M 35 ⊕	0 3 5	4 8 0 0
10 ◐ 15 ◐ 25- ◍ M 100 ◍ 200 ⊕	1 0 0	2 2 5 8
10 ◐ 20 ◐ 30 ◐ M 50 ◍ 100 ◍	0 5 0	2 2 5 5
- X	X X X	4 0 0 0
P 15 X	0 1 5	X 0 0 0
10 ◐ 50 ◍ 100 ◐	X X X	2 2 2 0
40 ◐ 90 ◍ 220- ⊕	X X X	2 2 7 0
M 10 ◍ 50 ◍ 100 ⊕	0 1 0	5 5 8 0
5 ◐ 15- ◐ E 40 ◍ 120 ⊕	0 4 0	2 1 5 8
- X M 5 ⊕	0 0 5	4 8 0 0
5 ◐ P 15 X	0 1 5	2 X 0 0
- X 10- ◍ 50- ⊕	X X X	4 4 7 0
- X M 10 ◍ 50 ◍	0 1 0	4 5 5 0
E 25 ◍	0 2 5	5 0 0 0
E 25 ⊕	0 2 5	8 0 0 0
W 5 X	0 0 5	X 0 0 0
W 0 X	0 0 0	X 0 0 0
W 1 X	0 0 1	X 0 0 0
W 10 X	0 1 0	X 0 0 0
120 W 15 X	0 1 5	2 X 0 0

Column	Identification

21-23 Visibility: Miles and fractions. Use Cols. 21 and 22 for whole miles and Col. 23 for fractions. If there are no fractions reported, Col. 23 will be punched with a zero. The " + " or " V " symbols after visibility will be disregarded in punching. Visibilities of 100 miles or more will be punched 990.

Examples:					
0	punch	000	1/16	punch	001
7		070	1/8		002
10		100	3/16		003
15		150	1/4		004
100		990	5/16		005
1 1/2		017	3/8		006
1 1/4		014	1/2		007
1 3/4		019	5/8		008
			3/4		009
			7/8		009

24-31 Weather and/or Obstructions to Vision: Punch only one symbol per column. Waterspout punched as tornado. HK is punched KH.

Any column not containing a symbol will be punched "0".

Punch	Columns 24	25	26	27	28	29	30	31
0	0	0	0	0	0	0	0	0
1	T	R-		S-	SW-	/P-	F	K
2	T+	R		S	SW	/P	1F	H
3	TOR	R+		S+	SW+	/P+	GF	KH
4		RW-	L-	SP-			BD	D
5	Q	RW	L	SP		A	BN	BS
6		RW+	L+	SP+				BY
7		ZR-	ZL-		SG-			
8		ZR	ZL	Ic	SG			
9		ZR+	ZL+		SG+			

Columns	Identification	MBS. + tenths

32-35 Sea Level Pressure: If sea level pressure begins with 0-3, prefix with "0"; if it begins with 7-9, prefix "9". If it begins with 4, 5, or 6 check with Supervisor.

Examples:	216	punch	0216
	143		0143
	742		9742
	982		9982

36 - 38 Dry Bulb Temperature: Punched to the nearest whole degree fahrenheit, rounding off the last digit when entered to tenths. When the temperature is above zero, prefix with an "0". When the temperature is below zero, prefix with an "X".

If Temperature is not reported in "A" Sheet - Pick up under Dry-Bulb on "B" Sheet.

Examples:	34.0	punch	034	— 0.3 Punch 000
	68.5	punch	069	— 0.5 Punch X01
	84.2	punch	084	— 10.3 Punch X10
	0.0	punch	000	— 100.6 Punch X101
	-4.6	punch	X05	
	-1.2	punch	X01	
	9.1	"	091	

39-41 Dew Point: Punched in whole degrees Fahrenheit. When Dew Point is above zero, prefix with "0". When below zero, prefix with "X".

Examples:	12	punch	012
	40	punch	040
	0	punch	000
	-0	punch	000
	-4	punch	X04
	-22	punch	X22

COLS.

42-43 Changed to tens of degrees 1/1/64

Wind Direction:

00	Calm	C	00
11	N	↓	36
12	NNE	↓↙	02
18	NNW	↓↘	34
22	NE	↙	05
32	ENE	←↓	07
33	E	←	09
34	ESE	←↖	11
44	SE	↖	14
54	SSE	↑↖	16
55	S	↑	18
56	SSW	↑↗	20
66	SW	↗	23
76	WSW	→↗	25
77	W	→	27
78	WNW	→↘	29
88	NW	↘	32

44-45 Wind Speed: Wind speed will be punched in whole knots. If wind speed is 100 or over, "X" overpunch Col. 41. Calm - punch 00.

Examples:
5 punch 05
25 punch 25
40 punch 40
102 punch X/0 2

Columns	Identification

46-49 Station Pressure: Punched to inches and hundredths rounding off last digit. Examples: 29.035 punch 2904
29.321 punch 2932
29.126 punch 2913
29.998 punch 3000

50-52 Wet Bulb Temperature: Punched to the nearest whole degree fahrenheit, rounding off the last digit when entered to tenths. When the temperature is above zero, prefix with a "0". When the temperature is below zero, prefix with an "X".

Examples: 34.0 punch 034
68.5 punch 069
84.2 punch 034
0.0 punch 000
-4.6 punch X05
-1.2 punch X01

If in parenthesis or Job 5008 = Punch as entered, ignoring parenthesis.

53 Total Sky Cover: Punch as entered, punch "X" for 10 tenths.

54-76 Clouds and Obscuring Phenomena:

IF, GF, F = 1
ST = 2
SC = 3
CU = 4
CB = 5
AS = 6
AC = 7
CI = 8
CS = 9
FS = $\frac{X}{2}$
FC = $\frac{X}{4}$
CM = $\frac{X}{5}$
NS = $\frac{X}{6}$
ACC = $\frac{X}{7}$
CC = $\frac{X}{9}$

D, S, R, H, K, etc. punch X

Cloud height - punch

ALSO SEE ATTACHED Sheet

(2) TYPE (of each layer). Punching of type of sky cover will conform with the rules for entry of cloud type on Form WBAN-10. Types will be punched according to the following code: Effective June 1, 1972

Punch Card Code	1	2	3	4	5	6	7	8	9
Types of clouds with single punch	F	St	SCSL Sc	TCU Cu	Cb	As	ACSL Ac	Ci	Cs
Types of clouds with "X" overpunch		STFRA Fs		CUFRA Fc	CBMAM Cm	Ns	ACCAS Acc		CCSL Cc

When an obscuring phenomenon other than fog is reported an "X" will be punched, with no underpunching.

ACMAM Punch 7

Use: Fog F = 1 will be reported with a "-X" or "X"

FC = $\frac{X}{F}$ will be reported with 

When an obscuring phenomenon other than Fog is reported, an "X" will be punched, with no underpunching.

Column		Identification
76	Opaque:	If clouds observed on "A" sheet are thin, this figure should be half or less than the total sky, with the exception of "-X", then the total sky and opaque sky should agree. PUNCH AS REPORTED IN COLUMN 36 of WBAN-10. PUNCH X FOR 10 TENTHS.
77-81	LEAVE BLANK	

U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE
NATIONAL WEATHER RECORDS CENTER

Job 16863

Layout Form — 80 Column Card

JOB # FCGETMP

Upper Air Synoptic - French TTAA + TTCC groups only

BB + DD groups on teletype key only
✓ TTAA key TTBB
✓ TTCC key TTBB

Add'l 1/4 data what is ✓

TTAA in 1st 4 Cols of 1st record of message only.

TTBB

TTCC in 1st 4 Cols of 1st record of message only.

TTDD

ΔΔΔΔ in Each record necessary after 1st.

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

Key groups of 5 for 15 fields then start new record beginning in Col 5 leaving Cols 1-4 Blank in Each record after 1st record.

/ = - (X punch)

JWP begins
/ SUPER 98-34 23-21 =
do not key

8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE
NATIONAL WEATHER RECORDS CENTER

Layout Form — 80 Column Card

JOB # FGGESFC

Job #16863 SYNOPTIC FORMAT

Synoptic Format Keyed from Non-Synoptic Forms

Note: 7 group - If temp is minus (-) add 50.

ADDITIONAL DATA GROUPS

Cols	Field
1	9
2–3	YEAR
4–5	MONTH
6–7	DAY
8–9	HOUR
10–14	BLOCK STN.
15–19	Nddff
20–24	VVwwW
25–29	PPPTT
30–34	NCLhCC
35–39	TdTdaPP

Any U.S. = Synoptic Unless Noted otherwise

NOAA Form 62-347
(1-77)

FGGE
SURFACE–LAND REPORT

Example

YEAR 1979 MONTH July

COUNTRY Argentina

WIND SPEED: KNTS 8 MPS

DAY	HR GMT	BLOCK STATION	Nddff	VVwwW	a	PPPTTT ±	$N_hC_Lh C_mC_h$	TdTdTdapp ±	RT	RRR	TC	MAX TEMP	TC	MIN TEMP	1st $N_sCh_sh_s$	2nd $N_sCh_sh_s$	3rd $N_sCh_sh_s$	4th $N_sCh_sh_s$
27	12	87162	82308	60616.	0	234+11.	8732/	10327.	2	002			4	+11.	85708	85520		
28	06	87162	NIL		0													
29	06	87162	NIL.		0													
30	06	87162	NIL.		0													
27	06	87178	82710	58959	0	196+16.	4962/	+16215.										
27	12	87178	82510	02179	0	214+14.	891//	-14216.	8	006.			4	+14	88703	83950.		
28	00	87178	81405.	70029	0	214+15	862//	+14303.	2	000.	4	+15						
28	06	87178	82006.	02444.	0	204+14	861//	-14707.										
30	06	87178	81416.	70219	0	265+10.	8072/	-09804.										
28	00	87211	NIL.		0													
28	12	87211	01405.	98020.	0	515-04	00900.	-04501	2	000			4	-05.	70055			
28	18	87211	00505	98020.	0	512+15.	00900.	+01212.										
29	00	87211	NIL.		0													
30	06	87217	00000	65020	0	301+06.	00900.	-06709.										
30	06	87222	00506.	70020.	0	268+08	00900	-00104										
29	12	87244	00000.	97020.	0	209-02	00900.	-02117.	8	000			4	-02.	70052			
30	12	87244	00000.	97020.	0	318+01	00900.	-02400.	8	000.			4	-03.	70053			
26	06	87257	NIL.		0													

PLEASE REFER TO INSTRUCTIONS ON REVERSE SIDE

NOAA Form 62-347
(1-77)

317 U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Environmental Data Service
National Climatic Center

FGGE Example
SURFACE–LAND REPORT
SYNOPTIC

YEAR 1978 MONTH April

COUNTRY Argentina

WIND SPEED: KNTS 2 MPS

DAY	HR GMT	BLOCK STATION	Nddff	VVwwW	PC	PPPTTT ±	$N_hC_LhC_mC_h$	TdTdTdapp ±	RT	RRR	TC	MAX TEMP	TC	MIN TEMP	1st $N_sCh_sh_s$	2nd $N_sCh_sh_s$	3rd $N_sCh_sh_s$	4th $N_sCh_sh_s$
30	12	87007	61403	99031	7	157701	40944	05209	X	000.			4	-02.	70052			
30	06	87046	02710.	80020	0	581+03	00900.	-04103.										
27	12	87047	60000	68012	6	565+04	60970.	-03103	2	000.			4	+04.	70004			
30	06	87047	03605.	70020.	6	542+03	00900.	-04703.										
26	00	87065	42308.	97030.	0	003+30.	45600.	+10249	2	000.	4	+36.						
26	18	87065	82013	97032.	0	178+16.	8097/	-19711.										
27	12	87065	82308	97032	0	246+12	8097/	-08219.	8	000.			4	+11.				
27	18	87065	82305	97032	0	219+14	865//	-18728.										
28	00	87065	81802	97032	0	206+13	865//	-08203.	2	000.	4	+14.						
28	18	87065	02305.	99000	0	108+17.	00900.	-09724.										
29	00	87065	01802.	99000.	0	198+12.	00900.	-03221	2	000.	4	+19.						
29	12	87065	02302	99000	0	264+05	00900	-12217.	8	000			4	+05.				
29	18	87065	01405	99000	0	223+23	00900	-15727.										
30	00	87065	00000	99000	0	238+15	00900	-05217.	2	000	4	+24.						
30	12	87065	81805	98022	0	271+10	8093/	-07713	8	000			4	+08				
30	18	87065	01405	99000.	0	215+21	00900	-04748.										
26	06	87078	50509	97031	0	067+27.	50970.	+18123.										
26	12	87078	82310	97032	0	150+17.	885//	+09232.	8	000.	1		4	+16.				

PLEASE REFER TO INSTRUCTIONS ON REVERSE SIDE