

SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

June 1976
NSRP 0002

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Proceedings of the REAPS Technical Symposium

Paper No. 24: ALKON from Lay-Out to Production on the Example of a Double Bottom

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE JUN 1976		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE The National Shipbuilding Research Program: Proceedings of the REAPS Technical Symposium Paper No. 24: ALKON From Lay-Out to Production on the Example of a Double Bottom				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center CD Code 2230 - Design Integration Tools Building 192, Room 128 9500 MacArthur Blvd Bethesda, MD 20817-5700				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 18	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

DISCLAIMER

These reports were prepared as an account of government-sponsored work. Neither the United States, nor the United States Navy, nor any person acting on behalf of the United States Navy (A) makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness or usefulness of the information contained in this report/manual, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or (B) assumes any liabilities with respect to the use of or for damages resulting from the use of any information, apparatus, method, or process disclosed in the report. As used in the above, "Persons acting on behalf of the United States Navy" includes any employee, contractor, or subcontractor to the contractor of the United States Navy to the extent that such employee, contractor, or subcontractor to the contractor prepares, handles, or distributes, or provides access to any information pursuant to his employment or contract or subcontract to the contractor with the United States Navy. ANY POSSIBLE IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR PURPOSE ARE SPECIFICALLY DISCLAIMED.



UMTRI

70060

**Proceedings of the
REAPS Technical Symposium
June 15-16, 1976
Atlanta, Georgia**

Research and
Engineering for
Automation and
Productivity in
Shipbuilding

**IIT RESEARCH INSTITUTE
10 WEST 35 STREET
CHICAGO, ILLINOIS 60616**

**Transportation
Research Institute**

© 1976

IIT RESEARCH INSTITUTE

ALL RIGHTS RESERVED - NO PART OF
THIS BOOK MAY BE REPRODUCED IN ANY
FORM WITHOUT PERMISSION IN WRITING
FROM IIT RESEARCH INSTITUTE EXCEPT
TO QUOTE BRIEF PASSAGES IN CONNECTION
WITH A REVIEW FOR A TRADE PUBLICATION
OR THE PRESS

AUTOKON USERS CLUB MEETING

LA CIOTAT/BANDOL 11.12 MAY 76

PAPER PRESENTED BY C.A.

J.P. BOUISARD

ALKON FROM LAY-OUT TO PRODUCTION ON THE

=====

EXAMPLE OF A DOUBLE-BOTTOM

=====

*

* *

I - INTRODUCTION -

== == == == == == ==

This paper concerning the evolution of the use of ALKON at C .A. is the fourth presented at the occasion of an AUKKON Users Club meeting.

This time, we have chosen to present a concrete application of what a set of ALKON norms, when directed to a specific part of the ship structure can achieve.

The part of the ship concerned is the double-bottom, both in engine room and in cargo area.

The ship is a container ship convertible into cargo ship ordered in October 1975 and for which keel laying will take place beginning of 1977.

+

-X -X

11- GUIDELINES AND MAIN STEPS -

=====

As we have already outlined in the introduction, the "DOUBLE-BOTTOM" is one specific part of the ship structure for which one can easily imagine that an ALKON norm (or set of norms) can be applied.

The reasons which make easy the design by norms of a double-bottom are the following :

10) A double-bottom is a well delimited part of the ship-structure

It is composed of :

Shell-plating between two boundary transverse-frames

Tank-top plating including holes, openings or casings between the above transverse limits

Girders running longitudinally including holes and stiffeners

Floors in transverse frames, crossing girders, intercostal or not, including holes and stiffeners

20) A good "picture" of the complete double-bottom can be obtained from above i.e. looking at a horizontal projection of the tank-top.

Starting from these facts the guidelines of a double-bottom set of norms will be :

Generation of tank-top, based on the principle of giving maximum information concerning the underlying girders and floors

Approximate positioning of holes in successive floors and girders along a line of holes

Generation of floors and girders

Possible modification of hole-positions in a single floor/girder

Drawing of the resulting lay-out

In practical use from lay-out phase to production, we will proceed through the following steps :

- 1°) - Preparation of the lay-out according to the above guide-lines
 - Drawing of the lay-out
- 2°) - Automatic splitting or dividing of floors and girders when they intersect each other
- 3°) - Introduction of all the divided parts of floors and girders in the composition of a block-drawing
 - Execution of a block-drawing of double-bottom block
- 4°) - Transfer of double-bottom parts to production-phase for :
 - . production transformations
 - . production identification
 - . list of pieces, nesting and so on
 - . sketches of assembly-parts

*
++ *

III- GOING THROUGH THE STEPS -

We will briefly go through the steps and will underline which are the items to take care of and which difficulties may arise.

"1.1 - Preparation of the lay-out and drawings

We must first of all, as this has not been done before, state that this starting phase has been developed together with the drawing of the lay-out by AKER/SRS (especially Mr. K.JACOBH:N from AC).

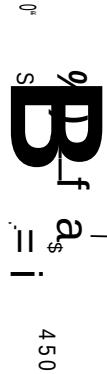
Generation of the tank-top

To obtain as a result the drawing of the tank-top (fig. 1) we have to generate successively by using appropriate norms :

vue de dessus

varangues élançhes.	varangues élançhes: 280 x 11 HP
Renforts varangues non éla	

.....Ailleurs épaisseurs profond de 14.5

Épaisseurs varangues et leurs renforts sur les coupes

- a) - Tank-top contour in the area of the double-bottom : on the drawing the tank-top contour is shown as an arrangement of contours projected horizontally even when the tank-top is composed of planes which are not at the same horizontal level (change of height) or if some portions of planes composing the tank-top are inclined.

The resulting contour seen horizontally can then have knuckle-points.

- b) - Traces of girders in the tank-top
- c) - Traces of floors in the tank-top
- d) - (opening contours in the tank-top)

As a general remark, this intermediate result contains information concerning the hierarchy of a crossing between floors and girders (which one is going through, which one is intercostal).

Generation of floors and girders

For all the floors and all the girders, which, at this point, exist only under the form of their trace in the tank-top, appropriate norms will generate :

Contour of the floors, as intersection in the transverse plane of contour of tank-top and contour of shell

Contour of the girders by the same method, but with the difference that for girders

We will obtain two contours : the actual contour,
the projected contour in the XZ plane

Then, will be added to each floor and each girder:

the local stiffeners

the holes

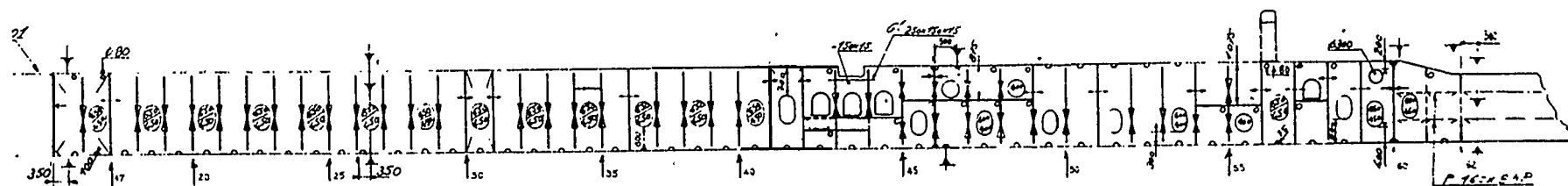
Everything is now ready to produce, after the tank-top drawing, the drawings of :

the girders in projected view (fig. 2)

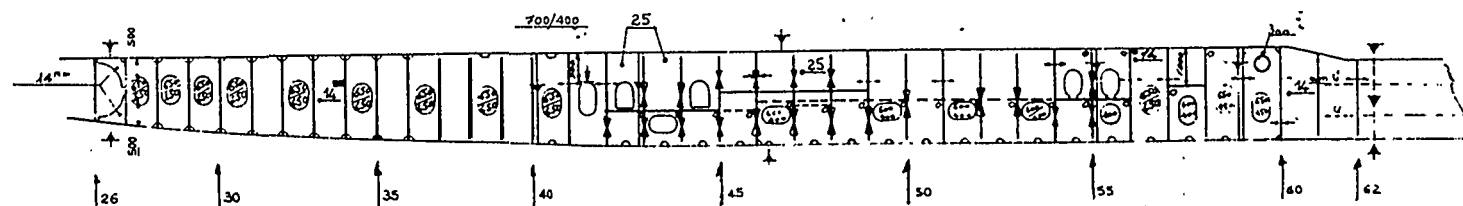
the floors at every frame (fig. 3 some floors)

These drawings, after some modifications/additions (updating of records in the database), can be used, if ready at the right time, as a very good basis for classification drawings.

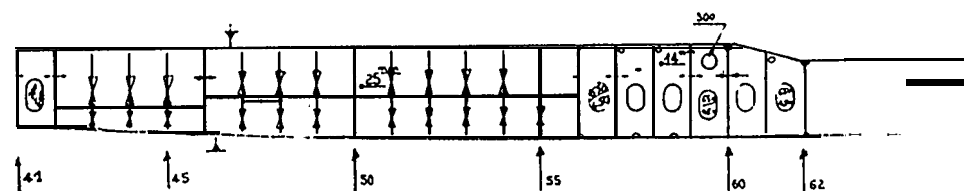
CARLINGUE CENTRALE vue de tribord



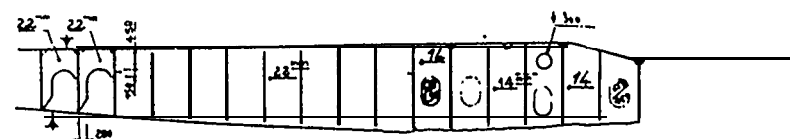
CARLINGUE N°1 vue de l'axe



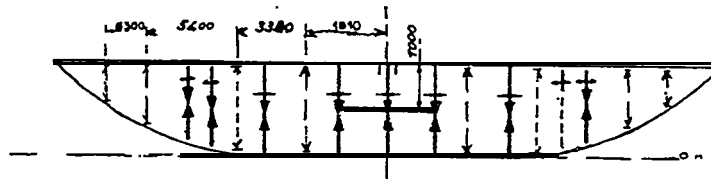
CARLINGUE N°2 vue de l'axe



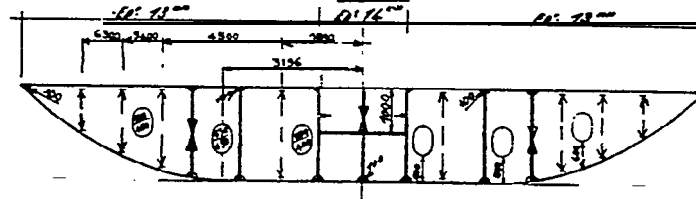
CARLINGUE N°3 BABORD vue de l'axe



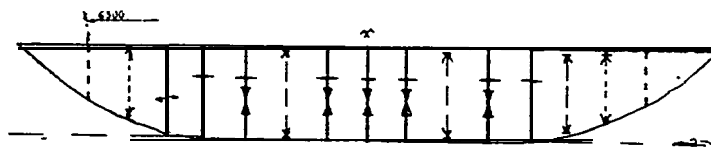
C.57 étanche EP: 14,5 mm



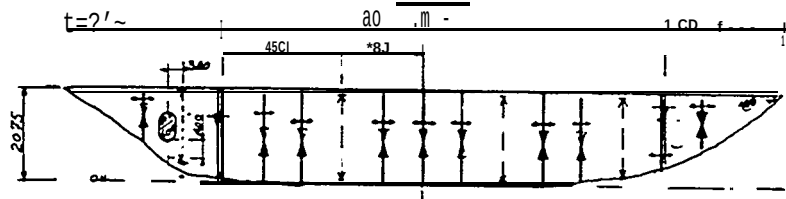
C.58



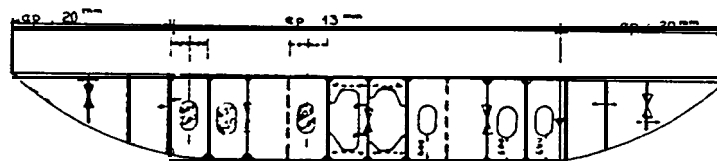
C-sg elanche 3_p. 20=.



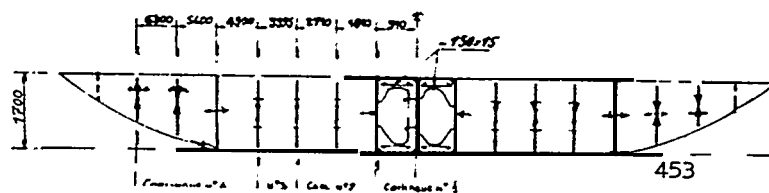
C.60



C-61



C. 62 1 P 44 - S -



3.2 Automatic splitting/dividing of floors and girders when they intersect each other.

This step, for which the corresponding norms have been written at C.A., is intended for preparing the two next steps and consequently:

all parts belonging to a block must be generated separately

the same parts, most of them being already single production parts to be nested, must be ready for transfer to the production

This automatic step starts from the complete girders and complete floors and divides them at butts (in the case of girders) or between girders (in the case of intercostal floors).

It is the job of the norms to recognize each case of intersection between a girder and a floor and also to determine on each side of one element going through if the left/right part of the element divided is watertight or not.

For each girder/floor divided in several parts, there is an automatic identification system, and the list of identifications is stored (composition matrixes) so that the drawing norms will later refer only-to that list for drawing or not the part, if the part is or not included in the block.

One remark has to be made here: the standard version of double-bottom norm package generates only floor-parts with a contour between tank-top, shell and (if necessary) one or two girders, but in the case of a duct-keel for instance, close to the central girder, we have to re-generate semi-automatically (that means with a non-standard norm) the duct-keel special parts.

Another exception to the standard version is the case when an intermediate tank-top divides the floors horizontally. "This can only be solved by the afore-mentioned semi-automatic method.

The result of this step can be an intermediate drawing of no official use showing all the girders and floors divided and identified.

3.3 - Introduction of double-bottom divided parts in the composition of a block-drawing

Execution of the block-drawing

At this point, the specific way of generating a double-bottom must have produced-standard records in the database to allow the standard process of execution of block-drawings developed at C.A. '

The link has been realized by the preceding step.

Now, there will be a big composition list of everything included in the block, everything divided by the limits of the block and so on.

The computer has only administration work to perform in order to draw sequentially the whole content of the block.

When we analyse the contents of one view in the block drawing, it is composed of :

- Contour of the parts which are in the projection plane of the view

- Contour holes in the above parts

- Traces of longitudinals penetrating the surface (or stopped on it)

- Traces in the plane of the view of the parts included in other surfaces.

- (for instance in a transverse view, for double-bottom we will have traces of tank-top, shell and girders)

This can be seen in some extracts of block-drawing of the said double-bottom (see fig. 4 - 5 . 6 - 7).

3.4 - Transfer of double-bottom parts to production

As we have seen before, the work performed for preparation of block-drawing is not far from what the production is waiting for.

We will give the list of the production transformations which have still to be executed :

- Adding of cwerlength on s-me parts when necessary assembly purposes

- Take care of bevel when the angle between Floor and girder or between floor-part and shell is more than a certain value

- Replacing of traces of stiffeners on parts by marking lines in contours

- After that the production parts can be used :

- . for nesting purposes

- . for assembly sketches

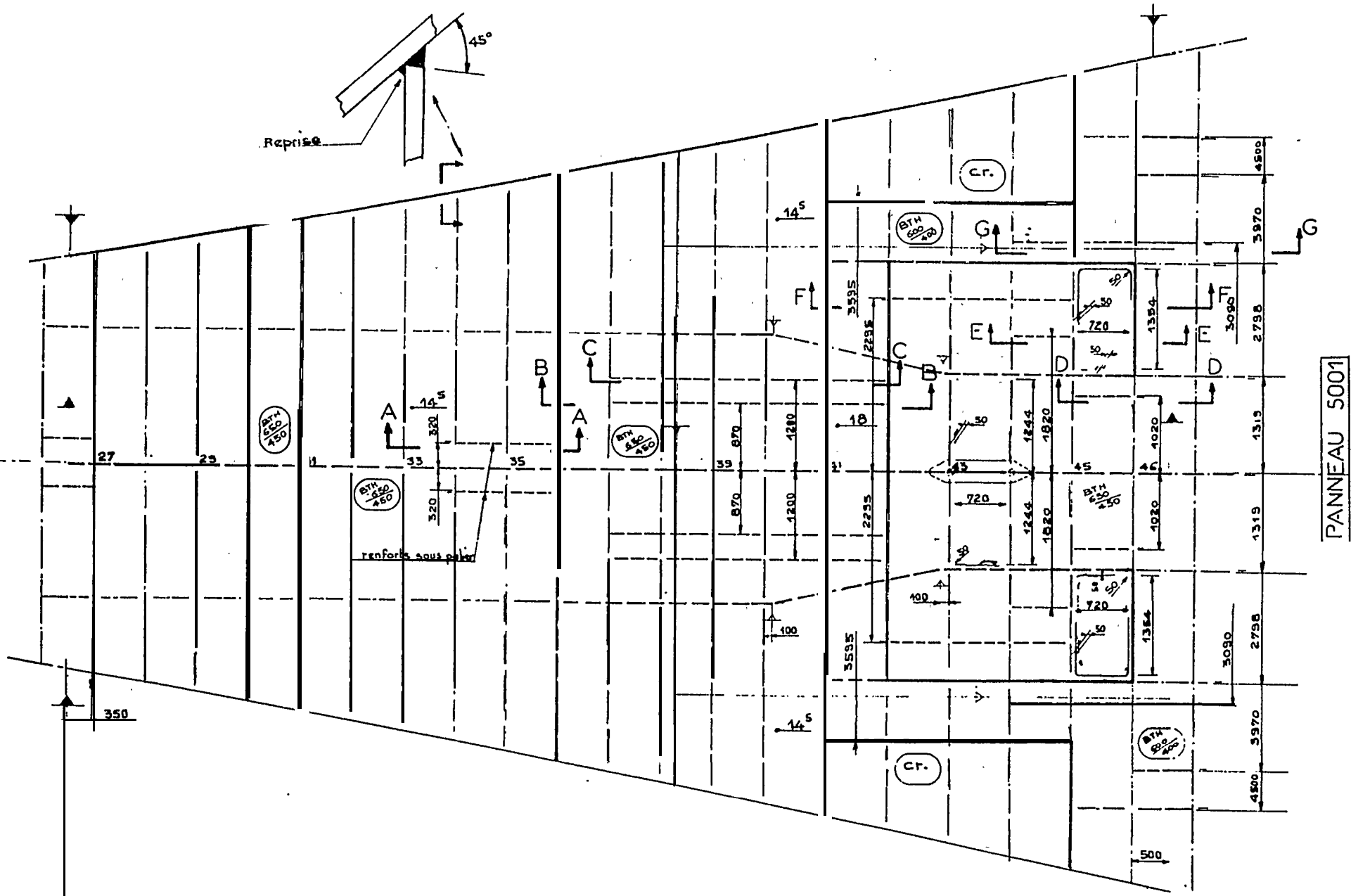
- . for lists of contents of blocks, assemblies and so on.

PLAFOND DE BALLAST

vue de dessus

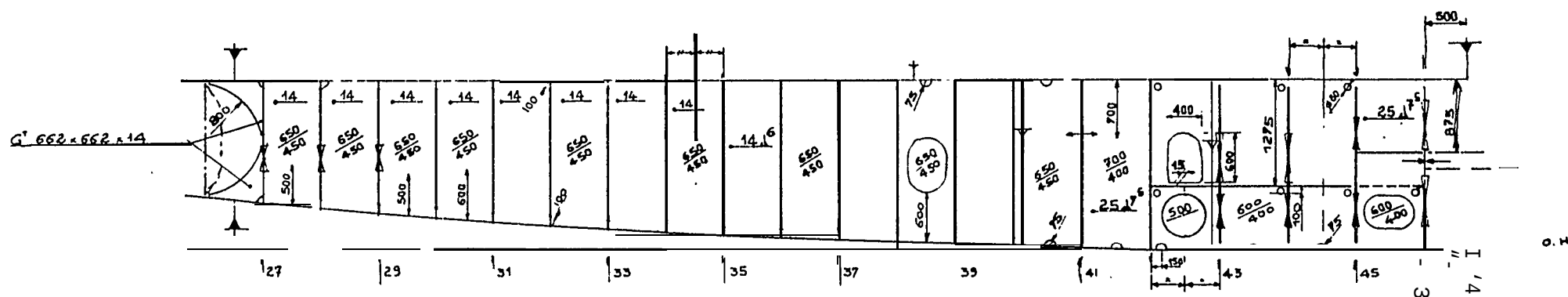
456

PANNEAU 5003

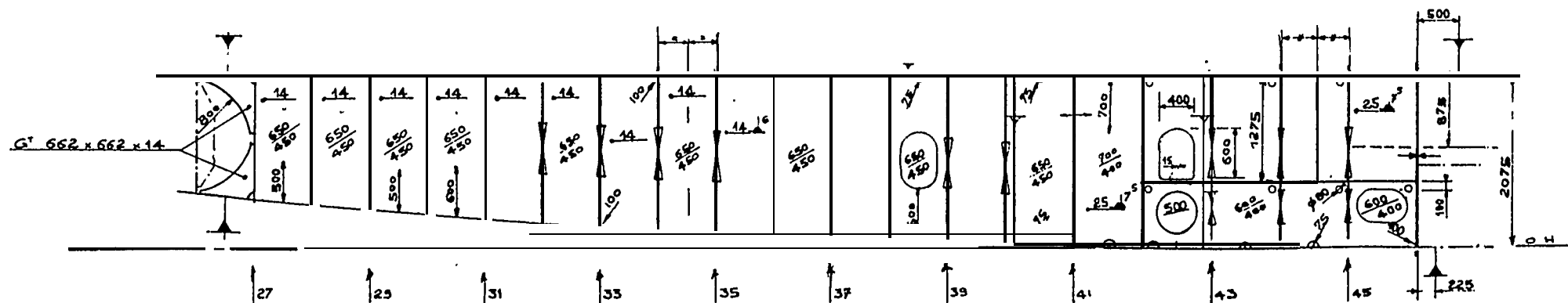


vue de l'axe

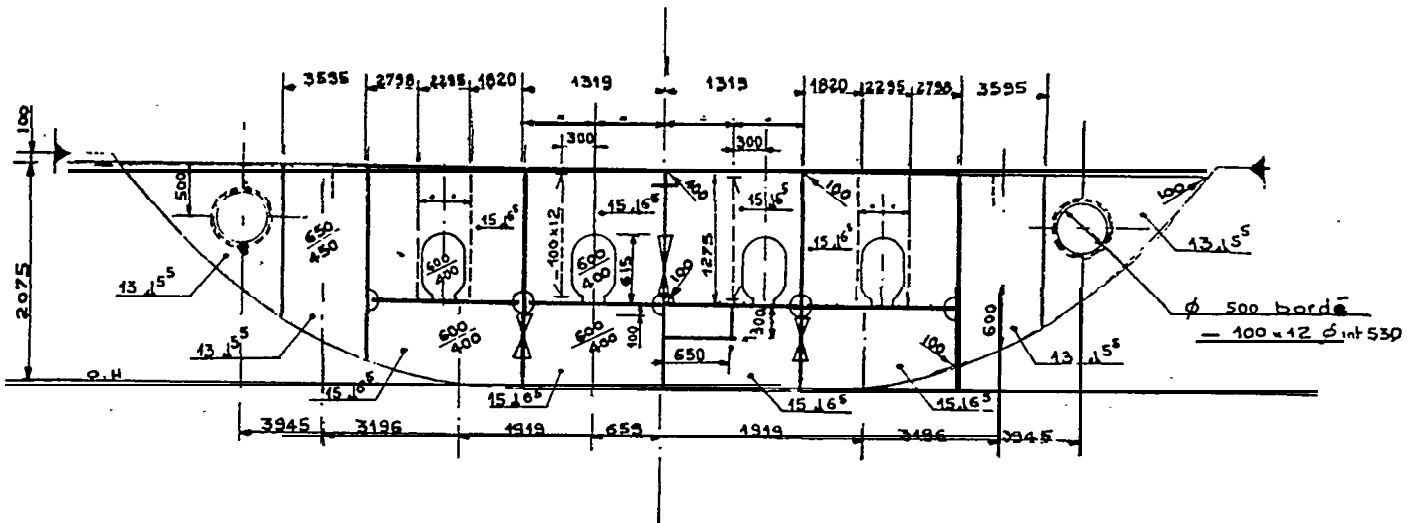
457

vue de tribord

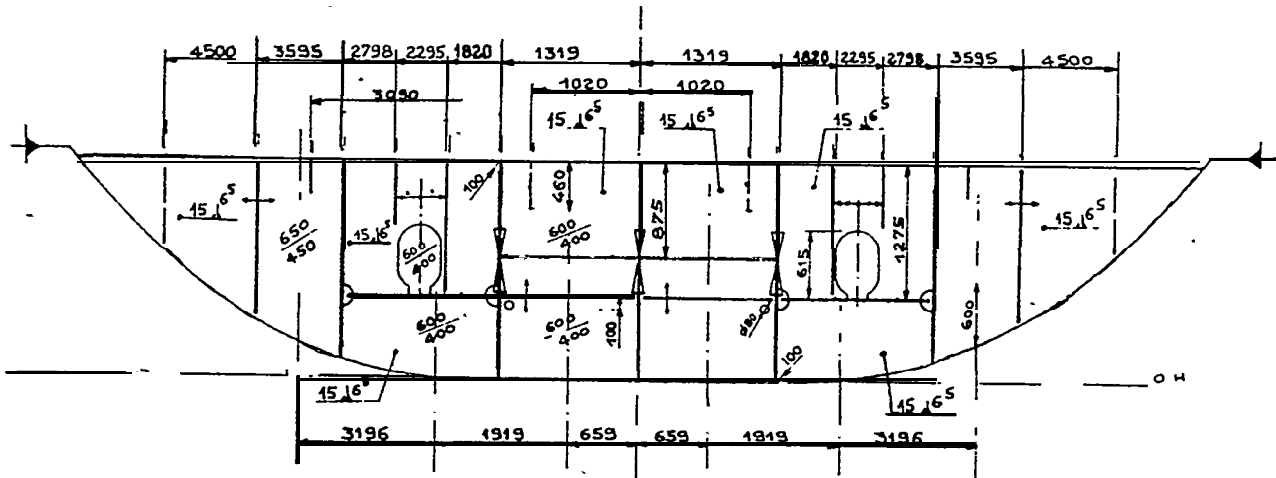
COUPE A 1810 DE L'AXE



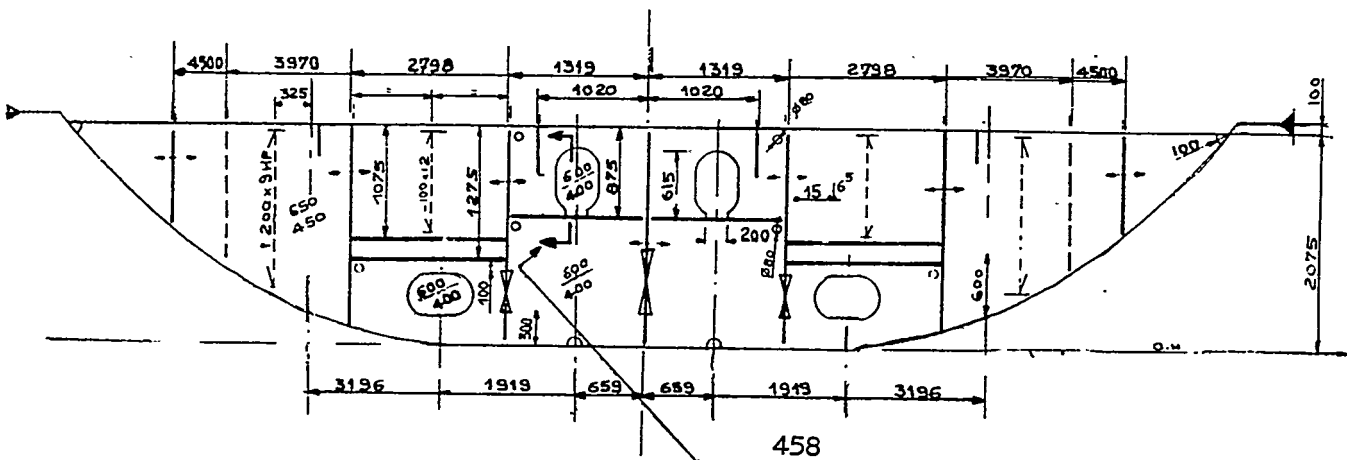
COUPLE 44 vue de l'A

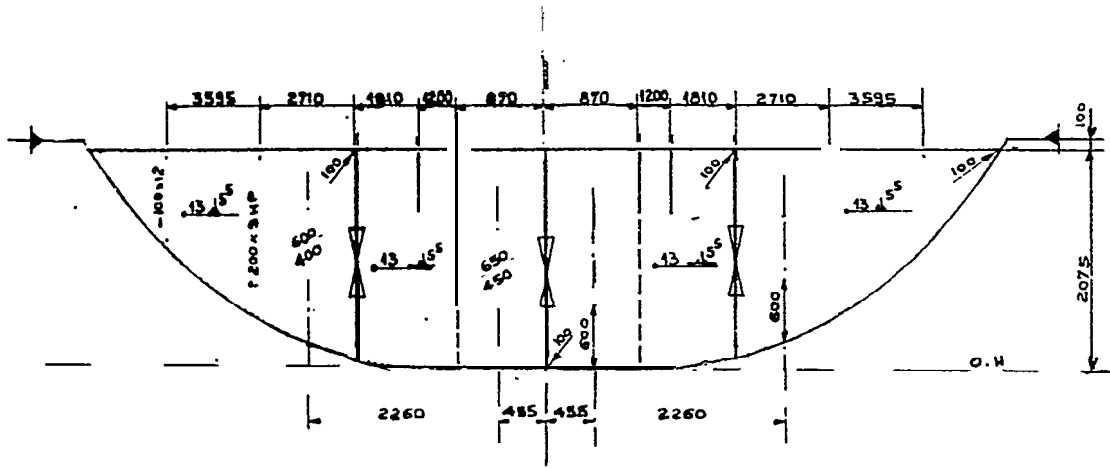
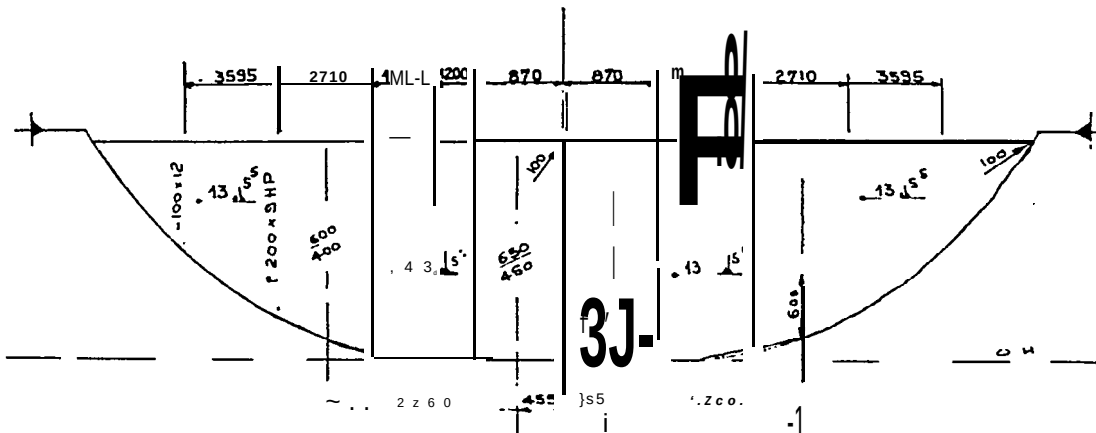


COUPLE 45 vue de l'AR

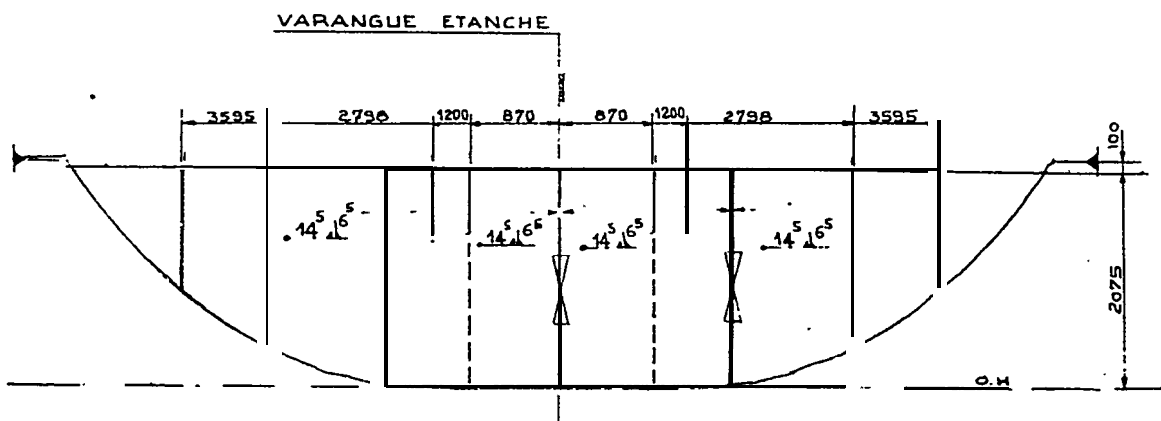


COUPLE 46 vue de l'AR



vue de l'ARvue de l'AR

vue de l'Ar



OF A DOUBLE-BOTTOM -

The results are very promising if we have the following conditions

Modifications of the design are a common fact when designing double-bottom, especially in engine area.

The -conclusion is, that, for other parts of the ship-structure especially for ships with a double-hull the guiding principles of the double-bottom norms might be applied.

The 27th of April

J.P. BOISARD

Additional copies of this report can be obtained from the
National Shipbuilding Research and Documentation Center:

<http://www.nsnet.com/docctr/>

Documentation Center
The University of Michigan
Transportation Research Institute
Marine Systems Division
2901 Baxter Road
Ann Arbor, MI 48109-2150

Phone: 734-763-2465
Fax: 734-763-4862
E-mail: Doc.Center@umich.edu