CARGOMANAGER

This printed manual supports users of CARGOMANAGER. The release, once installed, includes a full hyperlinked user manual that can be accessed directly from most screens. It also provides a range of screen specific Help, and a link to the Gower Optimal Algorithms web site (www.goweralg.co.uk) for additional support documents.

Users will note from the printed material that the online version is extensively hyperlinked, both within and between sections, and wherever possible the online version should be used in preference.

You should be also aware that online documentation is occasionally in advance of the printed format (reflecting new features etc.).

We wish you well in using the software and welcome feedback, ideally by email to support@goweralg.co.uk

G.O.A.L.

CARGOMANAGER Manual.

Note that in the interests of download size, the search mechanisms available within the manual on any systems installed from web downloads is rather less sophisticated than those of full applications installed from CD. In either case the manual content is identical.

New **CARGOMANAGER** users are first recommended to first read the Short Getting Started Guide and then possibly the rather longer Section 3 - Guided Tour. Existing users can see at a glance details on New Features.

Technical questions are dealt with in Section 2 and Appendix 1.

Questions on how to get packing solutions suitable for your particular environment - a critical factor - are dealt with in Section 6.

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SECTION 1 - INTRODUCTION.

CARGOMANAGER is a powerful personal computer based tool which will help you reduce the cost of movement, storage and transportation of goods. For example it will help you answer such questions as:

- *Will this consignment fit in this container size (and how!)?*
- *How much more of a particular product can be loaded in this trailer / container?*
- *How many containers are needed for this load?*
- *Which container / trailer size is best suited / most cost-effective for this consignment - whether the consignment requires 1 or 900 containers?*

This release provides full 32 bit Windows functionality and naturally uses a standard Windows user interface. It has been designed for operation on Windows XP / Windows Vista / Windows 7 systems using ideally 1024*768 resolution or better. Note that the amount of information displayed on text screens will vary according to the resolution of the display being used - those presented in this manual are typically those seen by a user with a 1024*768 resolution display.

The software, as standard, supports screen and printer operations in English, French, German and Danish languages, this being selected from the opening screen. A number of additional 'User Tip' screens are also provided. These can be suppressed from display and can later be re-activated, again from the opening screen. An electronic and fully searchable manual is naturayy provided as are Help screens which provide information relevant to each specific screen.

CARGOMANAGER has been developed to tackle a a full range of problems associated with the packing of goods into any rectangular enclosure - for example a shipping container or trailer - in order to minimise wasted space and maximise the revenue you can achieve in packing a given container.

It enables the user to specify packing restrictions resulting from such considerations as the nature of the product, its weight, and the type of packaging used and to define packing priorities for each product, and cater for multi-drop loads. It provides both on-screen and printer reports illustrating how cases may be packed, and presents this information in an effective, three dimensional graphical form as well as a variety of two dimensional representations.

The type of solution obtained relies on a set of user configured packing options. Once configured for a particular application environment these can usually be left unchanged thereafter. Our default values may yield suitable results but some initial configuration is likely to be required to meet specific needs.

Section 6 of the manual discusses these settings in great detail.

CARGOMANAGER

This software has been developed by Gower Optimal Algorithms Limited, the company behind the highly successful **PALLETMANAGER** suite of programs. It has been developed to tackle a complementary range of packaging and distribution problems. The software was launched way back in 1989 (for DOS!), and whilst the current release bears no resemblance to the original (rather simple) product, factors which remains at the forefront of our development program are the **quality** of both the software itself and of the solutions obtained, and **practicality** of the software to meet the needs of users across a wide range of businesses.

As the user will rapidly appreciate the methods employed within the software are totally different to those used in our popular **PALLETMANAGER** pallet loading software and have been developed especially to tackle (primarily) mixed CARGO packing problems. As part of our development programme we would encourage you to write to us with any comments or suggestions you may have concerning the operation of the software and the facilities you would like to see incorporated in future releases.

> We would stress in particular the fact that although the software does attempt to provide both volume efficient and stable consignments, given the range of environmental and handling conditions experienced in practice, it is essential that experience operatives determine the suitability of individual load plans for any particular application.

The User Manual.

This user manual is intended to provide both introductory material for those making use of **CARGOMANAGER** for the first time and, in addition, provides sections devoted to a more detailed description of each facility**.** As users will expect a full set of on-screen Help is available. Access to the on-disk manual (which itself is browser based and includes a full search mechanism) is available from nearly every screen.

In the manual the problems illustrated are those of packing a container (or containers) with a cargo of various case types. In practice, the software can be used to tackle a wide range of cargo packing problems - shippers, mixed pallets etc. - the range is only likely to be restricted by the ingenuity of the users!

Section 2 of the manual describes the simple installation steps required to install the software onto your computer using the familiar Windows Installer based procedure.

As well as a brief 8 page Getting Started Guide, the descriptions in Sections 3 and 4 provide a guided tour of some of the basic features of the software. Section 3 tackles the problem of packing a single container with a cargo. Section 4 provides an insight into some of the more advanced features, including the facility of packing a container in a series of sections, and that of packing multiple containers.

Sections are also provided on each of the main **CARGOMANAGER** modules and these describe in some detail the facilities which each provides.

We are sure that you will find **CARGOMANAGER** to be both easy to use and of considerable benefit to your company. Once again, any suggestions on facilities which would be of use to you would be gratefully received.

General Features of the Software.

- Input of cargo details via a user-friendly 'spreadsheet like' interface including an automatic two-way link to a large product database.
- Capability to input cargo from other sources including spreadsheets and databases.
- Provision to account for packing restrictions (for example orientation), and for specifying fragile or heavy items.
- Capability for user specification of cargo priorities.

- Analysis of cargo weight and volume prior to packing to allow adjustments to cargo list or container details.
- Inclusion of a multi-container feature to enable rapid calculation of the number of containers required for a consignment whether the consignment requires just 1 or 1000 containers.
- Facility to examine up to 50 possible container sizes in a single step - ranking these according to performance - whether considering loading just one container load or one requiring over 900 containers!
- Facility for saving cargo data on disk for subsequent re-run, and for input of user-created data files.
- Provision of a powerful and flexible set of packing methods which provide high volume packings whilst accounting for product packing constraints and priorities. The operation of these can be controlled by the user.
- Facility for packing cargo in a series of steps. This caters for multi-drop loads and for adding cargo to partly filled containers.
- Includes tools which will optimise the load mix when cargo weight is the loading restriction rather than space.
- Graphical displays in two and three dimensions, including views of the container as it is being packed, and when completely filled, and the capability to highlight any individual item on screen using the mouse and obtain its details and positioning information.
- Graphical display to screen of **all** the container loads forming a multi-container load, with the user able to select, print, level or add cargo to any or all as required.
- Powerful computer / user interaction providing realistic packing arrangements which are suitable for shop-floor loading.
- Two and three-dimensional printer reports showing loading arrangements and case types used together with a picking list. Additional load co-ordinate report detailing the exact position of each item in a consignment.
- On-line access to the full hyperlinked manual.
- Add-on integrated Email facility.

Obtaining Better / Quicker Solutions.

CARGOMANAGER can be used for tackling a very wide range of problem types - from problems where a couple of dozen cases are to be fitted into a container, to those with several thousand cases to be fitted into one (or 1000!) containers. With this release, according to license, up to 15,000 item types can form a consignment and up to 20,000 items may be loaded into any one container.

As you might expect, although the packing algorithms (and thus the solutions), do automatically take into account the characteristics of the cargo as input by the user. Obtaining precisely the type of solution required (complexity, speed of solution, degree of cargo mixing etc.) by a particular user does require a little further user configuration.

This information is specified on a 'Packing Options' screen. The Screen itself, together with its associated Help menu, provides detailed guidance on the effect of the settings on the packing processes (They are also

described in detail in Section 6 of this manual). Once set these values are typically left unchanged by users. Once you have learnt the basics of **CARGOMANAGER**, all users are encouraged to study Section 6 in some detail, and experiment with these features, to ensure that they obtain precisely the type of solutions they require.

We would stress in particular the fact that although the software does attempt to provide both volume efficient and stable consignments, given the range of environmental and handling conditions experienced in practice, it is essential that experience operatives determine the suitability of individual load plans for any particular application.

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SECTION 2 - INSTALLATION.

(Covers Installation & Removal, Running, Updating, Backup and Language selection.)

Introduction.

CARGOMANAGER is designed for use under Windows NT / 2000 /XP and Windows Vista / Windows 7 and assumes a display set at 1024 * 768 resolution or better. Initial installation will only require around 20Mb of space, but when running more complex problems (say packing 200 containers with thousands of items!), 200Mb or more of temporary files may be generated. The installation uses the familiar InstallShield / Microsoft Installer used by many software companies.

The version, as standard, supports screen / printer operation in English, French, German and Danish languages, with the language of operation being selected on the opening screen.

Installation Procedure.

The CD supplied normally contains copies of several of our software products including **PALLETMANAGER** and **CARGOMANAGER** software. The CD will normally autostart when placed in the CD drive and the **Install Software** option can then be selected.

All CD versions allow **TRIAL** installations of all our software products to be carried out. These TRIAL installations (only) **MUST** always be installed on a **local (not network) drive** of your computer (they will not function otherwise). The trial period is up to 21 days from installation. Normally no codes are required for such installations as they are pre-coded for trial.

A Licensed Enabled CD will have with it a set of license codes (specific to the software product), typically attached to the CD Case. These codes are needed when installing a fully licensed CD copy. A licensed user is able to successfully install the licensed software product on **both local and network drives.** The CD can be used to create a complete new installation or (if you have a current license / support agreement) for update of a previous installation. If you update an installation (in the same folder) then user configuration and database files from that release **will be retained.**

Installation Steps:

Before installing we would recommend that you firstly check the display mode of the computer. Whilst not essential for general operation some more advanced functions do require that the pc display is set (Control Panel / Display / Settings) **into 32bit / True Color mode.** If this not set then the user will be alerted.

Then, to install the software:

(1) With Windows running insert the installation CD. The CD will normally autostart and you are then able to to select the **'Install Application'** option to install **CARGOMANAGER**.

Note: It will **NOT** be necessary to de-install any previous copies of **CARGOMANAGER** - whether evaluation, trial or fully licensed that are already on the machine. User data files WILL be retained, but you should be aware that the first stage of Installation will remove application files before installing the new version.

If the computer on which you are installing already has a copy of the **same version** of the application installed then **you may be prompted to Modify / Repair / Remove the application**. Unless otherwise advised **you should select Repair** to update files accordingly.

(2) If you are installing in **TRIAL** mode then you must install on a **local drive of your computer.** If you have a **licensed CD** and a set of license codes then **you can install either locally or on a network drive.**

An InstallShield Wizard will guide you through the installation process. In choosing the destination location for the **CARGOMANAGER** files the default location (as with previous releases) is a folder CARGONT on your C drive. Installing 'over the top' of the previous release **will retain all user created files**.

All **CARGOMANAGER** files are normally held in this default folder, with the manual files etc in sub-folders below. No files (other than the **CARGOMANAGER** entry for the Start Menu and De-install) are placed in the Windows folders.

Note the comments below regarding complete removal of trial or full systems.

(3) The final installation step requires you to run the software. Select **CARGOMANAGER** using the appropriate Start / Programs entry which will have been added during installation.

When you run the software for the first time a License Screen may be displayed (showing for example the TRIAL Status of the installation). With **TRIAL** system you just select Continue to proceed with the trial.

With **Licensed System**s the screen shown requires you to enter License Codes for the software product **exactly as given** and then select 'Continue'.

Very Important: When this is done correctly then you are immediately informed that the software is '**Fully Licensed**'. Otherwise you will be informed that the software is in '**Trial mode'.**

Licensed users must ensure that the 'fully licensed' message is displayed as described above - otherwise the software may fail on first use with a 'time expired' message, and will at the very least fail in a few days.

Installation is now complete.

Users are encouraged to make use of the on-disk hyperlinked manual which can be accessed from the main **CARGOMANAGER** menu and from most screens. This includes a short **Guided Tour** and a **Summary of New Features**. The manual is a natural supplement to the individual Help entries available on most screens.

Software Removal.

To remove CARGOMANAGER you can select **Add/Remove programs** from the Windows Control Panel (after selecting **Start / Settings / Control Panel** (or Start / Control Panel) in Windows).

This will remove **most** files, however you will need to delete the few remaining files in the installation folder (C drive - folder CARGONT by default), and the folder itself, (in both instances using Windows Explorer / My Computer) to fully remove the system. (This is because the files remaining are generated by the **CARGOMANAGER** user and not installed by **CARGOMANAGER**).

In some very rare situations you may find that an entry for any previously installed version of CARGOMANAGER remains on the start menu. This can be removed by using the **right** mouse button to highlight the unwanted entry and then selecting **Delete**. (Do not remove it using add/remove in Control Panel - this would remove some user data files and some of the current version application files)

Updating files from previous releases.

As described earlier, the installation procedure carried out above will, by default, place your copy of **CARGOMANAGER** in the folder **CARGONT** on your C drive. If the previous release was installed in this default folder then all user files / settings will have been retained and no other action is required.

If however you used another folder for the earlier release, then to retain your earlier settings you will need to copy (using Windows Explorer etc) certain user files from the old folder as detailed below. All end-user files from release 4.0 and later of **CARGOMANAGER** are compatible with those in use with the current release. The files required are detailed below.

- any files with a .dat extension.
- The product database file ITEMBASE.CAR
- The packing parameters file PACKPARA.DEF
- The file containing directory information CMCONFIG
- The container dimensions database CONTBASE.CAR

All of the above files, but ONLY these, can be copied from the older **CARGOMANAGER** folder to the new installation folder if required.

This release uses a powerful browser like interface to display the full manual and allow search of the whole manual. If you experience any problems in launching / using this then please see the comments in Appendix 1.10.

Note on Operation.

The operation of **CARGOMANAGER** is by its very nature highly sequential. Although users are likely to want to switch between certain screens (e.g. the two and three dimensional screen views of the loaded container), and facilities are provided to allow this, in the interests of ease of operation all screens are displayed maximised. Users can of course switch to other applications (using Alt/Tab or using the task bar). A Windows taskbar at the base / top of screen is assumed.

Backup Procedures.

Whilst most **CARGOMANAGER** files can be re-created from the release disks in the event of computer disk failure, the user created/ modified files should be regularly backed up. The files are normally all held in the folder / directory in which **CARGOMANAGER** is installed, though it is possible for these to be automatically placed elsewhere (See Appendix 1).

Files requiring backup:

CONTBASE.CAR

ITEMBASE.CAR

CMCONFIG

GRPARAMS

PACKPARA.DEF

Plus all files in the folder / directory with a .DAT extension.

NOTE! Not all files may exist in every installation, and the references above to files in the CARGONT

directory assume a fully standard installation. As described elsewhere, files could be saved on other drives / directories, though this is not recommended. If in doubt the contents of the file CMCONFIG should be examined (using say Wordpad / Notepad) to determine whether alternate directories are in use for any of these files. Once again see Appendix 1.

Your IT staff can advise on the best way of performing such backups.

Language Selection

This version of **CARGOMANAGER** is, on installation, configured to display screens and print results in English. However, as standard, users may configure the software (on the front screen) to operate in French, German or Danish.

A translation of the printed manual is NOT currently available. However the translated screens and translated tooltip help which do form part of the installation should ensure that this should not be a major barrier to use. Additional Help screens in English are provided which should also assist in overcoming any uncertainties regarding definitions etc.

The translations have been carried out by graduate nationals having a science / engineering / logistics background. However given the technical nature of some of the material, users may feel alternate translations of key terms might be preferable. We would welcome written feedback on any such examples.

GOAL Support: support@goweralg.co.uk

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SECTION 3 - A Guided Tour.

(Covers Data Input, Calculation modes, Results display and Printing).

Welcome to **CARGOMANAGER**. This section of the manual provides you with an introduction to some of the basic features of the software. A rather shorter introduction can be found in the 8 page Getting Started Guide.

In this section a step by step approach is taken - which allows use the opportunity to explain aspects of operation in rather greater detail. New users might also wish to try out the example presented below to gain familiarity with the software..

The Problem to be Examined.

CARGOMANAGER has been developed to provide solutions to problems in which between 1 and 15,000 different cargo **types** (with dispatch quantities of up to 20,000 units of each product, subject to a total of 50,000 items in a dataset) are to be packed into one (or more) rectangular containers. Container loading, pallet loading and trailer loading are a few of the possible application areas. The software caters for a range of practical packing requirements (weight, fragility, priorities etc) as illustrated below, as well as producing volume efficient loads.

Consider a shipper who wishes to pack a 20' shipping container (Type 1C) with a cargo consisting of 4 case types.

	Length	Width	Height	Weight	Number
Pallets	1100	750	1550	500.0	3
Promotion	1120	690	720	20.0	9
Bulk Packs	500	420	280	45.0	49
Catering	590	460	535	40.5	82

All the above dimensions are external (in mm.), weight is in kg.

The nature of each product and its packaging require that certain constraints be placed on how the above items may be packed.

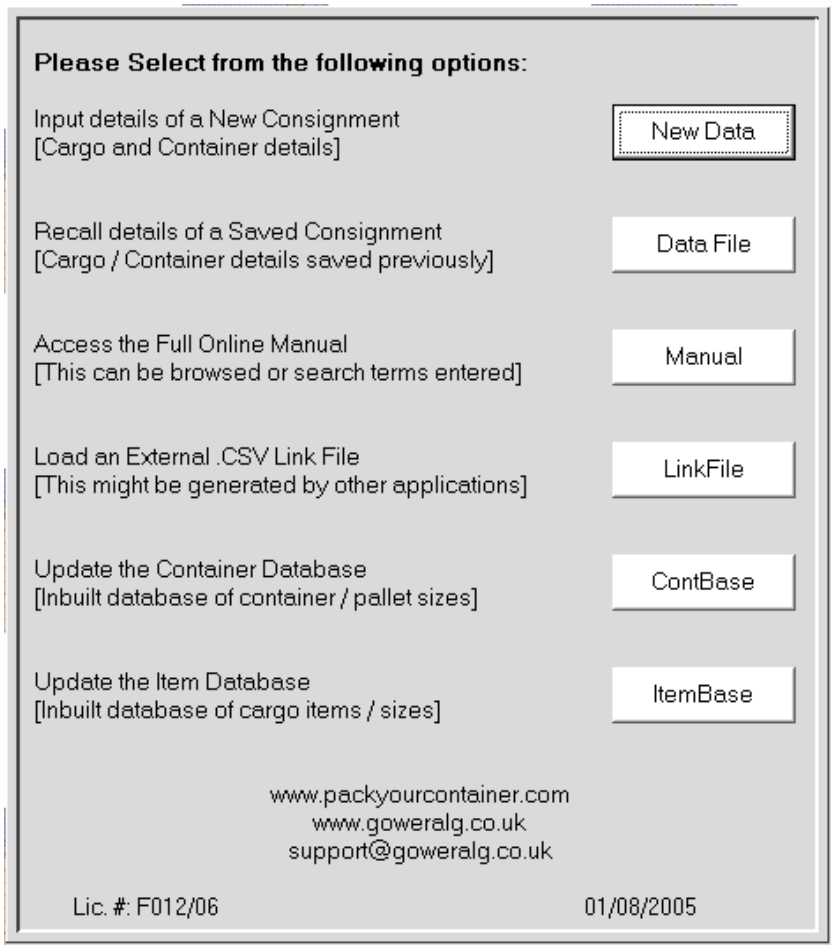
The **Pallets** are a HEAVY item, and this product MUST be placed on the container floor, with its 1550mm. dimension as the vertical dimension. It can only be stacked 1 high, however other lighter items may be placed on top of it.

The **Promotion** product is FRAGILE, and must be packed no more than 3 high in the container, without any other products being placed on top of it.

The other two products do not require special attention, and, in fact, the nature of the product and the packaging mean that they, as with product 2, can be placed in the container in any orientation. The problem outlined above is typical of those which can be tackled using **CARGOMANAGER**

Starting CARGOMANAGER.

Start **CARGOMANAGER** by selecting 'Start / (All) Programs/ **CARGOMANAGER**' or use any desktop icon which may have been configured by your IT staff.



The Main Menu screen shown above will be displayed. This provides you with the following options:

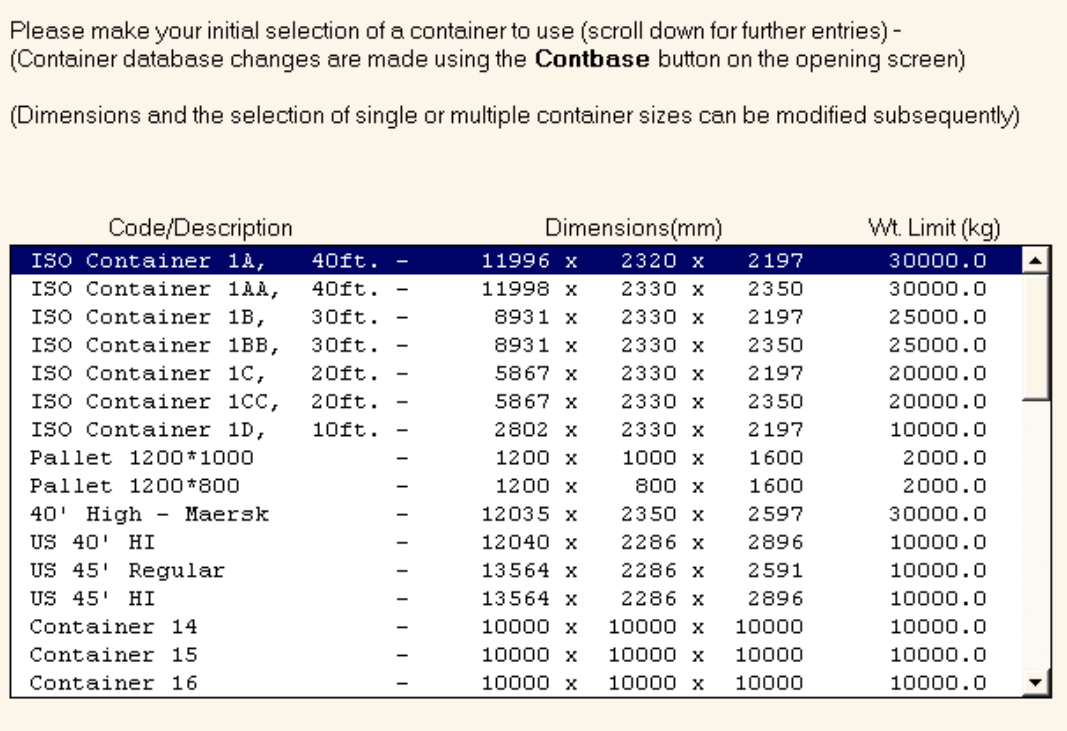
- Input a New Problem - (A likely / possible container size and full details of the consignment)
- Recall a consignment list (datafile) that has previously been saved.
- Access the on-disk complete manual.
- Use a consignment datafile generated from your own applications (a Linkfile).
- Update the **CARGOMANAGER** database holding container / pallet dimensions and descriptions.
- Update the **CARGOMANAGER** database holding details of potential cargo items (to avoid having to enter details manually each time).

In addition, at the top of the screen are the options Exit and Help. These are found on nearly all screens. Exit is fairly obvious, and Help provides you with assistance specific to each particular screen. On most screens direct access to the full 100+ page manual is also provided.

Tackling the Problem:

In following through the above example we select the **New Data Option.**

After being prompted for a Cargo Description - which can be any text description that describes the consignment - you are then presented with the Container Database screen shown below.



The database contains information on up the 50 container and pallet sizes. Using the **Contbase** option on the **opening screen** this can be edited to correctly reflect container sizes / descriptions / weight limits appropriate to your company.

Your selection of a particular container size at this time can be changed on any of the later data entry screens. This is just **an initial selection** of the container size to be used.

On this occasion the container size appropriate to the example problem described earlier in this section of the manual (ISO 1C - 5867 * 2330 * 2197) already appears in the list. The mouse is used to highlight and select this entry. You then have the opportunity to make one-off changes to this data - something which is not necessary on this occasion.

In this instance we know which container we are going to use for this consignment, but on many other occasions we may be uncertain as to which is most suitable. As we will see later **CARGOMANAGER** can quickly (in a single step) rank up to 50 container sizes in terms of their suitability for a particular consignment. In such cases the container size input at this stage is typically one which you consider as a likely contender.

IF YOU ARE USING AN EVALUATION COPY OF CARGOMANAGER then the Container Database will only contain one non-standard container size (one not matching the problem we are examining here). You will still be able to tackle the type of problem described in this section of the manual, but using the non-standard container size instead. Thus you will get slightly different results to those shown, but in all other respects the software will be fully functional.

Consignment Data Input:

You will now be prompted on Screen 3 to input details of the items which will form the consignment. This includes the dimensions and characteristics of the case / contents, the number available for packing and any priorities. The screen display provides for details for each case type to be entered on a separate 'page', and up to 600 case **types** can be defined for any consignment.

Whilst on this occasion we will enter at least some details manually, in practice all the required information (except for the quantity) can automatically be retrieved from the **CARGOMANAGER** item database. This database holds details of the characteristics of potential cargo items. It is also possible to link input to **CARGOMANAGER** directly to other applications you may use (e.g. Excel).

When an Item Database is available this will usually be displayed to the left hand side of the data entry screen. Completely new CARGOMANAGER installations will have a small number of database entries already set up. These can be used to automatically enter the data for some of the trial consignment as is discussed later in this section. The Itembase database is fully described in Section 10 of this manual and removes the need to enter any information on standard products into this data entry screen - except for the quantity to be shipped.

Data Entry - the completed screen for the first product is shown overleaf and the simple data entry procedure is, for completeness, described below. We will input details for the 'PALLETS' product manually, and then use the ITEMBASE to enter the remaining 3 products automatically:

1. Manual Entry for the PALLETS product:

Case Code: *TRIAL 1 PALLETS*

followed by the TAB or Enter key to move the cursor to the next entry box (for case length).

Length / Width / Height: *1100 / 750 / 1550* (once again using TAB / Enter key to move between fields).

The (currently ticked) permitted orientations boxes immediately below the three dimension entries cater for cargo items that do not have a fixed vertical orientation. In this instance the product is a pallet and thus only the 1550 dimension can be vertical, so the two boxes on the 'Can be placed vertically' should NOT be ticked. (To remove the ticks click the left mouse button once whilst pointing in the appropriate boxes).

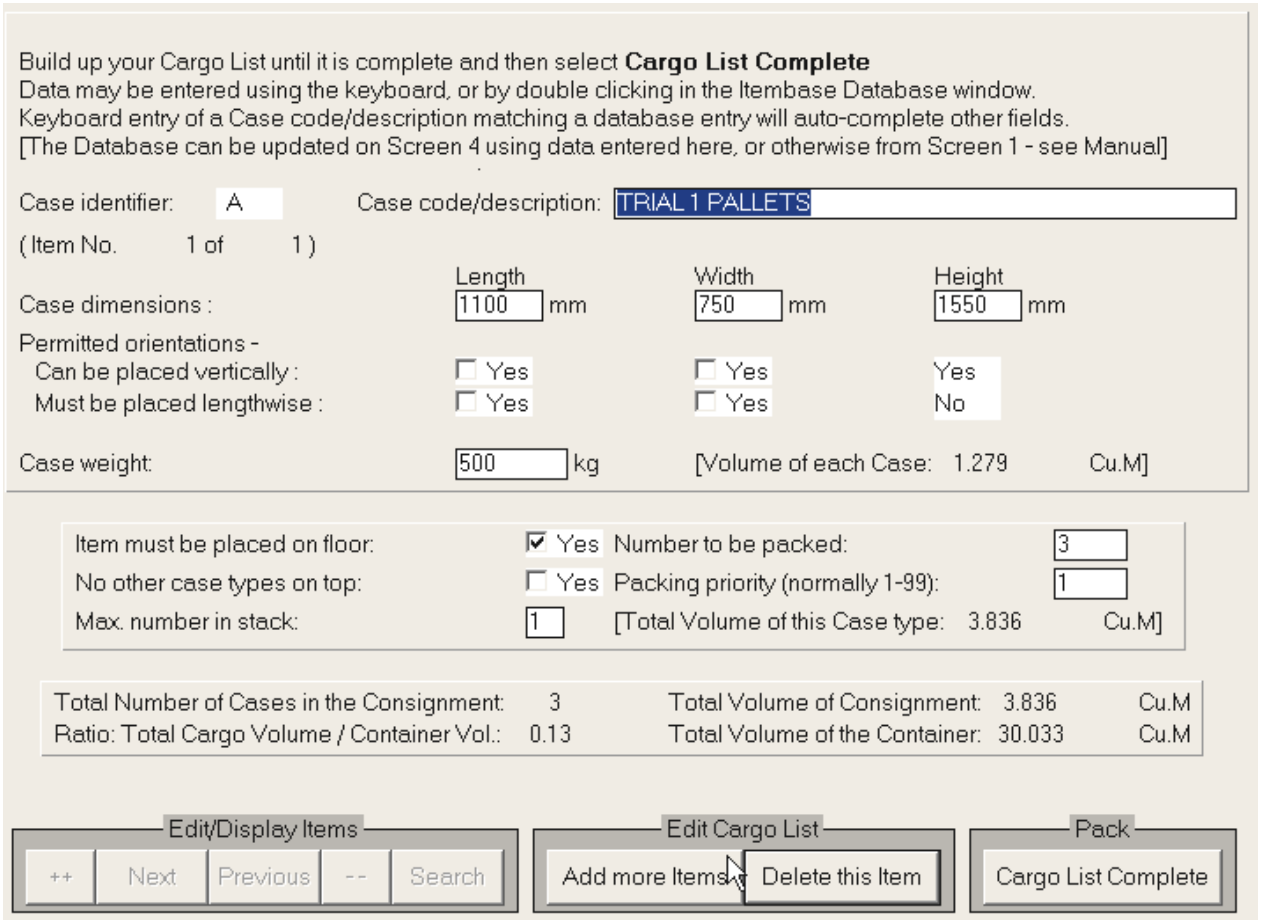
The two following tick boxes (also initially blank) allow for a particular dimension of the item to be forced to be lengthwise in the container - one or other of the two boxes might be ticked if we needed to force this arrangement (e.g. for a one-way entry pallet) - here no such restrictions apply.

The next entry which is required is 'Case Weight'. The data presented earlier has a case weight for each pallet is 500.0 Kg.

The left bottom portion of the screen allows us to specify whether the item MUST be placed on the container floor (For this pallet this IS a requirement); whether other items can be placed on top (this is not a problem for this item); and the number of such items which may form a stack - default 99. Here we want pallets to be just one layer high. Make Entries of Yes (on the floor) and 1 (layer high).

The bottom right of the screen allows us to enter the number of such items to be loaded (3) and the priority (1).

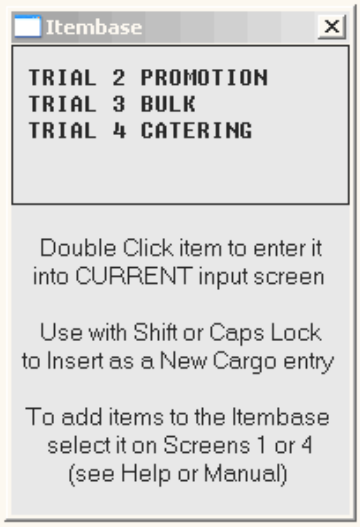
An entry of 3 should be made for the quantity to be packed



The entry of data manually can be a little time consuming so CARGOMANAGER has available a number of different mechanisms to help make data entry quick and easy.

2. Automatic entry of the remaining entries:

Those installing **CARGOMANAGER** for the first time will find that a small Item Database containing 3 items has already been set up. These items are the 3 remaining items used in this example. The Itembase Window will be automatically displayed to the left of the data entry screen, or (on low resolution screens), you may have to select Itembase from the top screen menu.



As indicated to the left, the 3 remaining items described earlier as forming the consignment are contained in the database (TRIAL 2 TO 4). If this Itembase is available to you then, having already entered TRIAL 1 PALLETS into the consignment data manually, you can add the following 3 items to the consignment in the following way.

With the 'TRIAL 1 PALLETS' screen displayed, select 'Add More Items', then double click on TRIAL 2 PROMOTION. This will enter details of the PROMOTION product into the screen - then enter the quantity (9) into the highlighted quantity field.

Once gaian 'Add More Items' and repeat for the other items.

If the CAPS LOCK key is set on then this removes the need to select 'Add More Items' between each entry.

If a windows such as that shown above is not shown automatically to the left side of Screen 3, and selecting Itembase from the top screen menu does not result in its display then you will need to enter details for the remaining 3 items manually to match the 3 item input display screens shown below and overleaf.

As described in more detail in Section 10 the Itembase holds descriptions and dimensions and characteristics for up to 25,000 products. Getting item details from the database into the Case Input screen can be done in one of two ways.

1) As described above the complete Itembase in a scrollable window can be displayed to the side of the Case Input screen and double clicking on any item will enter its details into either the current data entry screen or, with the **Caps Lock Key down**, will add the item as a new consignment entry.

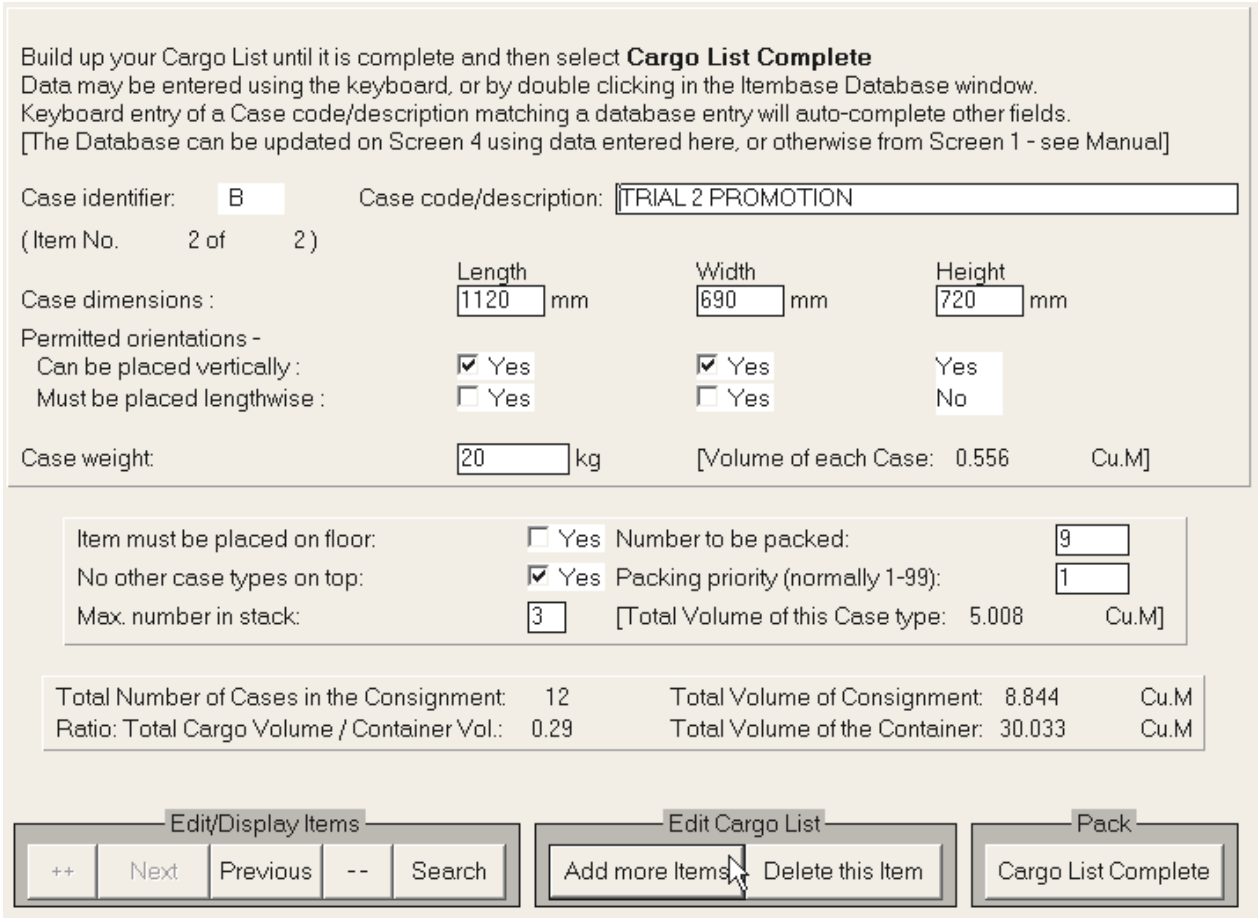
2) When **manually** entering text into the Case Code / Description field, then if the text enters matches that of a database entry then once again the full details will be added to the input screen.

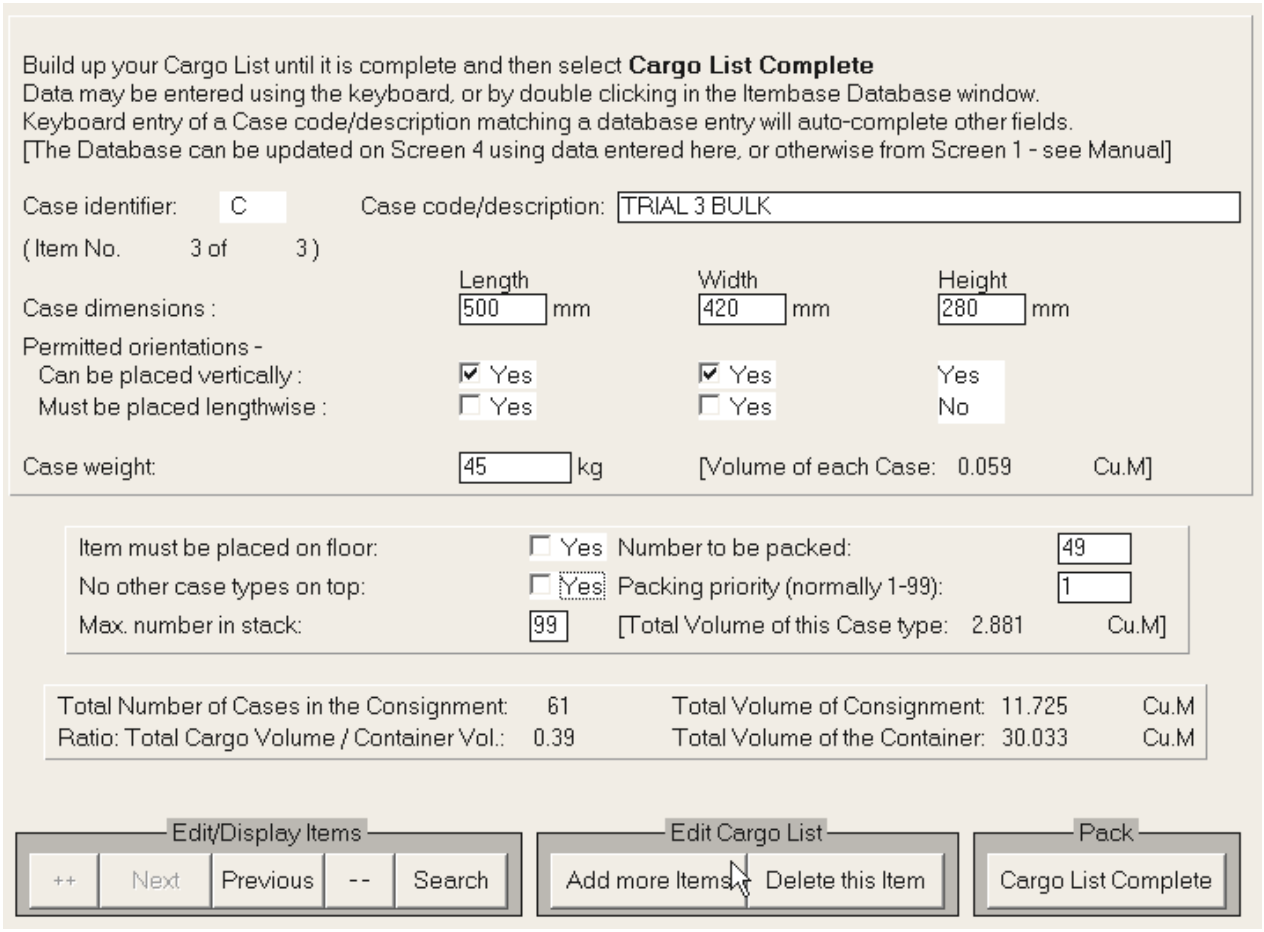
We have now completed entry of the first of 4 items. The details of the other 3 product types now need to be entered in a similar manner.

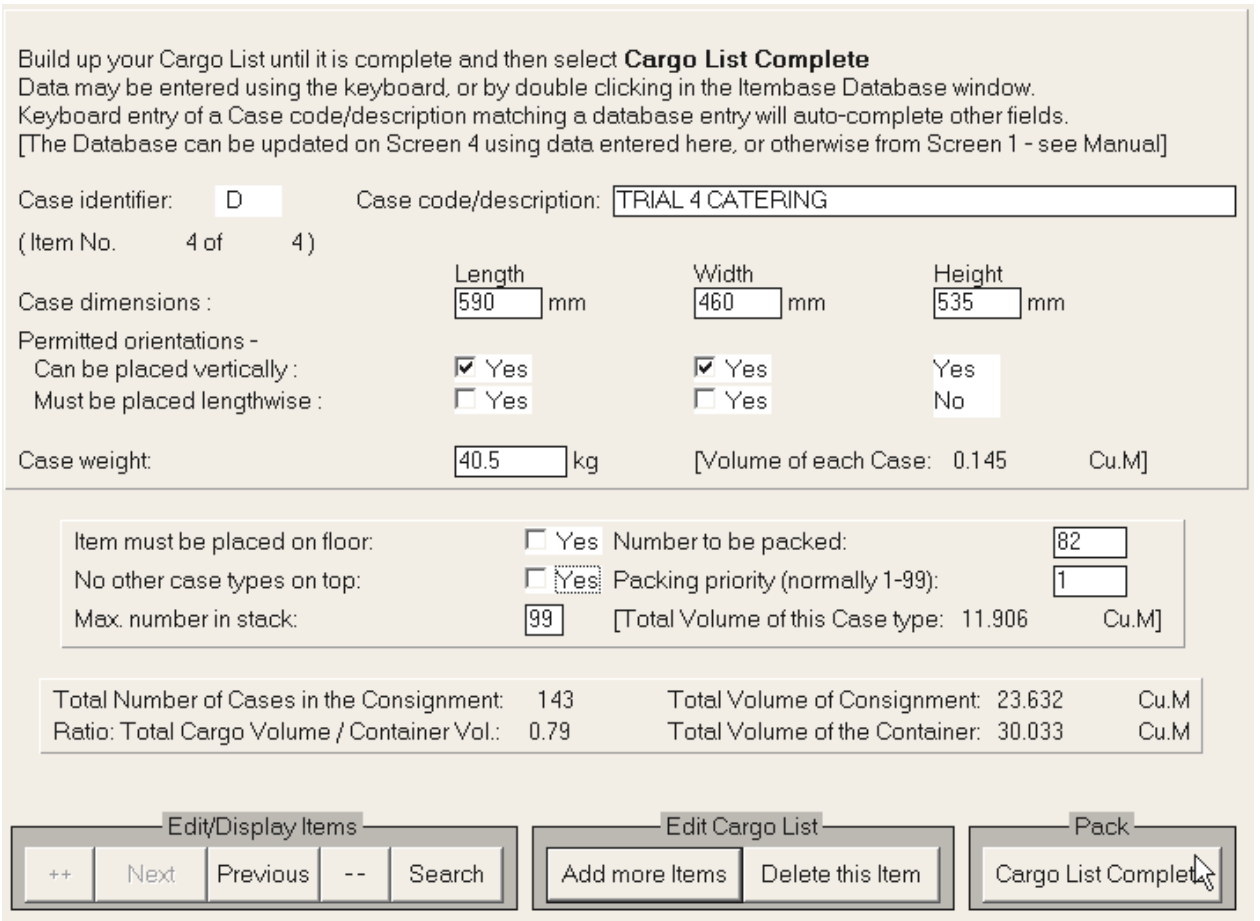
If the Itembase is not available then we can enter these manually - we select 'Add More Items' and enter the details for Products 2, 3 and 4.

If the Itembase containing TRIAL 2/3 & 4 is available then the approach detailed just above can be used.

In either case the next 3 screens should be as below:







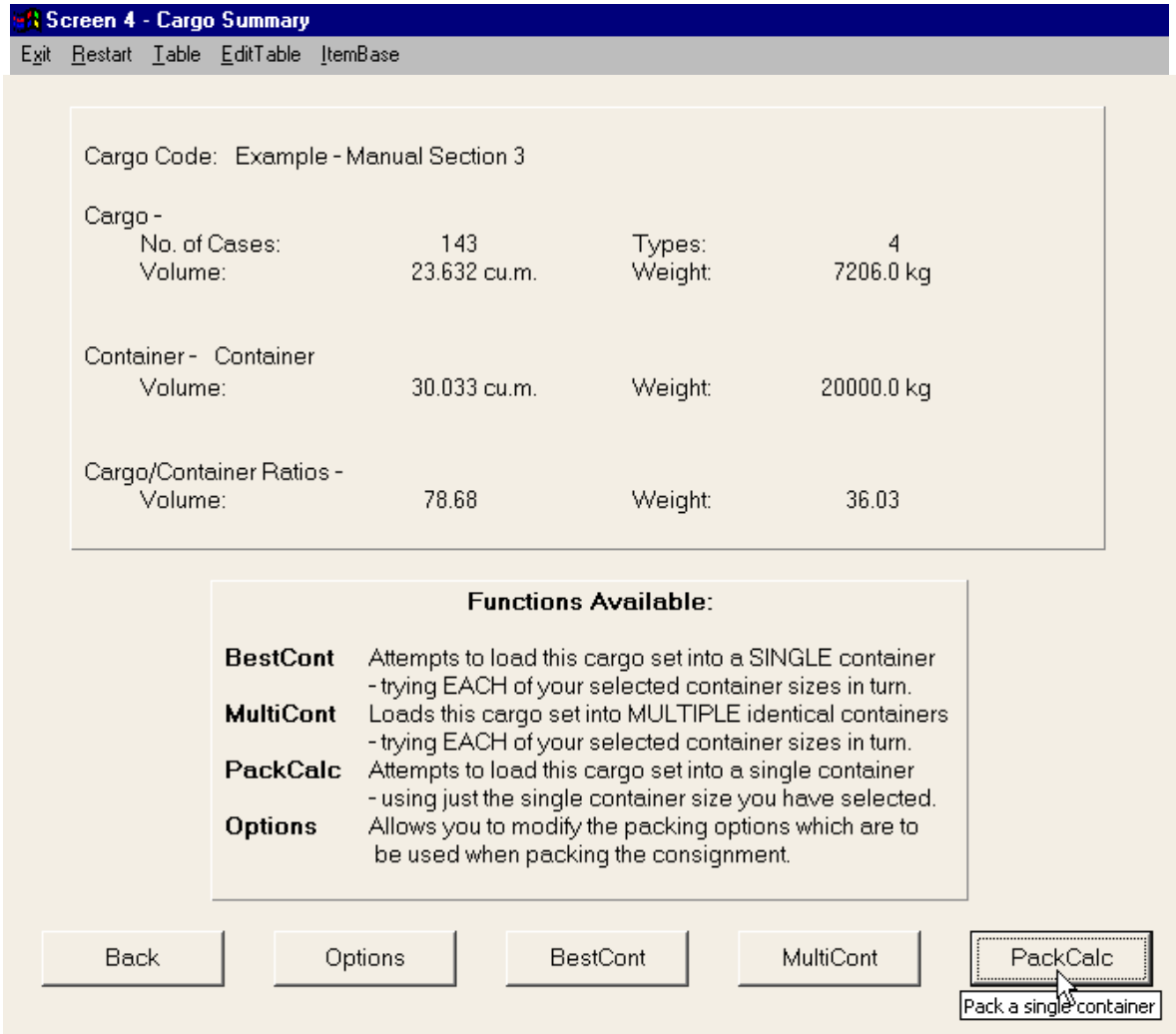
Having completed entries for the 4 products you can use the 'Next' and 'Previous' button to check that the data is indeed correct and then select **Cargo List Complete** to complete the data entry process.

Other options allow the deletion of a complete item entry and to search for a case code in the consignment entered so far.

You may have noticed that the data entry screen also provides you with information on the number and volume of the consignment, these being updated as you add data, together with details of how these compare with the container space available.

Having entered details of both the container, and of the cargo, we are now nearly ready to proceed with the packing of the container. Having selected **Cargo List Complete** a summary of the data entered is presented.

This screen displays the volume and weight of the cargo, the volume and weight limit of the container, and the ratio between them. The screen for the example problem is show below.



The cargo as specified has a volume of 23.632 cu.m., compared with a container internal volume of 30.03 cu.m.. This represents a cargo that is 78.68% of the internal container volume. Although we have specified some cases that are 'awkward' (HEAVY / FRAGILE), we would probably expect to be able to fit all the cargo within the stated container.

We might therefore wish to continue with the packing of the container (discussed below), or we might want to add additional items to the container load prior to packing. We can add new items by selecting 'Back' to move back one screen and then select Add Items. If all we need is to add extra quantities to existing item(s) we could select EditTable on the top menu of this screen.

Had the volume of the cargo exceeded the capacity of the container then we might have wished to

pack what we could into the stated container, or to increase the size of the container used (going back one screen and selecting Contbase), investigate a selection of container sizes for this load (BestCont / MultiCont as discussed below) or to change the quantities of the cases to be packed. The facility to add additional items to the cargo will be examined in more detail in Section 4 - which describes some of the more advanced features of **CARGOMANAGER**.

If the volume of the cargo did exceed that of the container then we may have wished to determine the number of containers which are required for the given cargo using the multi-container packing option.

Other options available on this screen include (on the top menu) **Itembase,** and as buttons **Options, BestCont and MultiCont**. The first two of these are described below, with the packing modes allowing comparison of different container sizes, **BestCont** and **MultiCont** being covered in Section 11 and Section 12 respectively.

Itembase: We may wish at some stage to add the product details which we have just entered ***manually*** onto the data input screen into the ITEMBASE, the database which holds Case Codes / Descriptions and their associated dimensional information as described in Section 10. Any items which have been entered manually (i.e. by typing in codes / dimensions into the Item Entry screen) can be automatically addred to the Itembase by selecting this entry.

Options: This allows users to tailor the packing rules used by **CARGOMANAGER** to suit their particular loading environment. This is discussed in great detail in Section 6 of this manual.

For the present we will pack the consignment just entered into a single container of the size selected using the PackCalc option.

When this is selected we are then prompted for a filename.

We may wish at some future time wish to re-run **CARGOMANAGER** using the same consignment data as we have just input, perhaps changing slightly the quantities or dimensions. We now have the opportunity to write details of the Container and Cargo to disk for possible future recall. Alternatively the temporary default filename (saved.dat) may be used.

The Calculation Phase.

CARGOMANAGER will then proceed to pack the given cargo and the progress of the various packing stages is displayed on screen. Depending on the type of cargo and on the packing options settings (Section 6), up to 5 packing stages are performed. **CARGOMANAGER** makes use of a wide range of techniques so as to obtain a cargo packing which makes efficient use of the volume of the container. If it can fit the cargo then the length of the container used is minimised, if it cannot then the arrangement selected maximises the volume packed. Once again the type of loading patterns produced can be influenced by packing options as described in Section 6.

The time taken to pack a cargo depends on a number of factors (which are discussed in more detail in Section 6), and in the example just input by you it will typically take just a couple of seconds to examine possible packings and to display a summary of the packing achieved.

The Packing Results Summary screen tells us that all 143 cargo items have been packed, that this was achieved in a length of 4970mm during packing Stage 3.

Select **Continue** to display initially a miniature view of the loaded container.

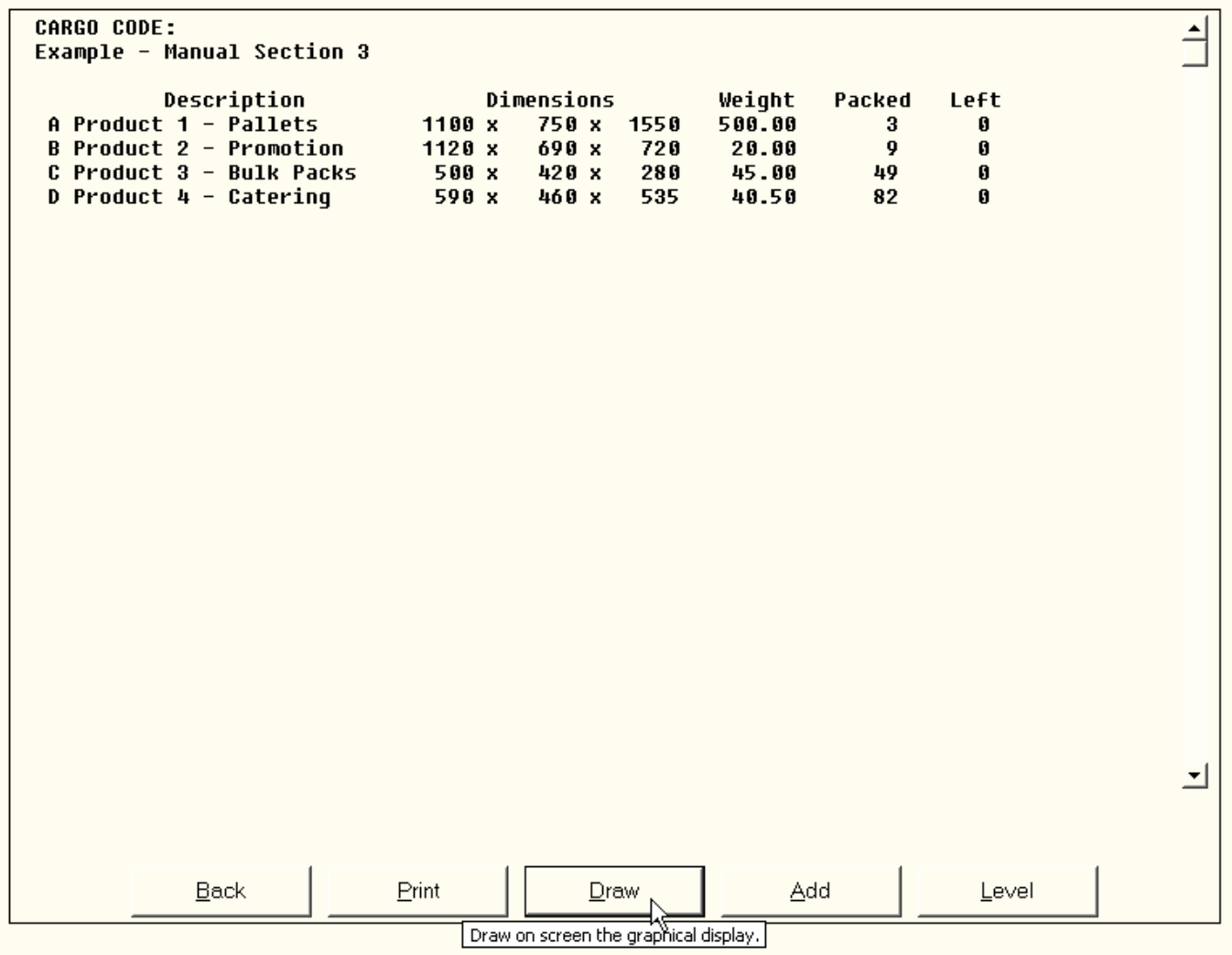
Whilst on this occasion there is just the single small picture of our one container, when tackling problems where you may wish to load a cargo set into multiple containers, then this screen would automatically show you in miniature the load plans of ALL the containers (12 at a time), and allow you to select which of those you wished to examine in more detail. Here the single container has already been selected for you and thus you now select **Continue** to display in tabular form the load details.

This screen (shown overleaf) presents in tabular form the number of items of each cargo type packed (in this instance all those available).

We might now select to **Draw** the suggested arrangement but options such as **Add** and **Level** are also available:

Given that only 4970mm. of the container has been filled (of the 5800mm. length), we may wish to immediately add some additional cargo items (of an existing or new cargo type) to those which have already been packed. In this situation the items already placed in the container will RETAIN their existing positions within the container and any additional items specified will be fitted into spaces within the existing packing arrangement. This would be selected using the **Add** option. (See Section 4).

The **Level** option would enable us to take the current packed cargo and re-pack it so as to provide a load which is spread over the floor of the container rather than being packed in minimum length. This option is likely to be of particular interest where a weight (rather than volume) constraint applies.



In this instance we will proceed to Draw the container layout on screen by select Draw.

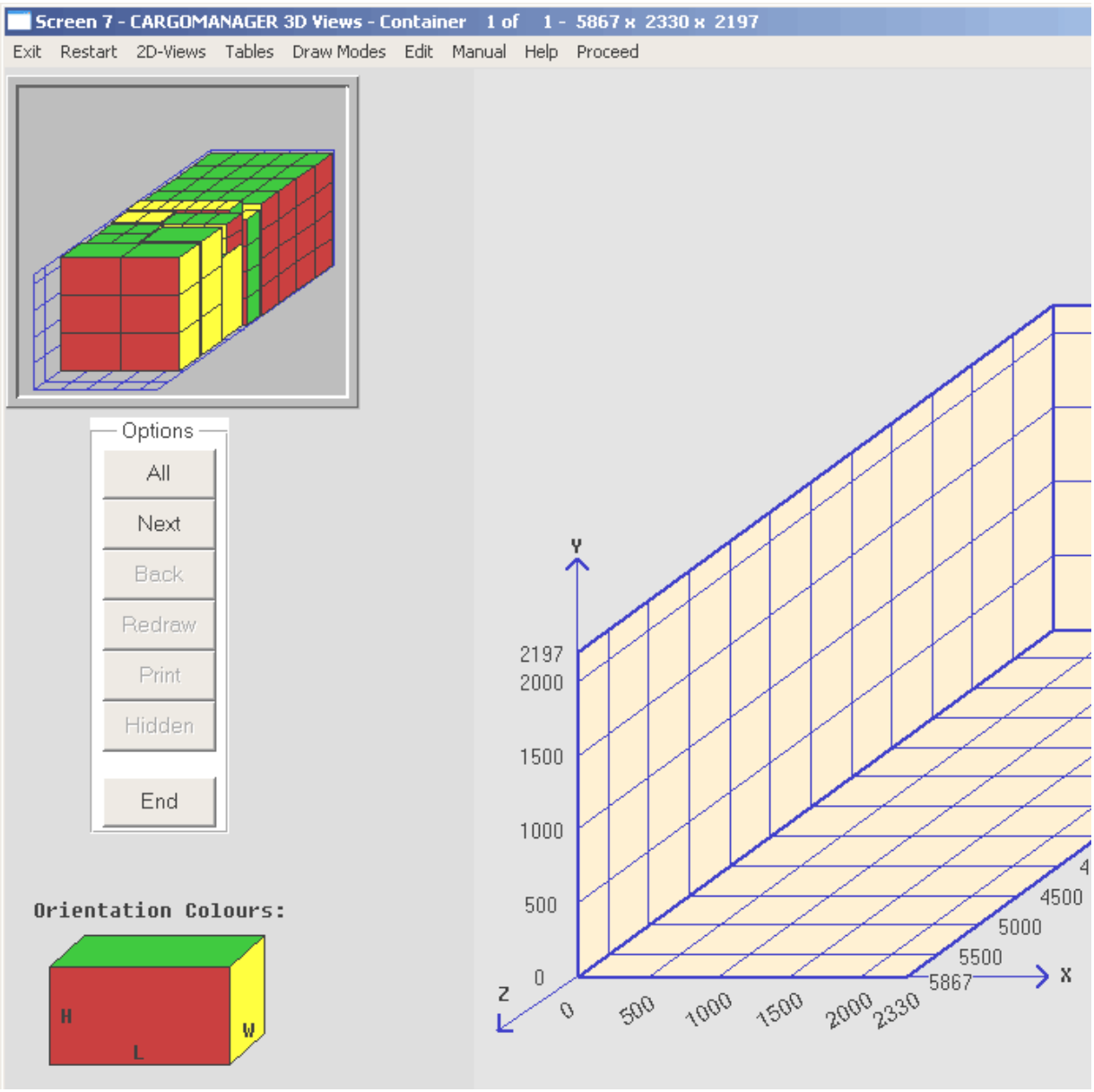
Following this, a three dimensional view of the empty container is displayed, together with a menu of possible commands which can be used to display the arrangement and, at the same time, select which views will subsequently be printed (if any) on your printer.

The Packing Display Phase.

The problem facing both those viewing a three dimensional screen display of a container packing, in which one views the cargo as it is 'loaded' from a point to the side of the container opening, is the appreciation of which case types are to be placed where, and in what orientation.

This problem is obviously of equal importance to those using a printed copy of the arrangement to perform the actual packing. This is particularly a problem when those case types placed near the front of the container in such a three dimensional view hide those packed nearer the rear of the container. The facilities provided on this screen allow the user, aided by the computer, to select one or more three dimensional views of the loaded container so that the complete packing can readily be appreciated and successfully packed.

The view currently displayed on the screen should be of the empty container as illustrated below.



A set of options buttons on the left hand side of the screen displays the single character commands (e.g. NA etc) which can be used to select different options. A subset of these will typically be available to use.

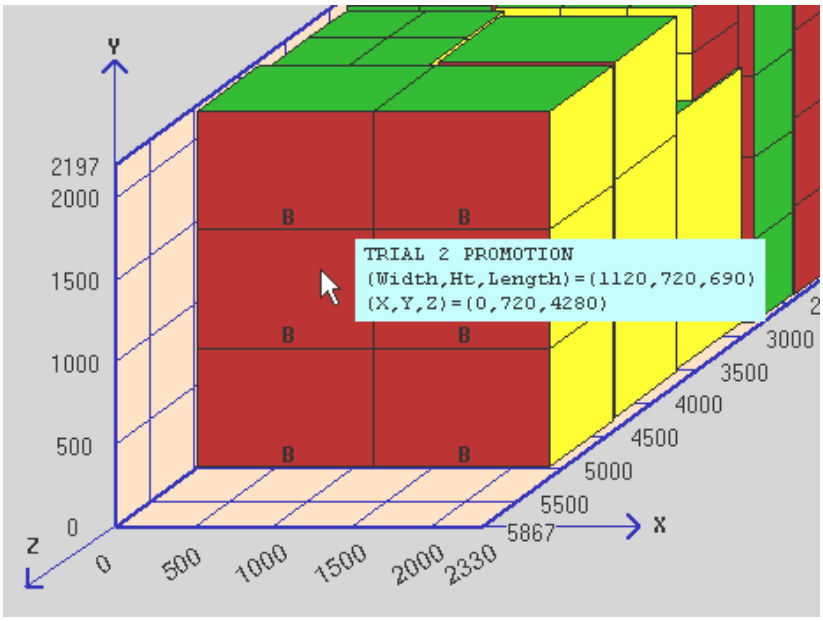
To the top left of the screen a 'mini-view' of the loaded container is presented. This not only shows the complete load arrangement in miniature but also is shaded / coloured to show the orientation of cases. When details of each case in the consignment was originally entered one dimension was stated to be the natural height, and this may or may not have been fixed as being vertical when packed. In the above miniature most cases are placed with their natural height vertical, but a few cases in the middle of the packing have been placed on-side to improve the packing. **Printed diagrams use both descriptive labels as well as shading / colouring to denote case orientation.**

Selecting **All** allows us to gain an overall impression of the arrangement.

Whilst the descriptive labels (A, B etc) may be sufficient for you to interpret some screen displays in other instances the Case Codes and Descriptions may be of immediate interest. (These will always be shown on printed diagrams). At any time you can select 'Tables' (at the top of screen) to display a window showing Case Codes or a Summary of the cargo loaded to date.

At any time the mouse can be used to point at the main 3D diagram and display details of the item

under the mouse pointer and its precise position in the container as shown below. Line 1 has the description, Line two the item dimensions as placed in the container and Line 3 the rear left bottom co-ordinate of the item when placed.



[If this function does not function then please ensure that, as described in the installation instruction, your computer display is set to High Colour / 32 bit colour mode - Start / Control Panel / Display / Settings.]

Having drawn all the cargo, select Redraw. This will allow us to return to the 'empty container' screen and then select other options.

When the 'empty' container is again displayed, select Next. This will display, working from the rear of the container, a group of cases which DO NOT OBSCURE one another. The number of cases and their position is determined by CARGOMANAGER and is dependent upon the drawing mode selection made on the Packing Options screen.

Thus pressing Next repeatedly will result in the complete cargo load being drawn in a series of stages. After each group of cases has been drawn press Next to draw the next group of cases until all have been drawn.

Once all the cargo items have been drawn, use the Back option to step back 'unloading' the cases - effectively reversing the operation of the Next command. This can be used at any time during drawing to remove the cargo loaded a group of cases at a time.

So far, although we have been able to draw on-screen parts / all of the cargo, we have yet to consider the printing of loading diagrams which will enable those stowing the items to successfully pack the cargo.

Specifying Information to be Printed.

The two remaining menu items (Print and Hidden), when used in conjunction with the keys already described, allow you to easily specify which views of the container are to be output to printer. Those views selected will be output in a similar graphical form to that on-screen but with the addition of descriptive information indicating case orientation and the full descriptive information input by you to describe each cargo item.

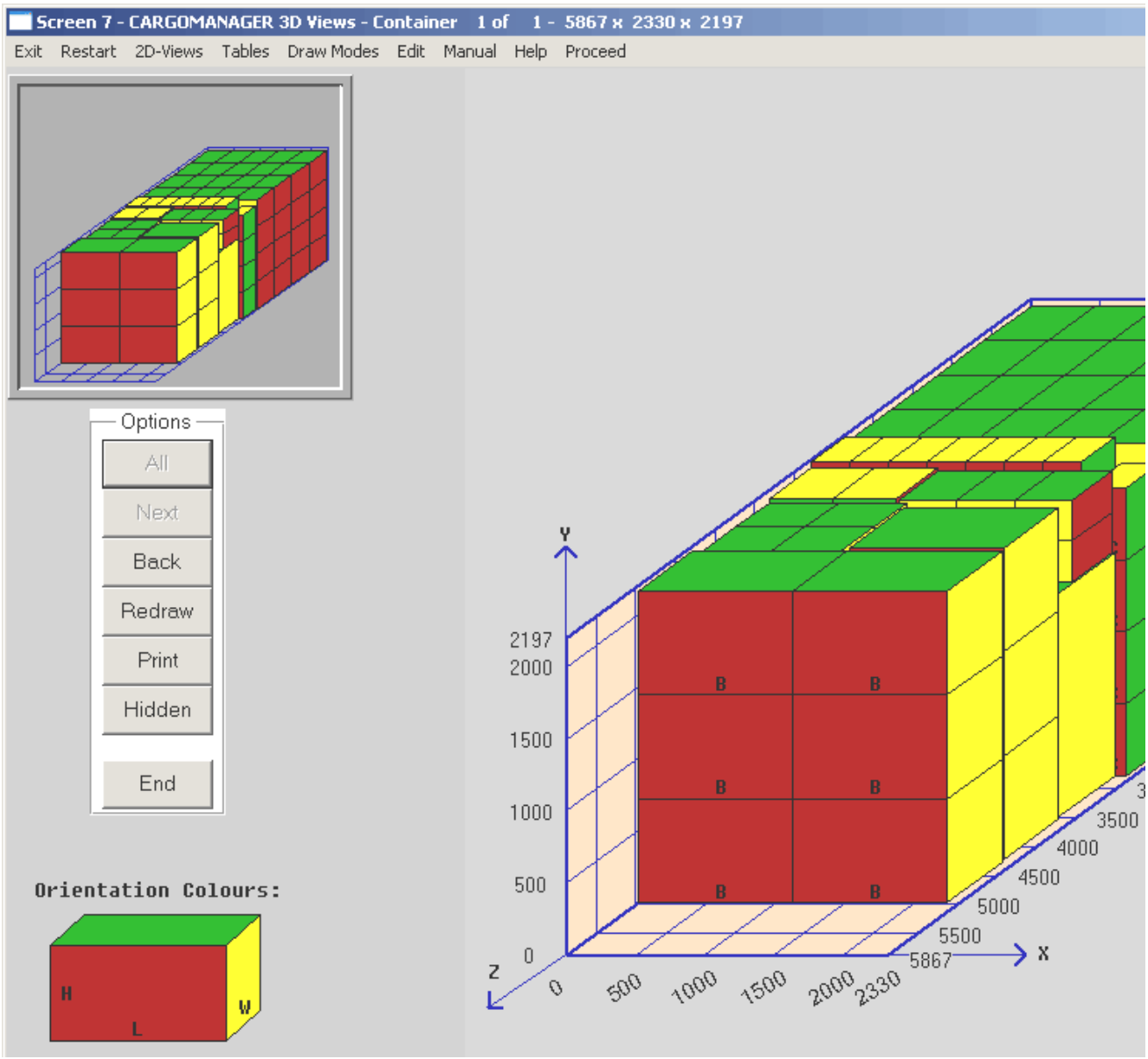
Select Redraw to return to the 'empty' container view, then select Next to display the first group of

cargo. This section consists of identical case types in a 'block' and a cargo loader presented with a printed detail (including descriptions) of the current screen view is likely to be able to pack all the cargo loaded so far without problem.

Select Next once again.

This time the case type used is different, and the cases just drawn as a result of the last Next command have partly obscured those previously packed. We would therefore like to produce a printer diagram of the section of the container as packed PRIOR to the last Next command.

Select Back and the cargo packed will be re-drawn, with the exception of the last section drawn (i.e. that which obscured our view).



Now press Print and all the cases drawn so far will be displayed in a shaded pattern. This indicates that, at a later stage, when printing of loading arrangements on the printer are selected, the portion of the load just shaded will be output to the printer as a separate sectional diagram, together with details of the number and type of cases of each type in the drawing.

You could now continue typing Next to add groups of cases to the display, however, you could well find it difficult to decide at what points to select further printer drawings without making frequent use

of the Back option to remove the last group of cases drawn.

This can be rather time consuming, especially when the container holds a large number of cases. A more powerful facility to cater for this situation has also been provided.

Select Redraw to return to the 'empty' container screen, and then select Next TWICE to re-produce the 'obscuring' group of cases.

As before, we wish to select a print-out of the portion of the container load PRIOR to the drawing of the last section which Hid from view the case arrangement we would like to obtain a printer drawing.

Select Hidden. The sections of the container layout which have just been hidden are now shaded (and will later be printed), and the group of cases just drawn remains in the normal display colours (as shown on the facing page).

Therefore the Hidden option is a way of selecting to print the cases drawn on screen PRIOR to the last selection of Next. It is equivalent to you typing Back (to go back 1 case group), Print (to print the view then displayed, followed by Next (to draw the next section).

So far you have selected just ONE printer picture - that including the 4 identical sections of case type D. Continue, to fill the container (using for example the Next option), and select a number of sections to be printed using the Print or Hidden options.

Continue until all the cases have been packed. If you wish to start the drawing / printing selection again (from the 'empty container' stage) then you can, of course, press Redraw at any time.

Once all the cases have been drawn on-screen, the option menu will indicate that End may be selected.

CARGOMANAGER will always have available, in addition to any views that you have selected, a view of the final, fully loaded container. Select End and the screen display will indicate the options now available to you.

The options now available include:

- Print the diagram(s) selected (or if you have the e-CARGO module to email the specification to others in PDF format - see Appendix 2).
- Output to printer / file the precise COORDINATES of all the items in the load plan.
- Level the cargo so as to provide an even more stable packing.
- Add further cargo to the load (leaving existing items in their current positions).
- Back - return to the screen providing a tabular summary of the items packed.
- Cancel - return to the graphical display of the packing.

The screen also indicates the number of pictures which will be output if Print is selected - and indicates that it is possible not only to produce 3D pictures of the packing but also 2D pictures (including floor plan and views from the side). This is discussed in more detail in Section 8 of the manual.

The printed view(s) provide information not only on which case types are to be placed where (using the case codes A, B, C etc), and, in addition, an indication of the orientation of each case.

During data input a 'height' dimension for each case was entered. This may have been the only valid vertical dimension in packing, or others may have been acceptable. In addition each case was defined as having a 'length' and a 'width'. In order to place a case in the container so as to match the three-dimensional drawn view it is necessary to identify:

The direction in which the dimension defined as 'height' is placed and the direction in which the dimension defined as 'length' is placed.

Each of these could be vertical in the container, widthwise across the container, or depthwise into the container. In order to identify the orientation, a code is printed for each case placed, in addition to the letter coding (A, B, C etc) used to identify the case type. These are detailed below:

Code:	Meaning:
1	Height vertical, length depthwise.
2	Height vertical, length widthwise.
3	Height widthwise, length depthwise
4	Height depthwise, length widthwise.
5	Height widthwise, length vertical
6	Height depthwise, length vertical.

(This key is printed on all reports)

In addition the user can select at print time whether just a 'line diagram' together with case codes and orientation codes is to be output, or whether the diagram should in addition provide further indication of case orientation using colouring / shading (as per the on-screen display).

During printing an on-screen view of the diagrams being printed is presented. After printing you can return to the 3D/2D screen drawings or select Exit or Restart (from the top menu) to exit from **CARGOMANAGER** or tackle a new problem.

In this Section you have successfully carried out an investigation using **CARGOMANAGER**. In doing so you have become familiar with many of the features of **CARGOMANAGER**, though to avoid confusion some of the more sophisticated features of the software have not been covered in this Section, but are covered in Section 4.

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SECTION 4 - MORE ADVANCED FEATURES.

In the previous section you were introduced to the use of many of the basic features of **CARGOMANAGER**. In this section some of the more advanced features of the software will be introduced, using where appropriate the container packing example introduced earlier.

The features covered include:

4.1. Packing Additional Cases.

At various stages in **CARGOMANAGER** additional cargo can be specified for packing into the container. This may be done BEFORE any attempt is made at packing the container (i.e. before the end of the INPUT procedures), or, the additional cargo may be added to a container AFTER some cargo has been packed into the container by **CARGOMANAGER**.

These two situations differ in that in the former instance the additional items are added to the complete cargo list which **CARGOMANAGER** will attempt to pack, whereas in the latter the additional cargo specified will be packed (where possible) into spaces available around the cargo which has already been packed.

These two situations will be examined separately.

Once again this will be done in the form of a 'hands-on' exercise, though you may prefer to follow through the discussion without using your computer.

a. Adding Cargo Prior to Packing.

Start-Up **CARGOMANAGER** and select the **DataFile** option.

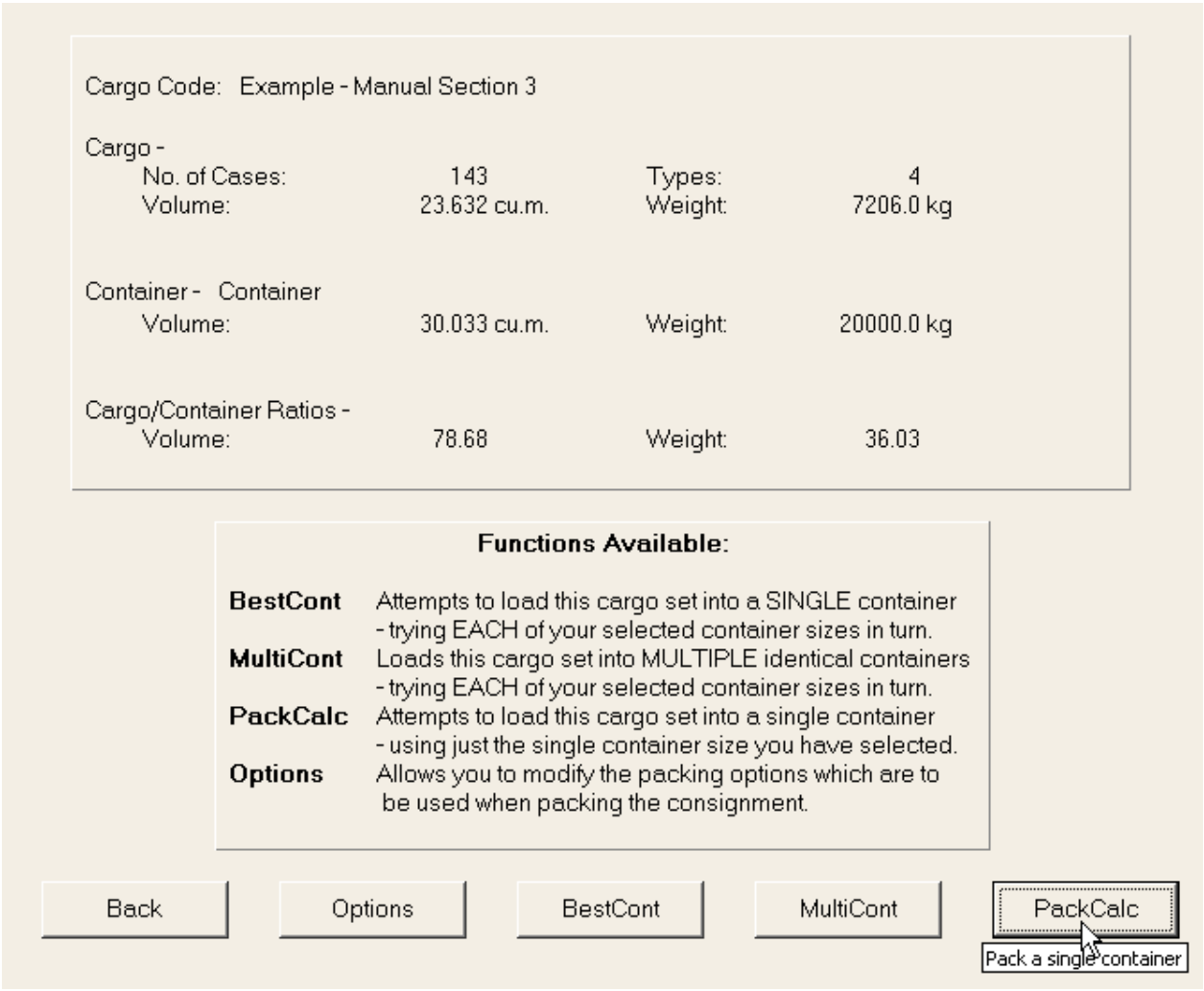
A number of .dat files will be shown as available - select the file **manual.dat.**

This is a file installed with **CARGOMANAGER** that contains the full details of the consignment entered manually by you in following the example of Section 3.

Select **Proceed** and then **OK** to confirm your choice and to move onto the Cargo Specification Screen.

For the present we will leave the data unchanged.

Select Cargo List Complete to move onto the Cargo Summary Screen.



As we noted during our examination of the problem in the previous section, the cargo as specified has a volume of 23.632 cu.m., compared with a container internal volume of 30.03 cu.m.. This represents a cargo that is 78.68% of the internal container volume. As we know from the previous section, this cargo can be fitted within the stated container.

We **might** therefore wish to continue with the packing of the container, **or** we might want to add additional items to the container load prior to packing.

Had the volume of the cargo exceeded the capacity of the container then we **might** have wished to pack what we could into the stated container, **or** to increase the size of the container used, **or** to change the quantities of the cases to be packed. A further option would be to calculate the number of containers required for this cargo.

At this stage we may therefore wish to proceed with the packing of the load as stated (by selecting **PackCalc** to move forward), or we may wish to step back one screen (using the Back button) to modify the cargo or the container details.

Let us assume that we wish to modify the number of cases of Product 4 that we wish to pack from the current 82, to a value of **130**, leaving the quantities of the other three products which we would like to pack unchanged. Select **Back** to move back one screen to display Screen 3 - Cargo Data Entry. Having done this select **Next** 3 times to display the information relating to Product 4 and adjust the quantity entry from the current value of 82 to a new value of 130.

It would be possible to make changes to any of the displayed values (on this screen or the container details by selecting Contbase or Contdims at the top of Screen 3. We will just make the one quantity change on this occasion.

Select **Cargo List Complete** to return to Screen 4 - Cargo Summary.

We now see that the data we have specified a cargo of 101.89% of the container volume. We will not be able to pack all of the cargo, especially as some of the case types have been specified as fragile or heavy. When items are excluded, CARGOMANAGER will determine which need to be excluded using (on this occasion) the criteria of maximum container volume utilisation.

We now proceed with the packing of the cargo as specified.

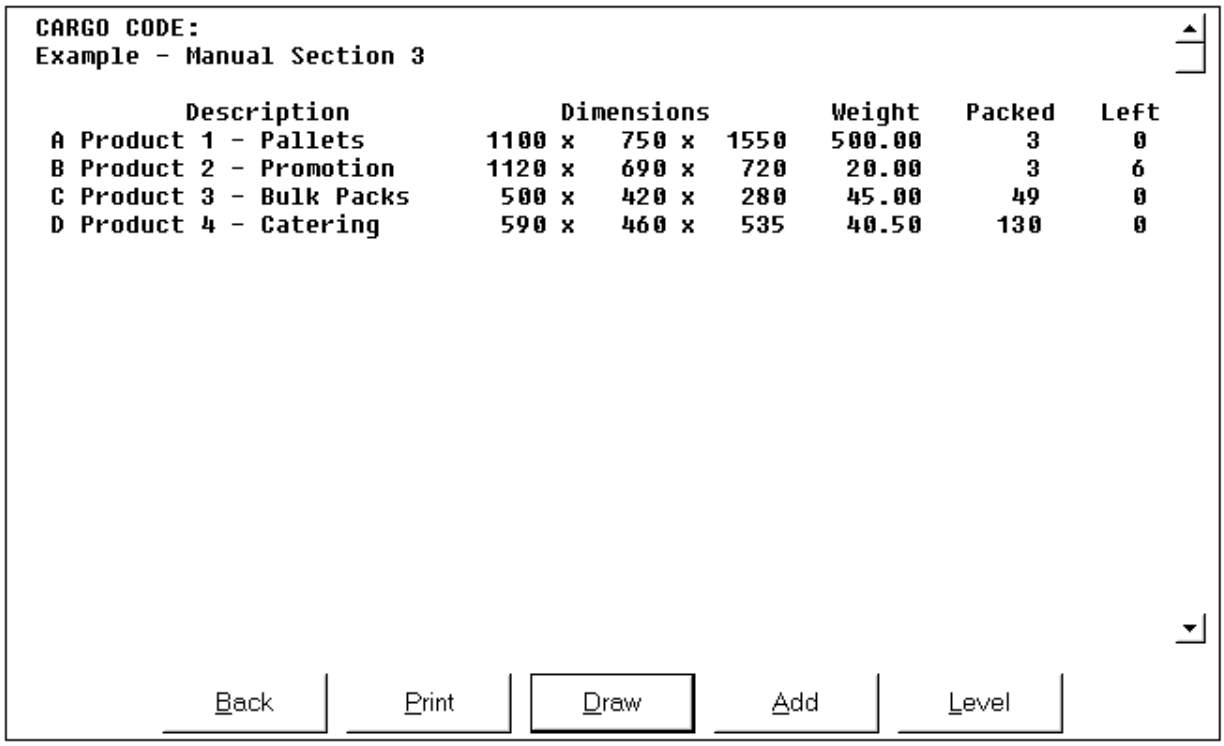
Select PackCalc and accept the default saved.dat datafile.

The **Calculation Phase** will commence.

Once again the multi-stage packing process is carried out. Once they are complete 185 items (of 191 available) have been packed. A volume utilisation of 91% has been achieved.

To examine details of unpacked items select **Continue** to proceed to Results Screen.

This screen presents in tabular form the number of items of each cargo type packed / unpacked. In this case a few of Product 2 have been left out.



A somewhat more comprehensive printer report can be obtained by selecting **Print**.

As stated earlier the items excluded from the packing are chosen by **CARGOMANAGER** so as to maximise the total volume packed. The criteria for exclusion are discussed in more detail in Section 6 of this manual. Using the procedure adopted above to add cargo PRIOR to packing no priority has been specified to individual cargo types.

In some cases it may be essential to specify certain cargo which MUST be packed, and add to this additional cargo which should be shipped if space permits. This can be achieved in two ways, either packing the 'essential' cargo first and specifying the remaining items as additional cargo afterwards, or by specifying priorities for each cargo item from the start. (See Section 6)

On the Case Input screen (Screen 3) you will remember that we gave a priority of 1 to each Case Type. For any line of data a priority between 1 (high) and 99 (low) may be given, though usually values of 1 (high) to perhaps 3 (low) will be sufficient. Whether or not unequal priorities have been assigned from the start, there will be situations where it is desirable to add cargo to that already packed.

b. Adding Additional Cargo After Packing.

Having examined one method of packing additional items, let us now return to the problem as originally specified (manual.dat) and **examine how additional cases can be added AFTER the 'essential' cargo has been packed. This approach to packing is termed in this manual as "End Packing".**

Select the Re-Start option.

Here, as before, the name of a data file can be specified by selecting the **DataFile** option from the main menu.

Once again choose the manual.dat data file and leave the data unchanged.

Proceed to the point where **PackCalc can be selected and select to perform the packing** (as carried out in Section 3).

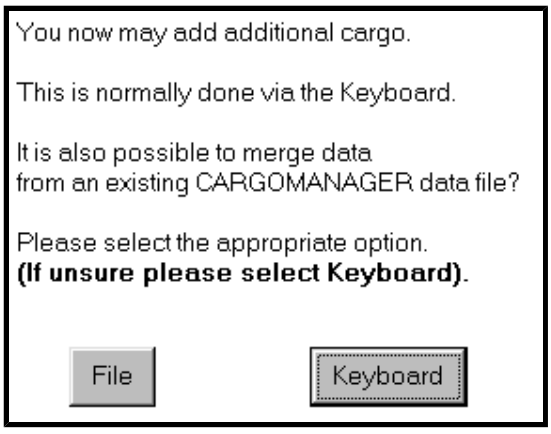
Once Calculations are complete and the packing results summary is displayed select **Continue** to show the tabular results screen.

A complete packing of all cargo has now been achieved, and some space remains in the container that may be suitable for packing with additional cargo. Earlier in this section we added 48 additional cases of Product 4 to our cargo list but found that their inclusion (which provided a cargo greater than the capacity of the container) resulted in a number of products being excluded.

Having packed all the 'essential' cargo, we will now add 48 additional cases of Product 4, and pack these within the spaces left in the container.

Select the Add Option from the option list.

You now have the option to merge cargo data held in a CARGOMANAGER file into the remaining space, or, more usually to enter additional cargo from the keyboard. The File option essentially merges data from an existing file into the current load.



If you select Keyboard entry then you will be presented with completed Cargo Data Entry screens similar to that entered by you as data for the above packing problem. It differs in two ways from the earlier screen.

The quantity column, which originally contained the quantity values input by you for each product to be packed, now contains zeros for the quantity entries (unless any had been unpacked).

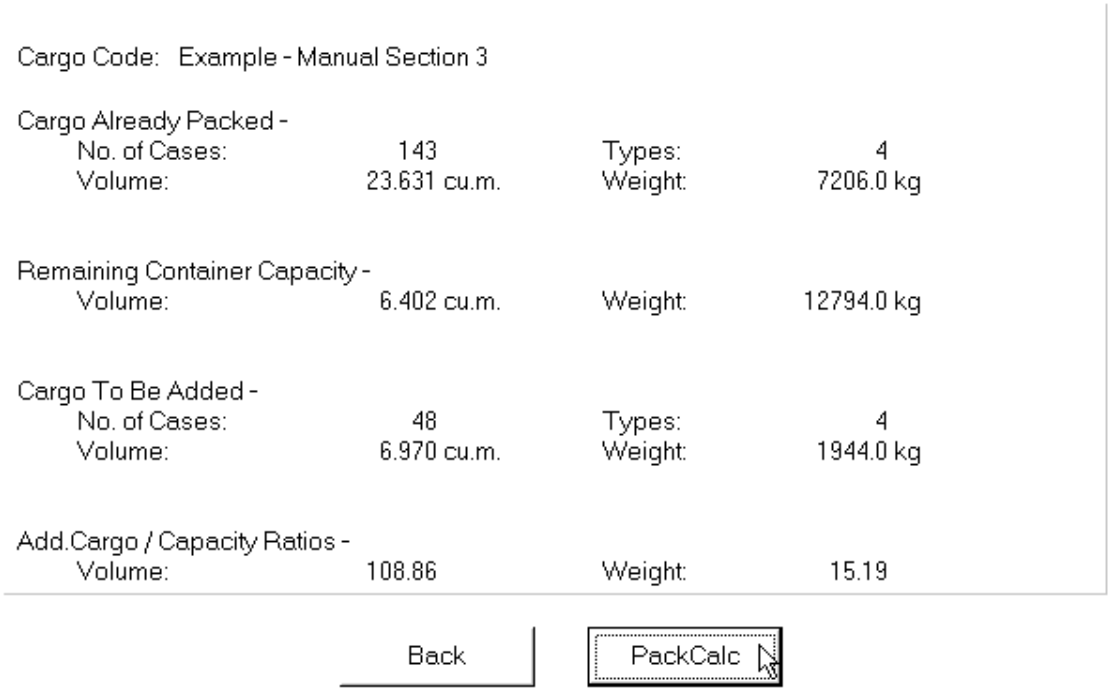
The priorities values are all as previously entered (all 1 in this instance).

The size and weight details cannot be edited, though you can change some of the other fields to relax the packing constraints originally applied.

Use the **Next** button 3 times to move to the screen displaying information on Product 4.

You could add additional items of another case type, but in this case we will simply attempt to add an **additional 48 cases of Product 4** to the existing (packed) cargo.

Using the procedure employed on earlier INPUT screens **edit the quantity entry for Product 4 from zero to 48. Now select Cargo List Complete to display the Cargo Summary screen.**



This screen provides details of the cargo already packed (143 items of 23.631 cu.m.) and the remaining capacity in the container (6.40 cu.m.). The additional cargo just specified has a volume of 6.97 cu.m.

Details are also given of the percentages that the added cargo represents of the total spare volume and weight.

It is clear that not all the additional cargo can be packed. In fact, the 6.40 cu.m. of the container currently unpacked is in part made up of small spaces left between / on top of cases already packed and thus may be unsuitable for packing the additional cargo specified.

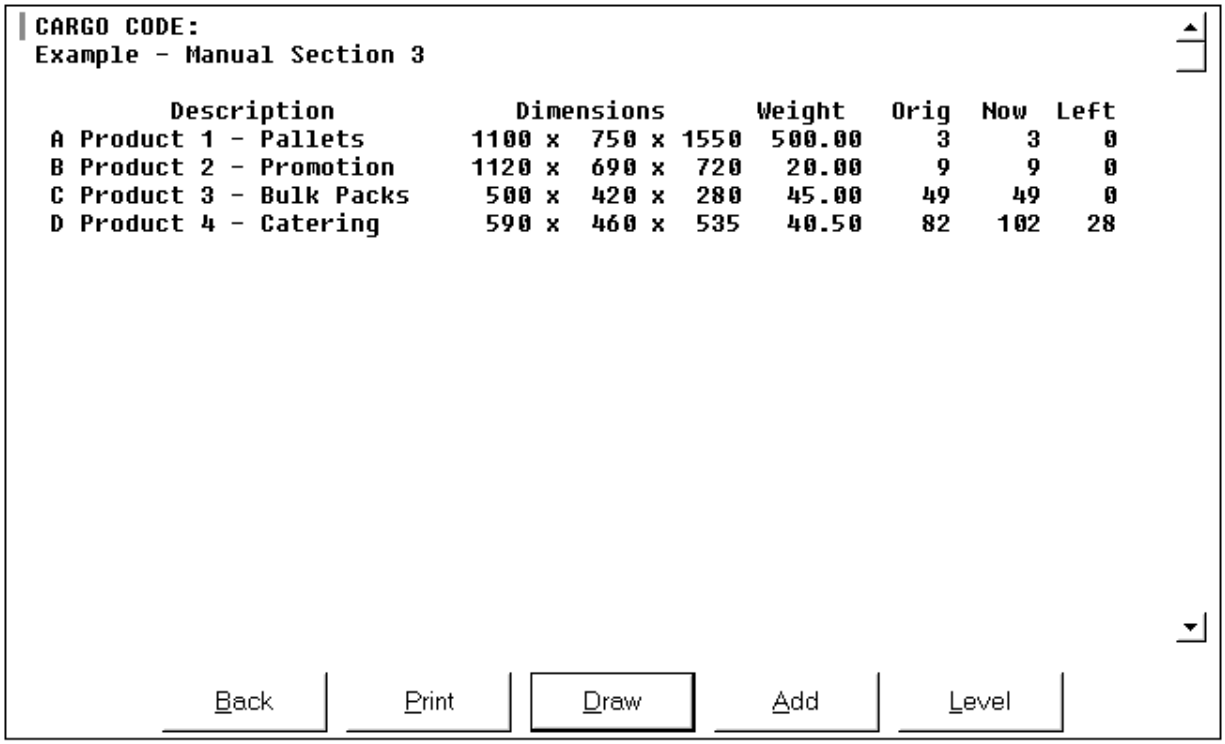
Select PackCalc to perform the packing, once again accepting the default saved.dat datafile name.

During this phase details of the items already packed and the spaces remaining in the container are retrieved.

The additional cargo is then packed into the available space and, as with the initial packing calculation process, details of the progress of calculations is provided on screen.

Once calculations are complete, the total number of Cases packed is displayed together with details of the weight/ volume of the additional items successfully packed. A total of 163 items have now been packed (20 additional items).

Select **Continue** to show the tabular details. This screen is similar to that provided earlier, except that details of previously packed items are shown as well as the additional items.



Your screen should be similar to that shown. The **Orig** column contains details of the number of cases of each type packed PRIOR to adding the additional items, **Now** refers to the total number now packed, **Left** gives details of those ADDITIONAL cases which remain unpacked.

Once again you may proceed by selecting **Draw** to view the packing used on screen / printer.

As you have seen, the second method of packing additional cargo has the advantage that items originally input (and packed) are left in place and the additional cargo is fitted into the spaces remaining in the arrangement.

Although, from a practical viewpoint this second method of adding additional items may well be preferable, it is important to realise that **CARGOMANAGER**, in common with the personnel loading a container, is best able to provide highly efficient packings when the whole of the cargo to be packed is known at the time packing begins.

4.2. Packing Multiple Containers.

CARGOMANAGER has been designed with the objective of packing the greatest volume of cargo into a single container, but **IS** well able to tackle problems where a cargo has been specified which may require several containers to cater for its volume / weight.

If, during INITIAL data entry (**not** 'End Packing'), a cargo is specified which has a volume greater than a single container then **CARGOMANAGER** offers two possible solution routes.

a. Stepwise Multiple Container Examination.

By selecting **PackCalc** at this stage the best possible packing of the single specified container is carried out and unpacked cargo is saved so that the items may be easily packed into a second and subsequent containers.

Having examined the packing achieved in this first container you can then pack the remaining items into further container(s) by selecting **NextCont** .

Using this as data (with, if required, a different container size), the packing process can again be repeated and, once again, all packing / display / drawing for this container should be completed.

This process can be repeated for any number of containers as long as the input data meets the following

constraints (Constraints which apply for ALL data input within **CARGOMANAGER**):

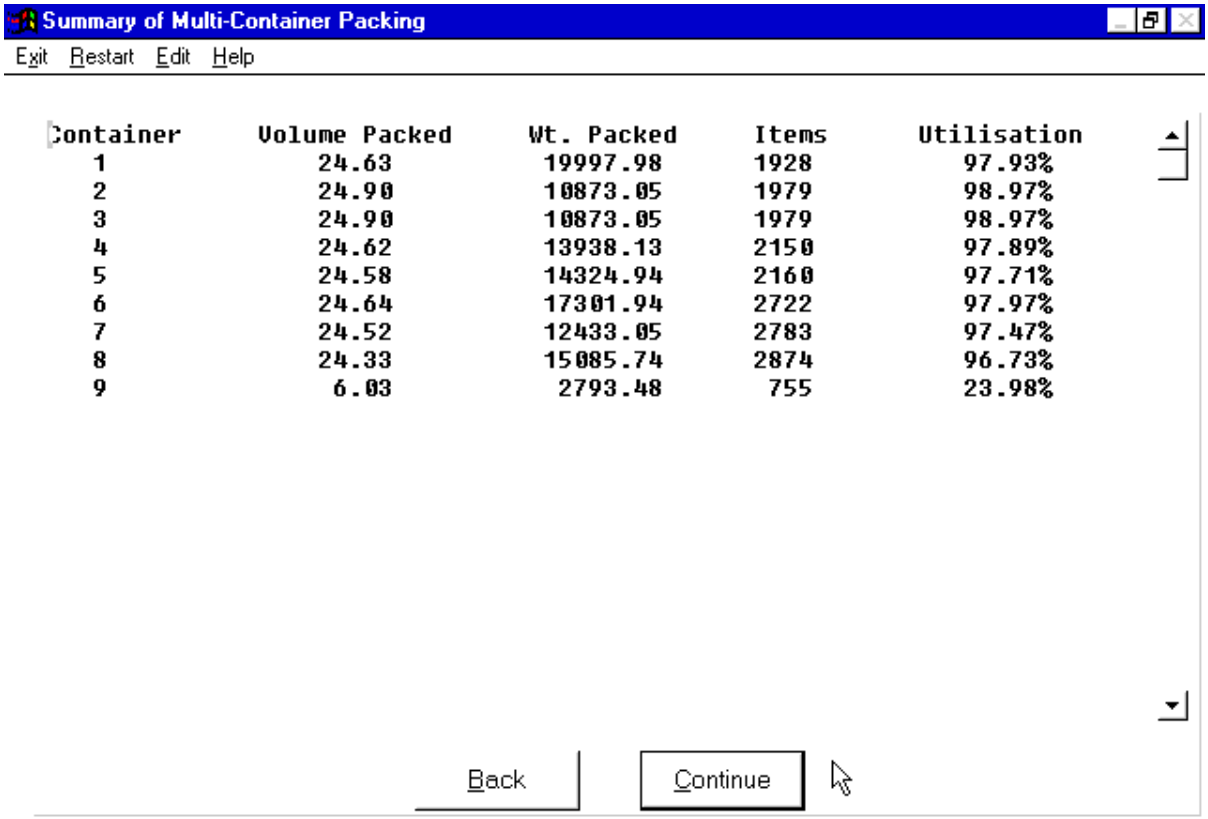
Total Number of Case **Types** : Less than 15,000

Total Number of Cases : Less than 50,000

b. One Step Multiple Container Estimation.

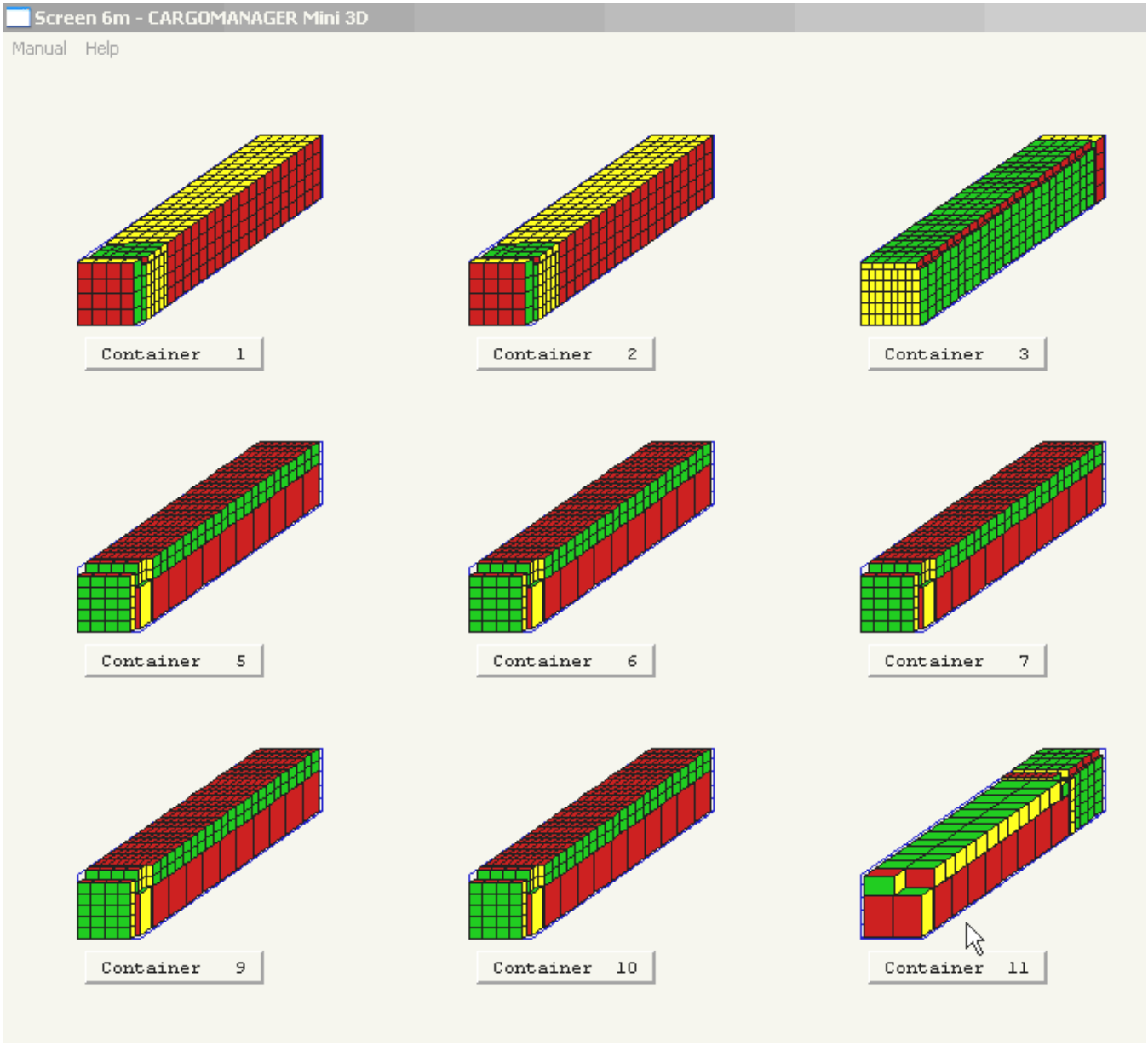
CARGOMANAGER also offers a **MultiCont** multi-container calculation mode. This is selected from the menu bar in the same manner as **PackCalc**.

In this mode the total cargo is packed in a single step into as many containers as are required. Each container is identical to that specified on the main container input screen. A screen summary is provided giving the number of items fitted into each container and the percentage fill obtained but no detailed cargo arrangements are available for any of the completely filled containers. The summary screen is illustrated below.



Once the calculations are complete miniature images of all the containers used as displayed on screen (12 to a page). Any of the containers can then be selected for detailed examination and printing.

[Just the left hand part of one such screen is shown below]



In this release the solutions obtained using the Stepwise procedure described earlier **May NOT** provide the user with the same solution as when using the One Step approach. This is because the MultiCont one step approach now utilises extra steps designed to further reduce the number of containers required.

The process of packing as much as possible into the first container, then taking the remaining items and packing as much as possible into the 2nd container and so on may **not** lead to a multiple container solution which minimises the number of containers used. Using this approach items that 'pack efficiently' may be 'used up' in the early containers, with 'awkward' items being left for later containers. Whilst **CARGOMANAGER MultiCont** does begin by determining the solution which it would achieved using this multistep approach it then goes on, wherever possible, to improve on this by either reducing the total number of containers required, or producing a solution where the final container has more free space.

4.3. Packing Subjected to Weight Limits.

The methods employed with **CARGOMANAGER** have been developed with the objective of maximising volume utilisation within a container, whilst taking into account priorities. However, the container weight limit input by the user **IS** used to limit the weight of cargo in any container to that specified.

In such instances the excluded items will be saved in the same manner as for items excluded due to lack of

volume and if required be available for packing into a subsequent container.

During the calculation phases, if a greater volume utilisation could have been achieved had the weight limit not been in operation then an appropriate message is output on both screen and printer reports. The cases actually loaded will meet the stated container load limit.

In this release we have also added a powerful new feature - WEIGHT WIZZARD - to allow users who have problems in which their objective is to maximise **weight** and not the volume packed in a container to obtain such solutions. This is discussed in Section 4.8.

As detailed in Section 4.5 below, the **Level** option can be selected so as to provide a more stable packing arrangement than otherwise be obtained. Two different forms of levelling are available and these are discussed in Section 4.5 below.

4.4. Speeding Up Calculations.

Normally, the calculation time on modern computer equipment will be a matter of a few seconds.

However, especially when a cargo is specified which is sufficient to fill significantly more than a single container, and consists of many item types, then the number of combinations (i.e. possible packings of the first / subsequent containers) may be considerable. As noted on the Calculations screen - the use of the **Escape Early button** can be applied to 'jump' forwards. Where users experience problems with the time required for these computation stages, they should refer to Section 6 of this manual where the operation of this option is described in detail.

4.5. Load Levelling.

In operation **CARGOMANAGER** attempts to make maximum use of the container volume and, in doing so, carries out packing from the rear of the container forwards leaving as much space as possible towards the door of the container. There may well be situations in which the cargo to be packed is insufficient to give a high volumetric fill of the container volume and thus an arrangement in which the cargo is 'spread' over the container floor is required. The **Level** option provides for this to be achieved.

When selected a re-packing of the cargo which has currently been fitted into the container is carried out in an effort to achieve a more level load.

During the re-packing phase a screen is displayed showing the progress of levelling. Packing at a series of container height limits is carried out and the height limit currently being applied and the percentage of cargo fitted is displayed.

If, as described in Section 6, the packing option to allow 'layered solutions when levelling' has been specified, then in most instances just the final solution height will be displayed. Layered solutions are ones in which each item type in a consignment tends to be placed in layers over the container floor rather than in vertical blocks building from the rear of the container. These layers may well prove to be more stable in transit and experimentation will show whether they are desirable in a particular environment.

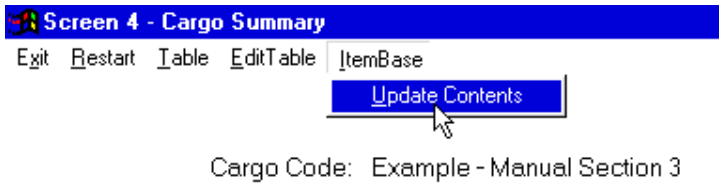
Where, during layering calculations, a moving bar is displayed, this is used to indicate the number of attempts being made at each possible height. Once a levelled arrangement has been found this is then displayed. If no improvement is possible then the un-levelled arrangement is re-produced.

As on the main calculation screens the **Escape Early button** can be used to 'Jump Forward'. On this screen this will result in only one attempt being made at each pre-determined loading height. This can result in a poorer levelling (or no improvement at all) being obtained. As described in Section 7 of the manual the user may choose which of the views (levelled or un-levelled) is to be utilised on the drawing screens.

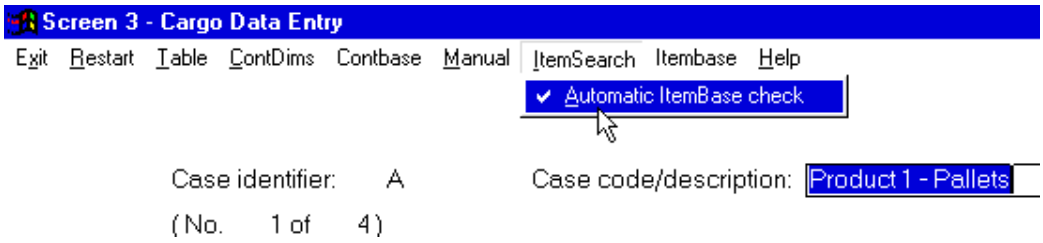
4.6. A Cargo Database.

The entry of cargo details (Cargo description, size etc) may, in situations where the same product types are frequently encountered, prove somewhat time consuming. In order to overcome such problems it is possible to build up you own database of product descriptions and characteristics which **CARGOMANAGER** can access and thereby enter appropriate information into the screens for you. Information on up 25,000 items can the quickly accessed in this way.

Three procedures may be used to develop this database. It is possible to use a spreadsheet containing item descriptions, dimensions and weights to create an Itembase database using the MAKEIB utility - this is described in Section 10. A second approach is to use the inbuilt database program described in Section 10 which allows entry of Cargo Descriptors and dimensions on an item by item basis. Alternatively, having manually entered details of one or more cargo items into the input screen of **CARGOMANAGER** the **ItemBase** option is available (on the Cargo Summary Screen). This option saves all Case Information associated with the current problem into the database, updating any existing records with the new data. This is shown below.



During data entry, after entry of each product description (i.e. Case code/description), **CARGOMANAGER** will normally search the database for a product match. If one is found then the details of product size, orientation and layer constraints will be automatically entered on the data screen and the cursor positioned ready for the user to enter the quantity to be packed. The automatic database check can be switched off if required as shown below.

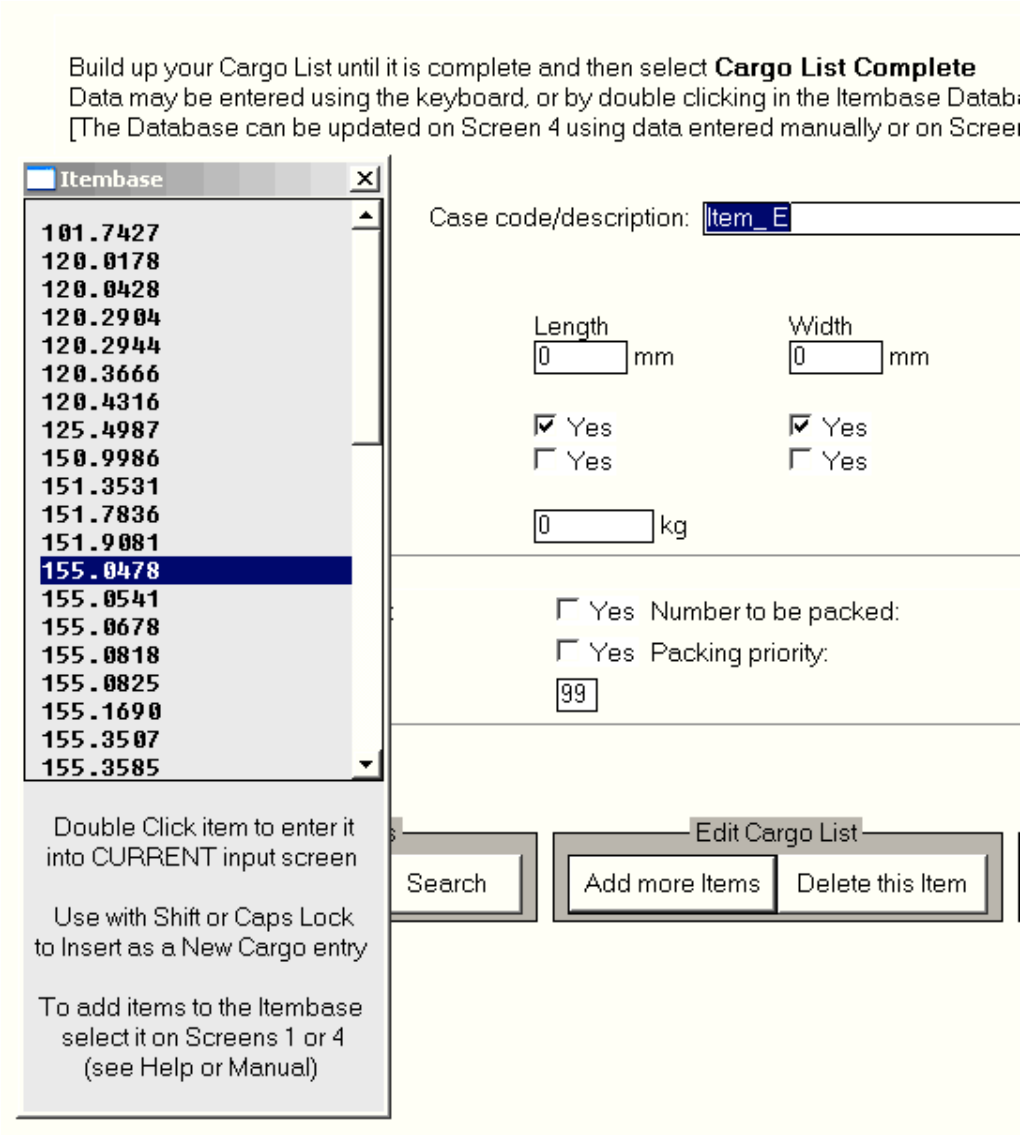


This process continues until all cargo items have been entered.

If the product description is NOT identified then **CARGOMANAGER** will request details of size etc in the usual way.

As described in Section 10, the number of characters of the case code / description which are to form a unique identifier can be modified by the user from the default value otherwise utilised.

In addition to the matching of Case Code / Description described above it is also possible to display the full Itembase on screen (using the **Itembase** option at the top of screen - see below). The database (Code/Description) is shown as an additional window (here the user has used numeric codes - 155.3585). By Double-Clicking on any entry the (currently blank) details for Item_E will be replaced with those held in the database for 155.3585.

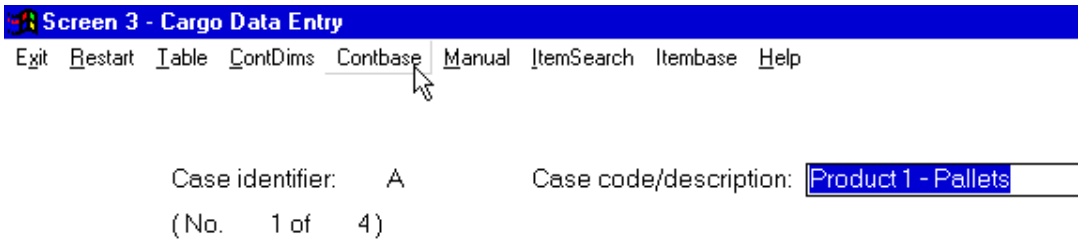


In situations where a number of entries are to be selected from the Itembase then the sequence would be to 'Add more items' (which would display a screen with a description but with zero dimensions for case Length / Width and Height); then double click on the Itembase entry required, then enter the quantity of that item that will be in the consignment.

If the Shift key (or more conveniently) the Caps Lock key is used when double clicking this will avoid the need to repeatedly use the Add more Items key.

4.7 Changing Container Size.

Whilst Section 11 and Section 12 of this manual describe in detail how to examine the efficiency with which multiple container sizes may be used for any consignment, if all that is required is to change the container size to another single value, then at any time one can select a new Contbase container from the menu on the Cargo data Entry screen. This is shown below.



4.8 Weight Wizard - Optimising Weight Utilisation.

As previously discussed **CARGOMANAGER** packing functions normally focus on the maximisation of load volume (or load value). Where the resulting packing would be over the container weight limit, cargo is excluded so that the loaded cargo falls within the load limits. Whilst this will usually provide a suitable solution, it will not necessarily mean that the **weight** of cargo packed is as close to the container weight limit as might have been achieved had cargo items been 'juggled' to meet weight rather than volume limits.

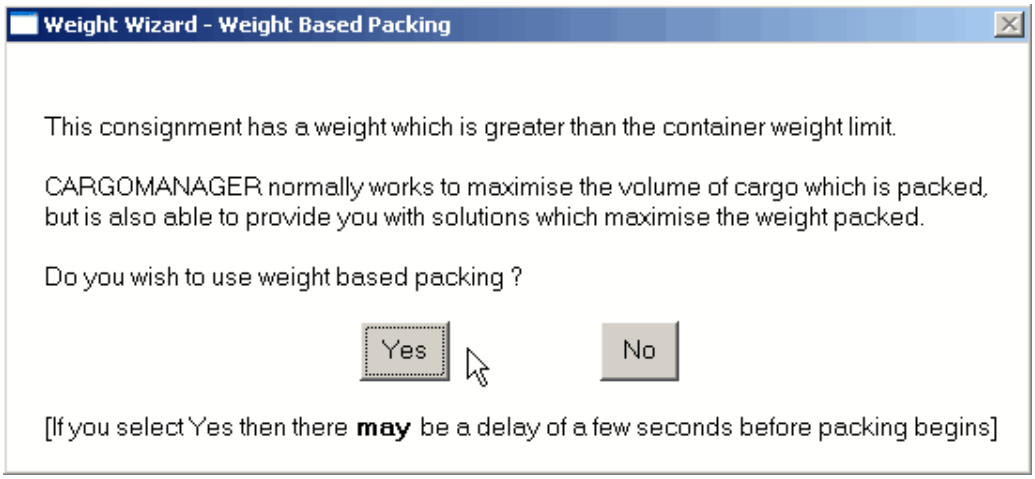
This release of **CARGOMANAGER** now includes a powerful optimising tool - **Weight Wizard** - which will carry out the 'juggling' so as to provide a weight of cargo which is as close to the container limit as possible. In doing so it will also take account of items which the user stipulates **must** be packed. The routine is available in **PackCalc** mode (single container packing) and, as described below, when appropriate, the user will be prompted as to whether a weight based calculation should be carried out.

The approach taken by **Weight Wizard** is based on setting priorities for each cargo item in the consignment so that a set of those items which comes closest to the container load weight limit are packed first.

The screen below shows the prompt which may be displayed to you in PackCalc mode at the point after the consignment data has been saved to disk. **It will be displayed only when all the following conditions are met**:

- The cargo list must contain 30 of fewer items.
- Each item must have its own entry (i.e. the quantity to pack of each product code must = 1 - or zero)
- The consignment must have a total weight which exceeds the load limit of the container.

When these conditions are true **CARGOMANAGER** will prompt you as below:



If you choose NOT to perform a weight based packing then the solution will (as previously) be carried out to maximise the volume packed, subject to the weight limit.

If you accept the option to perform a weight based packing then **CARGOMANAGER** will calculate how best to achieve a load close to the container weight limit and then make changes to the priorities associated with each item so that the packing that is then carried out attempts to achieve this. It should be noted that when both weight and volume are a problem (cargo weight greater than the container weight limit and cargo volume close to or greater than container volume) then it may not be physically possible to provide a solution close to the weight limit.

How this is done.

Many users utilise the priority coding that can be associated with each item in a consignment to indicate cargo which must be packed (Priority 1), and cargo which should can be packed once Priority 1 items have been loaded (larger values - e.g. 2, 10, 50 etc). In developing the weight based loading algorithms we were well aware that even for weight based problems there might still be Priority 1 items which must be packed, to which should be added other items so as to make the weight as close as possible to the limit.

In practice the following rules are applied.

If the priorities for **all** items are = 1 (the default) then **CARGOMANAGER** assumes that it may select freely from all items in an attempt to fall just within the load limits.

If some items have a priority 1, and others have larger priority values, then **CARGOMANAGER** assumes that the Priority 1 items must be packed, and calculates which of the remaining items (all items with a larger value) are best used to make up a consignment close to the weight limit. It then allocates these a Packing Priority = 2, with those items that if added would exceed the load limit given a Packing Priority = 51. Thus all items will then have values = 1, 2 or 51.

These changes are carried out automatically **but do NOT change the values held in your saved .DAT file or any linkfile** which may have been used. Thus you can go back and carrying out another packing, selecting not to use Weight Wizzard, and utilise the priorities you originally assigned.

Points to note:

- The limit of 30 products is a function of the time taken to perform the load optimisation. Selecting the best set from 30 may take just a few seconds, but selecting the best set from 31 would take twice as long etc! We have applied the limit of 30 to provide the best balance between solution time and practical needs.
- If you have a consignment which as well as being too heavy for the container is also likely to be difficult to fit on a volume basis then you might wish to examine solutions both with and without the Weight Wizzard weight based packing being used and compare these for suitability.
- Obviously, if you pre-assign many of the cargo items (but not all) a priority value of 1 then there will be little or no opportunity for **CARGOMANAGER** to get close to the weight limit as most / all of the cargo to be packed will be pre-assigned. If Weight Wizard finds that in a consignment having various initial priority values the 'must pack' priority 1 cargo already exceeeds the weight limit then it will not make changes to the priorities.
- The weights of cargo items and the container weight limit are held as numbers with a decimal part (e.g. 26000.0). Calculations of the actual load at any point are done to high accuracy but it may be beneficial to add just a small amount to the container load limit (e.g. say 26000.1 instead of 26000.0) to allow for inaccuracies which **always** occur in **any program** when manipulating numbers. Computers are not as accurate as you might believe!

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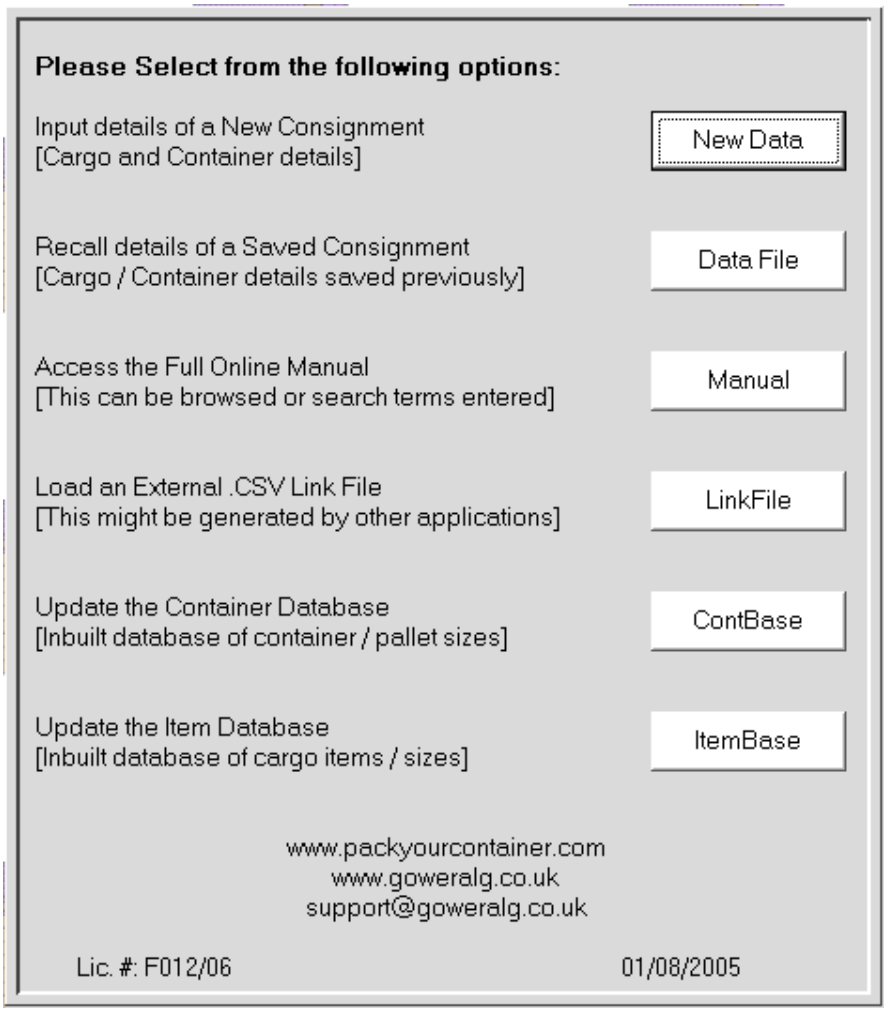
SECTION 5 - THE INPUT SCREENS.

(Covers main menu, container database, item input and input cargo summary) -

In this section more detailed information is given on the operation of the various data input screens within **CARGOMANAGER**. Many of the features of these screens were described during the guided tour and the discussion here assumes that you have carried out at least one investigation using **CARGOMANAGER**.

Having started **CARGOMANAGER** by selecting the **CARGOMANAGER** Icon or Start / Programs / CARGOMANAGER the main menu screen is displayed.



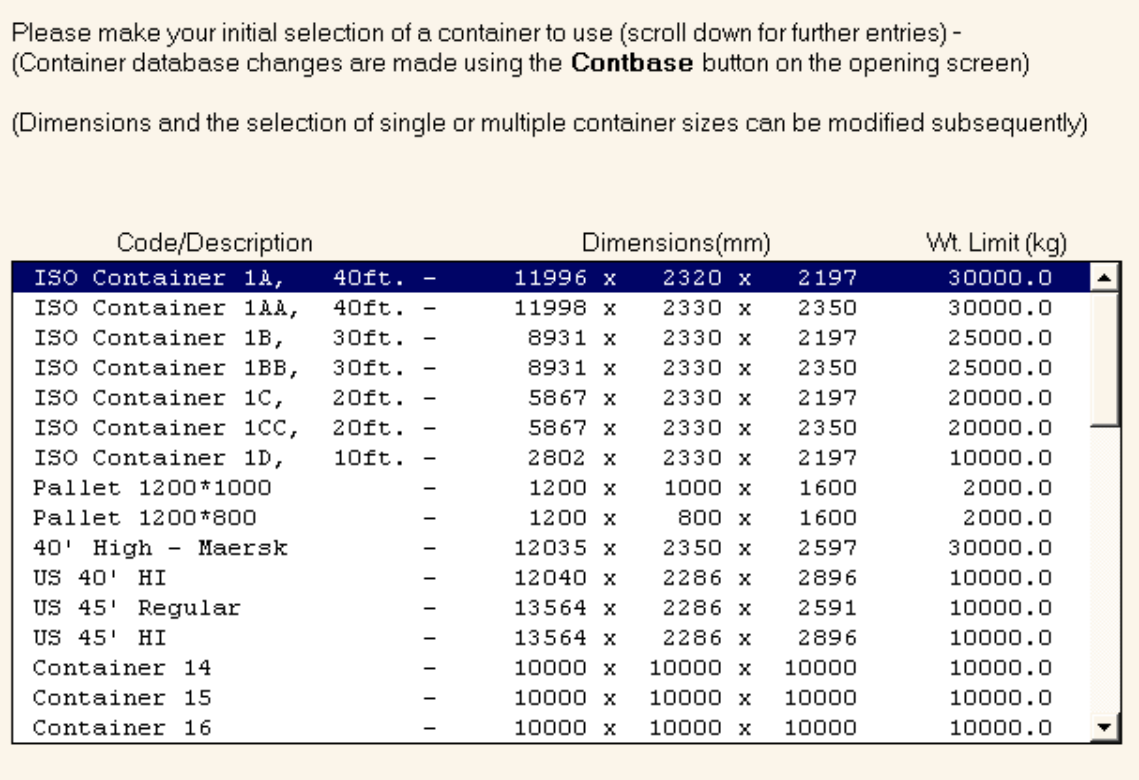
The main buttons on this screen allow you to:

- Input a New Problem
- Recall a consignment list (datafile) which has previously been saved.
- Examine the online manual (which has both a traditional index and additionally provides search facilities within the browser).
- Use a consignment datafile generated from your own applications (a Linkfile). This might have been generated from a spreadsheet or database for example.

- Update the database holding container dimensions.
- Update the database holding potential cargo items.

If you select to tackle a new problem then you are then prompted for a Cargo Description - this can be any text description which describes the consignment - then select **Proceed**.

You are then presented with the Container Database screen shown below.



The database contains information on up the 50 container sizes and these can be edited to suit your needs. The edit procedure can be selected from the main **CARGOMANAGER** screen.

IF YOU ARE USING AN EVALUATION COPY OF CARGOMANAGER then the Container Database will only contain one container size fixed by us. In all other respects the software will be fully functional.

Having selected the container size to be used the next screen requires you to input details of the items which will form the consignment. This includes the dimensions and characteristics of the case / contents, the number available for packing and any priorities.

The screen display provides for details for each case type to be entered on a separate 'page', and up to 15,000 case types can be defined. The details requested on the container / cargo screens include:

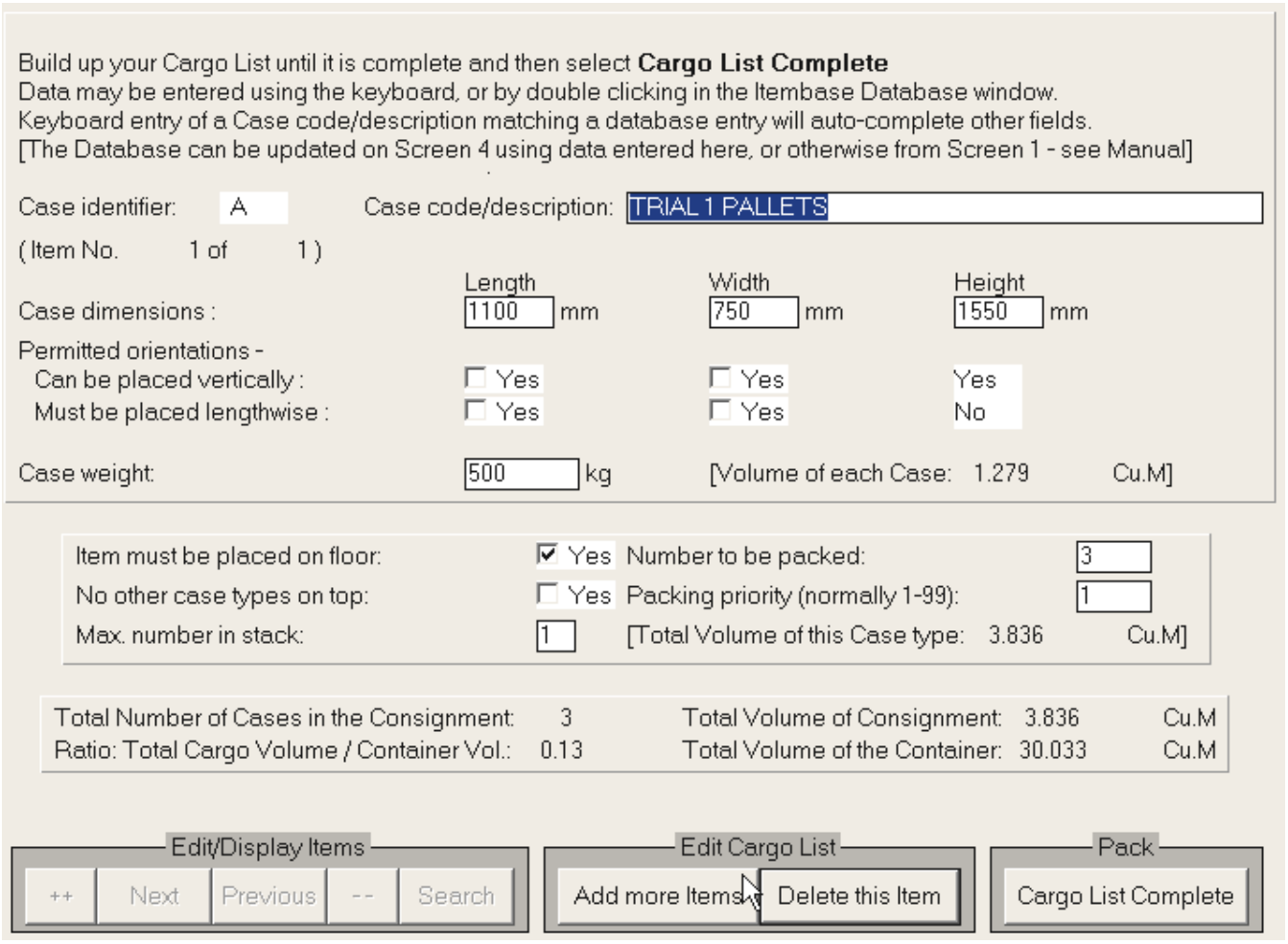
Cargo Code / Description - a character / numeric entry of up to 40 characters.

Container Description - a character / numeric code of up to 25 characters.

Container INTERNAL Length, Width and Height - integer values in the range 10mm to 30,000mm.

Maximum Container Load - The maximum load within a container - a numeric value in the range 1 kg to 60,000 kg.

In making entries on the Cargo screen the use of the enter or tab keys move the cursor to the next entry box. Alternatively the mouse pointer can be used to position the inserting point into appropriate entry fields.



The (by default empty) permitted orientations boxes immediately below the three dimension entries cater for cargo items which do not have a fixed vertical orientation. (To tick such a box click the left mouse button once - click again to remove the tick).

The two following tick boxes (also initially blank) allow for a particular dimension of the item to be forced to be lengthwise in the container - one or other of the two boxes might be ticked if we needed to force this arrangement - here no such restrictions apply. This might apply for one-way pallets.

The next entry which is required is 'Case Weight'. Values up to 999.9Kg are valid.

The left bottom portion of the screen allows you to specify whether the item MUST be placed on the container floor; whether other items can be placed on top, and the number of such items which may form a stack - default 99.

These settings can (naturally) have a significant impact on the quality and suitability of load plans and are discussed in more detail in the following paragraphs. It should be stressed that you should not mark items as heavy, fragile or change the default number of layers unless this is really a practical requirement. Adding such constraints unnecessarily will almost always produce inferior solutions.

Obviously some types of cargo are by their very nature necessarily placed on the floor of the trailer / container, either one layer high or perhaps a few layers high. Marking such items as heavy and setting a layer limit of 1 or more will ensure that a suitable loading plan will be produced.

Normally **CARGOMANAGER** assumes that it is acceptable to stack other - **non heavy items (i.e. items which need NOT be placed on the floor)** - on top of those items marked as being heavy. If this is not the case then **BOTH** 'Item must be placed on floor' and 'No other case types on top' tick boxes should be selected for the heavy item and a maximum number of layers (1 or more) specified.

Items which are specified as having 'No other case types on top' will be limited in height to the number of layers specified. If a limit on the number of layers high is set, but **no** indication is given as to whether the item must be on the floor or must have no other case types on top, then the latter will be assumed.

There is an opportunity to relax the constraints so that Heavy items of different types and Fragile items of different types may be mixed. This is described in Section 6.

Remaining Data Items:

Towards the bottom right of the screen we can enter the number of such items to be loaded (0-20000) and the priority (normally 1-99, but a larger range can be used if required). If all items have equal priority then the default value of 1 should be used for all items. If some items have a higher priority then values 1, 2, 3 etc can be used where 1 is associated with item(s) of the highest priority etc. Use of the smallest range of priority values (1 to X) will speed up computation times. Once all details are complete for the whole consignment the **Cargo List Complete** option is selected**.**

The limit on the number of individual items which CARGOMANAGER will attempt to fit into a single container is 20,000. Thus the upper limit on the total number of cases which may be input assumes that several container loads may be input at once.

A summary is provided at the bottom of the input screen of the items input so far.

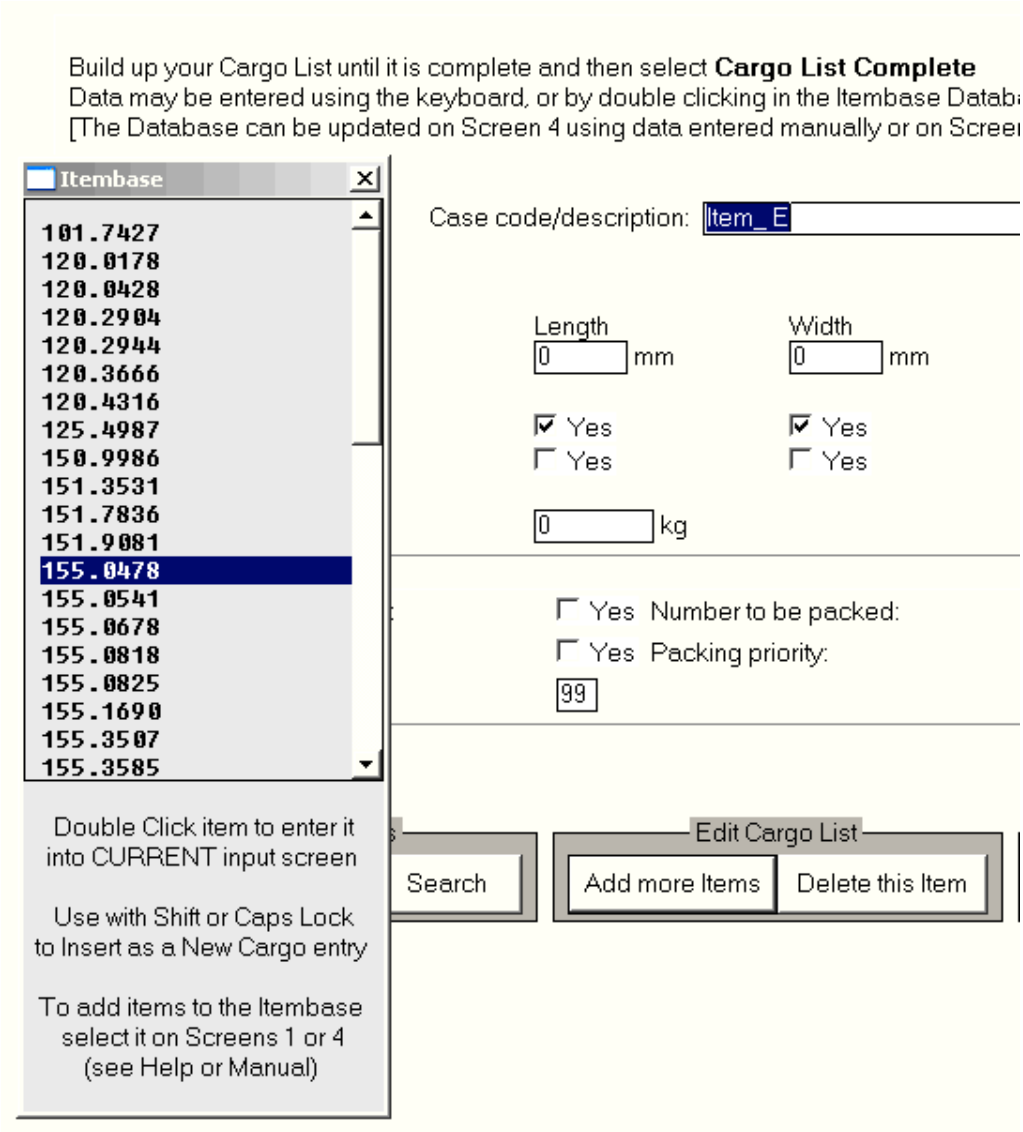
Rapid Data Entry.

Whilst manual entry of details into the Cargo Specification screen is relatively quick and easy two far quicker techniques may be employed. Both make use of the Item Database. As described in Section 10 this can be created and updated in a number of ways (from a spreadsheet, using the inbuilt database etc.), and holds details on products, their dimensions and other loading constraints. Once the database has been created then it can be used during data entry in one of two ways:

- After entering a Case Code (and pressing tab/enter) the Item Database is automatically checked for a match. Assuming one is found the dimensional / orientation information etc. is added to the screen and the cursor advanced to the Number to be packed field. (this action can be de-activated using the Itemsearch option).

- Alternatively (or additionally), you can display the whole of the Item Database on screen in a scrollable re-sizeable window by selecting (from the top of screen) the Itembase option. This is shown below. You can then double-click on any entry in the database window and (once again) the product information will be entered into the Cargo Specification screen. You can then enter the quantity to be packed and then select Add Item to add any further items to the cargo list. Note that this works in a slightly different manner depending upon the possible use of Shift or Caps Lock keys.

The automatic display on screen of the Itembase is a feature of this release (without the need to select Itembase). This will occur automatically whenever the database has 2 or more entries. The Itembase window can be closed at any time, can be moved around the screen, and can be re-displayed whenever needed using the **Itembase** option at the top of screen.



Container Size Selection.

The size of the container to be used will normally have been selected on the previous screen (or when the cargo list was first entered if packing a 2nd or subsequent container). You can change the size from this screen in two ways - select the **Contdims** option to display the current dimensions and edit as required or selecting the **Contbase** option to display the whole of the container database and selecting an entry from that database. You can also used the BestCont and MultiCont facilities described in Section 11 and Section 12 respectively in situations where the container size is uncertain and guidance is required.

Obtaining the Best Possible Packings.

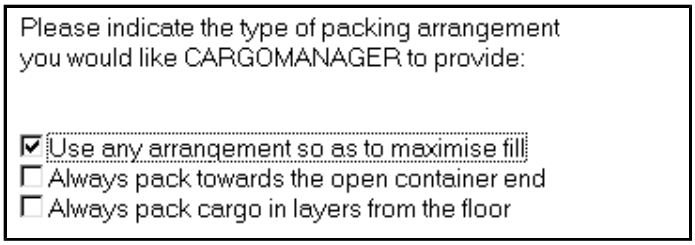
The values entered above have a very significant impact on the quality of the loading arrangements achieved. Before specifying the orientation, heavy, fragile and number of layers values at a value OTHER THAN their defaults the points detailed below should be considered.

Where the **normal** stacking height of a product exceeds the loading height of the container, need the product be specified as fragile?

In many instances limited packing height will mean that products which might have a fixed vertical dimension within a warehousing situation will not be restricted in the same way within a container loading situation.

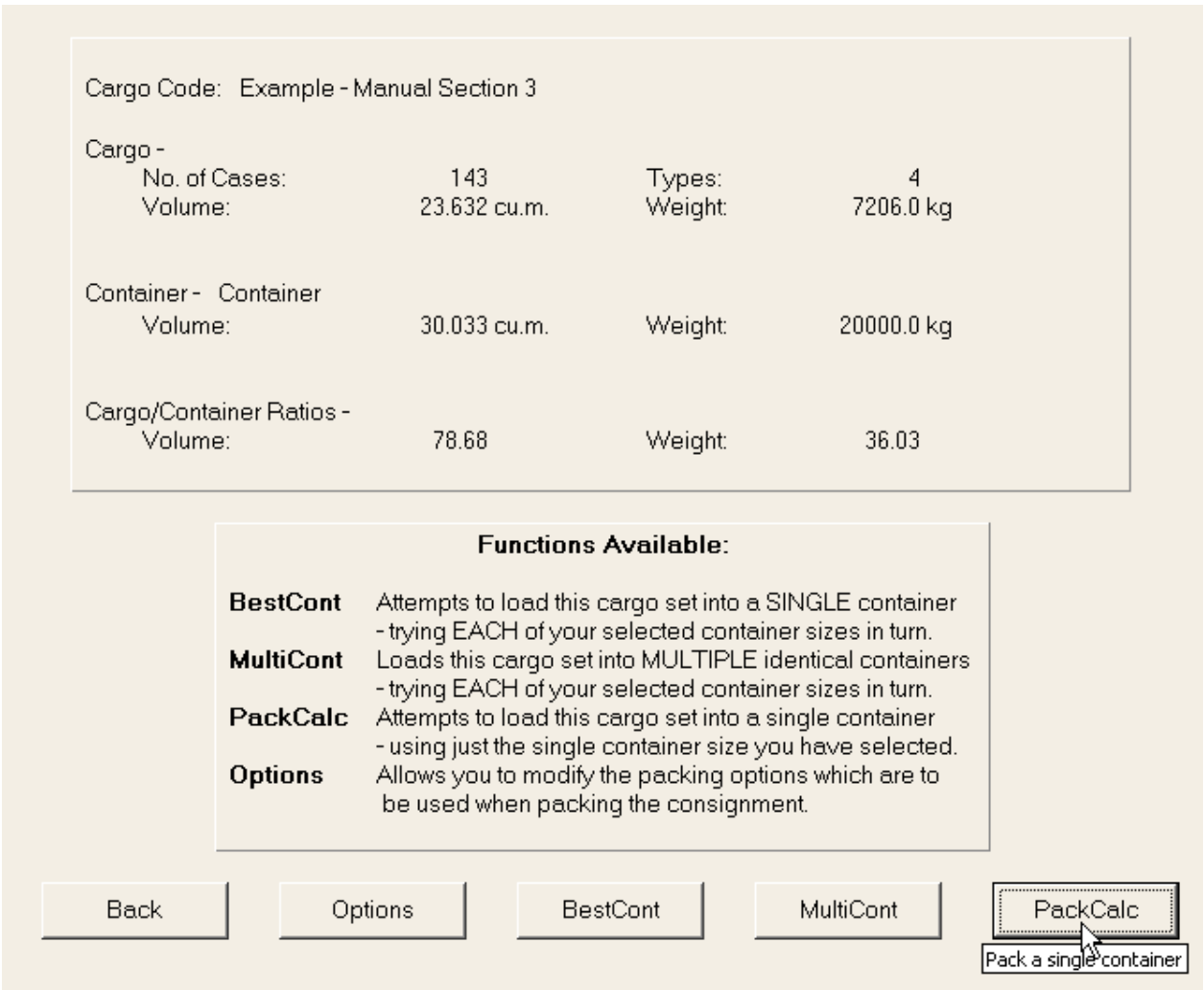
CARGOMANAGER, will, as in the case of manual load planning, be best able to provide good packings if few constraints are placed on possible orientations etc of the cases being loaded. An 'ideal' cargo will be one in which no fragile or heavy items exist and for which any case orientation is valid.

Also, when loading a single product into a container / pallet, you will be presented with the dialogue shown below. One of three options may be selected.



The first of these will attempt to pack as much of the cargo using any of the packing methods available to **CARGOMANAGER**. This may be a loading from the floor or from the end of the container. The second and third options are self explanatory and the one most appropriate to the practical circumstances should be selected. The 2nd option will attempt to minimise the length of the container used. It is recommended that in all instances where you wish to minimise the **length** used (whether single or multiple product types are loaded), then the **Complexity** option (Packing Options Screen) should be set at a maximum value of 2. For mixed cargo sets the options on layerering etc set on the packing options screen should be utilised.

Cargo Summary Screen.



On this screen, in addition to the 'Back', 'BestCont', 'MultiCont' and 'PackCalc' options there is the 'Options' button. This allows users to tailor the packing rules used by **CARGOMANAGER** to suit their particular loading environment. This is discussed in great detail in Section 6 of this manual.

As described on screen BestCont enables loading comparisons to be obtained for loading single container loads (Section 11) and MultiCont deals with multiple container packing using multiple identical containers of one or

more sizes (Section 12).

On selecting the **PackCalc** option you are then prompted for a filename.

If you wish at some future time to re-run **CARGOMANAGER** using the same consignment data, perhaps changing slightly the quantities or dimensions then you now have the opportunity to write details of the Container and Cargo to disk for possible future recall.

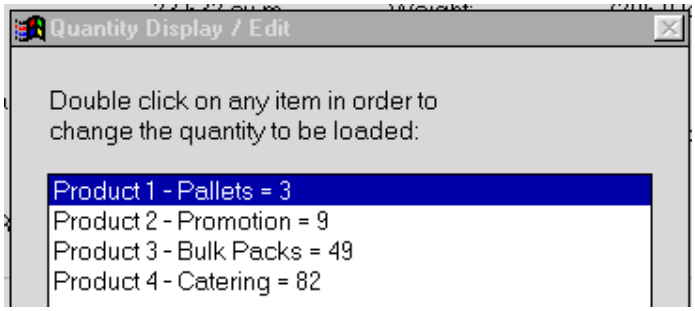
If you do not wish to do so accept the suggested filename 'saved.dat' to hold the details.

One name LEFTOVER.DAT is **NOT** valid. This is a file used by **CARGOMANAGER** to (automatically) save details of unpacked cases which you may wish to place into a subsequent container.

If the name of an existing file is given then the user is prompted to overwrite the file or insert select another name.

Additionally, as described earlier, you can select the **ItemBase** option which will add all the dimensional information entered on the data input screens to the data held already in the Item Database. Where an entry has the same Case Code / Description as an existing entry then the **new** information will replace the old.

Another feature which may be of assistance here is the **Table** option. This allows you to view in a tabular form the cargo specified and quickly change the quantities associated with any or all of the current entries. This can be useful when the exact quantities are unknown until the last minute but the item codes are known well in advance. This screen is shown below.



Thus quantities can quickly be changed and their effect on loading easily ascertained.

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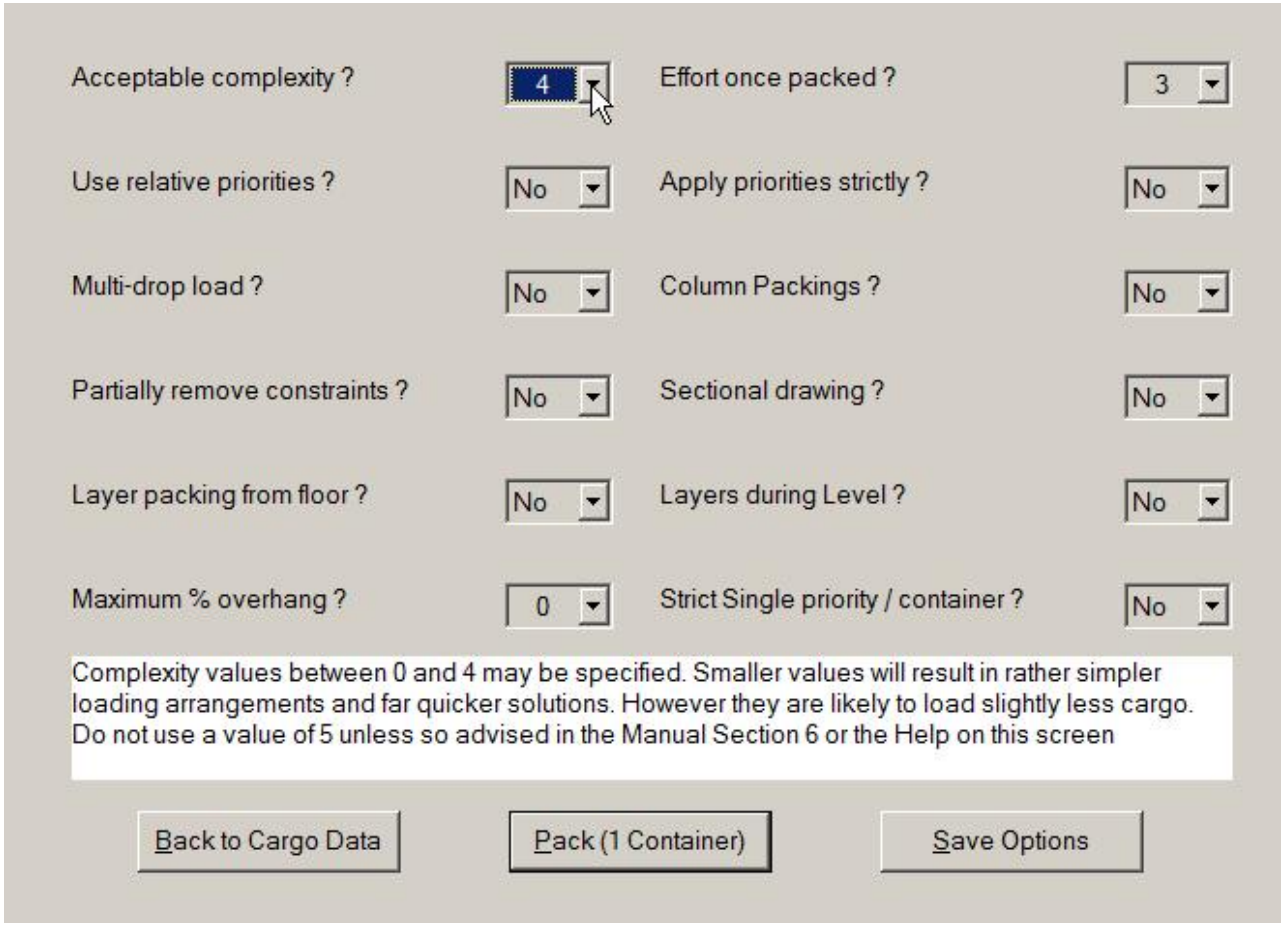
SECTION 6 - PACKING OPTIONS.

Covers: **suggested settings for specific practical situations**; also complexity, effort, priorities, ranking, multiple drops, column packings, layered solutions and overhang)

CARGOMANAGER has been designed to deal with a huge range of possible problem types - from a single container holding just a few dozen identical items to a multiple container load containing many thousands of items of many different types. It is therefore not surprising that in order to meet the needs of a specific application some degree of 'tailoring' may be required. The Packing Options screen provides this facility. It should be noted that changes to these values are unlikely to be required on a regular basis, and once set they may well not require any subsequent change.

Following the display of the Summary of Input Data you may select to pack immediately the specified cargo or alternatively select **Options** to display the Packing Options Screen. The Options screen allows you to control the way in which packing is carried out. If you choose to move directly to Packing then the previous (or Default) option settings remain unchanged.

The settings on this screen are very important in obtaining solutions appropriate to your needs and the description below of the parameters and their effect should be read with some care. Once set they may well not require any subsequent change.



The **Packing Options** screen can be selected prior to the commencement of loading of each empty container. A default set of answers to the questions posed is provided, and the user may set up their own defaults

These questions and the effects they have on the packing process are discussed below, and a summary of suggested settings for some common situations is given at the end of the Section.

It should be noted that help is available on the Options screen in two forms - both through the Help option at the top of screen and through help text which will appear as the mouse pointer is moved to select options.

Acceptable Complexity - 0 = Simple / 4 = Complex.

This is by far **the most important control available** to the user in determining the type and complexity of layouts produced.

Depending upon the type of cargo and the manner in which the products are to be physically loaded it may be acceptable to you for **CARGOMANAGER** to utilise relatively complex packing arrangements. If this is the case then a value of **3** or **4** will allow **CARGOMANAGER** to experiment with both simple and more complex arrangements. In doing so **CARGOMANAGER** will still retain a preference for simple arrangements to be used if they are as efficient (in volume fill terms) as more complex forms. The highest value of **4** provides (for all cargo sets) the full range of solutions offered by level 3, but does in addition, for cargoes of just a single product type, include investigations of solutions using optimal layers of the product.

If offered a complexity value of **5 this should only be tried** if solutions that firstly pack one SIDE of the container and then move progressively across towards the other side are a requirement.

You should also note that setting a complexity value greater than 2 **may** result in solutions which are easier to pack into an open-side / curtain-side container rather than a conventional closed shipping container. Thus if you wish to **minimise the length** of container used a maximum complexity value of **2** should be used.

If however only relatively simple arrangements are acceptable to you then a value of **1** should be specified. This will tend to provide slightly less volume efficient loadings and require a great deal less computing time. A value of **2** is likely to provide a reasonable compromise in many situations. Using a value of **3** may lead to solutions which require significantly increased loading effort.

A value of **0** is also available. This provides an even faster calculation phase but at the expense of some loss of quality. Thus solutions using a value zero, although always fully feasible, may have a volume utilisation that is significantly lower than is actually possible. It has been included so that very quick estimates of cargo fill may be obtained.

The Effort Once Packed value described below is also important if the time taken to pack cargo sets is found to be rather great.

Effort Once Packed - 1 = low / 3 = high

Once **all the cargo has been successfully packed**, **CARGOMANAGER** may be instructed to strive to further improve the packing (pack in a shorter container length) with various levels of effort. If a value of **1** is specified then once a complete packing has been achieved little further effort will be applied. This would be most suitable if you simply wanted to determine whether or not a cargo would fit. If a value of **2** is given then some continued effort will be used to obtain a simpler packing using the same or a shorter length of container. A value of **3** will result in significant continued effort being used to improve the packing. If during further examination a solution is found which is as good but is simpler to pack then this simpler solution is retained.

Use Relative Priorities (Not Absolute)?

When entering data pertaining to each case type, you have the opportunity to specify priority values in the range 1 to 99 (a larger range - say 1-9999 can be used if required but may impact on solution times). These values may be treated in **CARGOMANAGER** in two distinct ways which we term as **Absolute** and **Relative** priorities.

If an **Absolute** priority scheme is selected (the default negative response to this question), then cases with a higher priority (i.e. a lower numerical value, e.g. 1), are assumed to have higher 'value' and will always (space permitting) be packed in preference to those of a lower priority. Thus cases of priority 1 will be packed in preference to those of priority 2 and so on. The actual numerical values used for the different

priority classes do not matter if an Absolute priority definition is used as long as they are different and are smaller for items of greater priority.

If a **Relative** priority scheme is selected then although the priorities specified indicate a preference for certain case types to be packed, these priorities are modified according to the volume of the case concerned. Thus a case of volume $1M^3$ and priority value 2 will have 'equal value' in the packing to a case of volume $0.5M^3$ and priority 1. Thus the priority value you specify is utilised in a way so as to represent value per unit volume. In this way some trade-off between the volume of a case and its priority is achieved in the packing.

It is suggested that you initially utilise the Absolute priority scheme to ascertain whether it achieves your objectives, and later examine the effect of selecting a relative scheme.

Apply priorities as a strict ranking?

The response to this question, which is only meaningful in respect of Absolute Priorities (above), determines exactly how the packing carried out by **CARGOMANAGER** treats the priority values you have specified.

A response of **N**o to this question indicates that although you have a preference for (say) priority 1 to be packed before priority 2 items this is not a binding rule. Thus, should there be insufficient space for all the priority 1 items to be fitted into a container, then any remaining spaces can be used for lower priority items.

By responding **Y**es to this question, no attempt will be made to load **any** lower priority items into a container until **all** the higher priority items have been placed.

The multi-drop loads option (discussed immediately below) can utilise priority codings to indicate the sequence of loading into a container, items with a higher priority coding being loaded first. If you choose to use the priority mechanism in this way then a **Y**es response to this question will clearly apply. It should be stressed however, that the quality of solution obtained (% fill) may well be lower than that obtained if intermixing of priorities were allowed.

Is this a multi-drop load?

If we had intended to load the container with the stated cargo for one destination, and then add a number of other items (using the End Packing option) which are to be unloaded at different (earlier) destinations, then we would need to ensure that the cargo for these earlier destinations is physically accessible without unloading the complete cargo.

In such instances a reply of **Y**es at this stage is likely to be required. However a reply **N** will enable **CARGOMANAGER** to use any spaces towards the rear during any subsequent 'End Packing'. This is likely to improve load efficiency but may cause cargo access problems.

A further situation in which a **Y**es answer should be given is where a single set of cargo items has been specified with priority values which reflect the sequence in which they are to be loaded into the container. As described below priority values can be used in this way and the resultant packing will ensure that the highest priority items are placed first into the container, and other items having a lower priority value are then packed in sequence in such a way that access (for unloading) to all items of the same priority value is maintained. A **Y**es response here ensures that this access is maintained. If a **N**o response were given then cargo of differing priorities might be intermixed.

Restrict packings to Columns?

Normally the packing solutions provided by **CARGOMANAGER** take a wide variety of forms, though all of course take full account of the restrictions you stipulate for both individual case types and for the consignment as a whole. A small number of users have identified situations where they ONLY wish to obtain solutions in which cases on second and subsequent layers form perfect vertical columns with no overhang or underhang. Whilst this naturally places a major restriction on the type of patterns possible, by responding **Y** to this question such restrictions may be applied. We would normally recommend that a **N** response be made

to this question.

Partially remove constraints on heavy/fragile items?

As described earlier, special item types (those which have been specified as being either heavy or fragile) are subject to special packing rules. Normally if a number of different heavy item types have been specified then, even if such items may be placed several stacks high, NO intermixing of different item types will be attempted. Thus if both items A and B are defined as heavy, and both may be stacked 3 high, then no stacking of A on B or B on A will be attempted. The same rules are applied to groups of fragile items. If however such intermixing (within the heavy and fragile classes) is allowable, then a **Y**es response to this question should be given. A positive response to this question (thus partially removing a packing constraint) is likely to produce improved packings.

Should the drawing produced be sectional?

Two distinct methods of presenting the loading arrangement on screen are employed in **CARGOMANAGER**. One is based on the drawing of 'blocks' of identical cases (where these exist), whilst the other approach considers each box as an individual element and produces cross-sections along the width of the container. Although both approaches produce diagrams in which each case is individually drawn and labelled the 'block' approach does have a significant advantage in terms of drawing speed and is considered by many to provide a more effective visual impact. This does however depend upon the characteristics of the cargo (e.g. number of case types) and on individual preference.

The **Sectional** view can be selected by responding **Y** to this question. If there are a large number of cases then, for speed of response, an **N** selection is recommended.

It should be emphasized that the answer given will NOT change the actual packing arrangement calculated.

Should packing be layered from the floor up?

When loading, for example, mixed pallets, it may be a requirement that solutions are readily placed in layers on the pallet base, rather than in 'walls' at one edge. This option, when selected, will produce solutions of a layered form. Where layered solutions are desirable, then we would strongly recommend that not only should a positive response be made to this question, but also a value of **3** or ideally **4** be made to the 'Acceptable Complexity' option discussed above.

Attempt layered solutions when levelling?

Once the loading of a container is complete then, either prior to display of the packing used, or following the screen display a levelled solution may be selected. This procedure attempts to spread the container load more evenly across the floor of the container, minimising the height used. **CARGOMANAGER** contains two procedures for doing this, one based upon building 'walls' from the back of the container, and the alternate approach of 'layered solutions' in which product of the similar type tends to be spread across the container floor in layers.

If a **Y**es response to this question is given then such layered solutions will be attempted. In the event of there not being a suitable layered solution (e.g. when the cargo contains many different item types), then the default 'wall' solutions will be provided. Once again, should layered solutions be more desirable in general, these may be produced for the single product situation (without the need to apply levelling at a later stage) by selecting a value of **4** for 'Acceptable Complexity'.

Maximum % Overhang ?

Although the use of overhang in packings will usually be undesirable, there may well be instances in which the characteristics of cargo and container are such that a significantly greater packing might be achieved if overhang is allowed. If overhang is to be allowed then, as described below, the percentage of a case which may be allowed to overhang another is specified. Should a packing **not** using overhang be found which is equally effective, then this solution will be used. Selecting overhang does increase the computation time.

The limit of 50% will obviously generate a very unstable load, and a figure of 10% or 15% is likely to be more realistic.

Having selected suitable values for these options three options are available.

Once these questions are answered, the user may select from the following options at the base of screen:

Pack to proceed to the packing of the cargo

Save to save the options on the current display. These will then form the default answers for all subsequent runs.

Back to return to the previous screens. On selecting **Pack** the Calculation phase will commence.

Strict Single priority / container ?

This option, when set, forces CARGOMANAGER to pack the containers (in MultiCont mode not when adding additional cargo) in a strict order based on priorities as when using 'Apply priorities as a strict ranking?' discussed earlier in this Section, **but in addition** packs the cargo so that each set of cargo having the same priority is packed into its own container/containers. Thus cargo with priority 1 will be packed first into one or more containers, and once this is complete a new container is started for cargo with priority 2 etc. [It is permissible to have priority values which jump in value - say 1, 5, 8 etc].

You should note that when this option is set the option 'Apply priorities as a strict ranking' is also set. If you go on to add cargo to a part filled container (perhaps a container holding just cargo of priority 4 for example), you can add cargo of any priority values to this container - it does not have to have a priority of 4. However if you add cargo items having 2 priorities (say 1 and 7), then no attempt will be made to load items of priority 7 until **all** the cargo of priority 1 has been loaded, assuming this is possible.

Suggestions for Option values

When distributed, **CARGOMANAGER** has default values set up for all the above parameters. For all Yes / No answers the default is **No**, and for numeric responses values of 4 and 3 are typically used. Ideal values for particular situations are best determined through experimentation. It should be stressed that once default values appropriate to a particular situation have been defined then little subsequent modification should be needed.

The suggestions given below are for changes you might wish to make to the distributed default values as a first basis for experimentation.

Cargo consists of a large number of case types.

In such situations the calculation time required may be significant and a lower level of Acceptable Complexity might usefully be selected, perhaps a value of 2 or 1.

Loading solutions obtained are rather too complex for actual loading.

In a container load of a few dozen cases a fairly complex loading arrangement may be quite acceptable, but in a load of thousands of cases a similar degree of complexity may well not be suitable. Also, what one loader might consider as complex, another might consider as quite acceptable. Once again lowering the Acceptable Level of complexity to values of 2 or 1 should assist in obtaining suitable loading arrangements.

Once a complete packing has been achieved CARGOMANAGER still continues to perform calculations for some time.

The 'Effort once packed' parameter determines what happens once a complete solution for the given cargo is found. Reducing this will speed things up as described above.

The cargo has to be dropped off at a number of points en route and the loading arrangement used should accommodate this.

CARGOMANAGER has two mechanisms to achieve this, one known as 'End Packing' and the other utilising cargo priorities. These have been described elsewhere but a summary of each is given below together with suggested parameter values.

End Packing allows additional cargo to be added to a partly filled container. Using this mechanism the suggested procedure would be:

Input **A** the case descriptions / dimensions that you expect to form the complete container load. In each instance use the default ZERO quantity value. Once all the case descriptions have been input, modify the quantity entries to reflect the quantities to be 'dropped off' at the last drop-off point (i.e. to be loaded first). Once this has been done, select **PackCalc** and thus perform the loading of this initial set of cargo. Then select **Add** when the Tabular Packing results are displayed and modify the quantity values to reflect the quantities to be unloaded at the last but one drop-off point and continue with this process until all the required cargo has been packed.

When using **End Packing** for this multi-drop situation the following parameter values (changes from the distributed settings) are suggested:

Multi-drop load : **Yes (If No is used access to later cargo may be a problem)**

Complexity: **2** or less

Priority alues for Multi-drop loads.

As described earlier priority values are primarily intended to indicate the 'value' of an item in the consignment so that **CARGOMANAGER** can (where the cargo cannot be completely loaded into a container) maximise the value packed.

It is, however, possible to use this parameter to indicate a strict order in which the consignment is to be loaded. This is achieved in the following manner.

Input details of the items required at each drop-off point together with the required quantities. Where an item is required at two locations then two separate entries will need to be made. For those items required at the last drop-off point give a priority value of 1, for the next to last a value of 2 and so on. Once all data has been input select **EndEdit** and then **Options** to set option values as given below:

When using **Priority alues** for this multi-drop situation the following parameter values are suggested:

Multi-drop **Yes**

Complexity **2** (or less)

Priorities as a strict ranking **Yes**

As discussed earlier, if you wish to pack all the cargo of a given priority into the same container / containers and then start a new container for cargo of priority 2 etc, then the option: Strict Single priority / container ? should also be set as **Yes.**

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SECTION 7 - THE CALCULATION PHASE.

(Covers the packing process, breaking early, tabular results and load levelling)

Once data entry is complete the Calculation Phase of **CARGOMANAGER** will then commence.

CARGOMANAGER makes use of a wide range of methods so as to obtain a cargo packing which makes maximum use of the volume of the container. If the cargo CAN be fitted then the length of the container used is minimised, if it cannot then the arrangement which maximises the volume packed is selected. If the packing is constrained by weight then appropriate messages will be output on both screen and printer and the weight of cargo packed will be restricted so as to meet the stated weight constraint.

The calculations are carried out in a number of distinct stages and during each stage a very large number of possible packing arrangements are investigated. As each stage progresses the screen display shows the rate of computational progress and the 'Break Early' option is available to terminate calculations early.

The time taken to pack a cargo depends on a number of factors. Obviously the number of cargo items and types is a major influence on the time taken. Also, if the specified cargo is significantly greater in volume than that of the container, the time taken will be extended.

In addition, the 'Level of Complexity' and the 'Effort once packed' values selected on the Packing Options Screen will have a major influence.

The time taken can also be reduced in the following ways:

You are able to **Skip Forward** over later calculation steps by pressing the **Break Early button**, if required and this facility is described below.

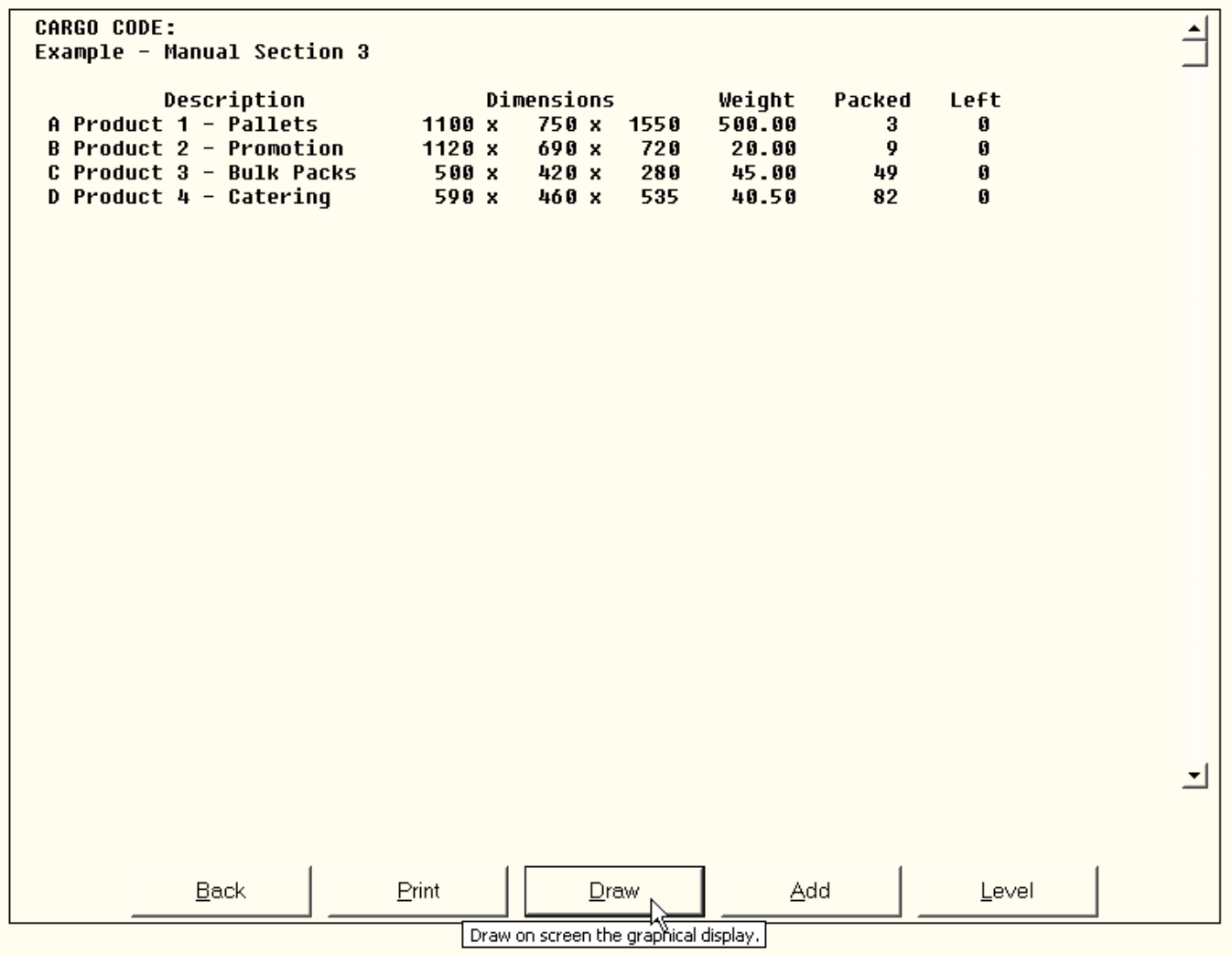
You may set the value of the 'Effort once packed' variable on the Packing Options screen to a value of 1. (see Section 6).

The Break Early Button Operation.

As outlined above there may well be situations where a **CARGOMANAGER** user wishes to restrict the number of calculations carried out - either because a solution has already been found, or because of time constraints. The selection of **Break Early** during any of the stages will **terminate that stage prematurely**, and move on to the next Stage of Calculations (which will, if no action is taken, proceed normally). In doing so, the best solution found up to the point when the button was selected will be retained as the 'best' solution.

If the problem is easily soluble then calculation time is likely to be fairly small, especially if the Packing Options for 'Complexity' and 'Effort once packed' have been set appropriately. This latter parameter will also, in these instances, avoid any need to utilise the Break Early button. Once calculations are complete the solution which provides the best volume utilisation (subject to weight constraints) is saved.

Select **Continue** to display the results in tabular form.



This screen presents in tabular form the number of items of each cargo type packed (in this instance all those available). A more comprehensive printer report can be obtained at this stage. This is achieved by selecting **Print**.

Three further options are available at this stage:

Firstly, you may wish to proceed and draw (on screen / printer) the packing arrangement which has been determined. This is accomplished by selecting the **Draw** option.

Secondly, if the specified load has only partly filled the container you may wish to immediately add some additional cargo items (of an existing OR new cargo type) to those which have already been packed. Within **CARGOMANAGER** this is referred to as **End Packing.**

In this situation the items already placed in the container will **retain** their existing positions within the container and any additional items specified will be fitted into spaces within the existing packing arrangement.

This can be selected using the **Add** option.

Finally, you may have now packed all the cargo which has to go into this container (it might have been restricted by weight for example) and wish to ensure that it is 'spread' as far as possible over the container floor. If the packing is volume restricted then the arrangement obtained by selecting **Draw** will probably meet your needs. However, where the load is restricted by weight the arrangement obtained by selecting **Draw** will be packed up at one end of the container. A further option **Level** will re-calculate possible packings with the objective of minimising height usage.

Proceeding to the Next Screen.

Thus, you may choose to move forward to display on screen / printer the solution calculated (by selecting **Draw)**, or you may choose to **Add** additional cases which would lead you back to the input screen for End Packing, or you may level the load using the **Level** option.

If **Draw** is selected a three dimensional view of the empty container is displayed, together with a menu of possible commands which can be used to display the arrangement and, at the same time, select which views (if any), will subsequently be printed.

The Levelling Option.

This option may be selected either after the tabular display of results or after the screen display of packing. The option takes the current cargo which has been successfully packed in the container and attempt to obtain an arrangement of the cases which minimised the height used. In doing so the load is 'spread' more evenly over the container floor.

The option is intended to provide a final arrangement for a cargo set. If, subsequently, additional cargo is added (Using End Packing), this cargo will be added to the Unlevelled Load and the Level option will need to be re-selected for this new cargo set.

As described in Section 6 (Options), two different levelling mechanisms may be employed. One of these is based on 'block-building' from the rear of the container, whilst the other utilises a layering procedure for the consignment. The method utilised is determined by your selection on the Options screen.

The Solutions Achieved.

Throughout extensive trials **CARGOMANAGER** has been found to provide container packings which give very high volume utilisation. However, situations might arise when extensive manual experimentation could provide an improved solution. We are pleased to receive reports of such situations (in writing) so that we can, where possible, incorporate further improvements in future releases.

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SECTION 8 - LAYOUT DISPLAY AND PRINTING.

(Covers viewing options, 2D displays, printing, adding cargo and levelling, packing the next container)

Viewing Options.

The opening screen of the on-screen container display shows a view of an empty container viewed from a point to the side of the container opening. There may be very occasional instances when the arrangement cannot, for geometric reasons, be viewed from a point to the side of the opening. In such cases a view looking directly into the container opening will be displayed.

The facilities provided on this screen allow the user, aided by the computer, to select a number of three dimensional views of the loaded container so that the complete packing can readily be appreciated and successfully packed. In addition two dimensional views can be obtained on screen and printer.

The options menu displays a number of buttons which provide the drawing functions - All, Next, Back etc.

Initially the **Next** and **All** options are available, with in addition and number of 'top of screen' options which will be described later. Recently a further option button has been introduced **AutoStep** which is described below.

The **Next** option, will display, working from the rear of the container, a group of cases. Thus pressing **Next** repeatedly will result in the complete cargo load being drawn in a series of stages.

Two methods of display are available to the user, a 'block' method in which blocks of cases of identical type and orientation are drawn at each Next step, and a 'sectional' approach in which partial or complete cross-sections of the container are drawn at each step. The user may select the 'block' or 'sectional' approach initially at the packing options screen. The block approach provides for quicker screen and printer drawing where the cargo consists of a large number of cases, or when there are just a few case types. It can also be changed by the **DrawModes** option at the top of this screen.

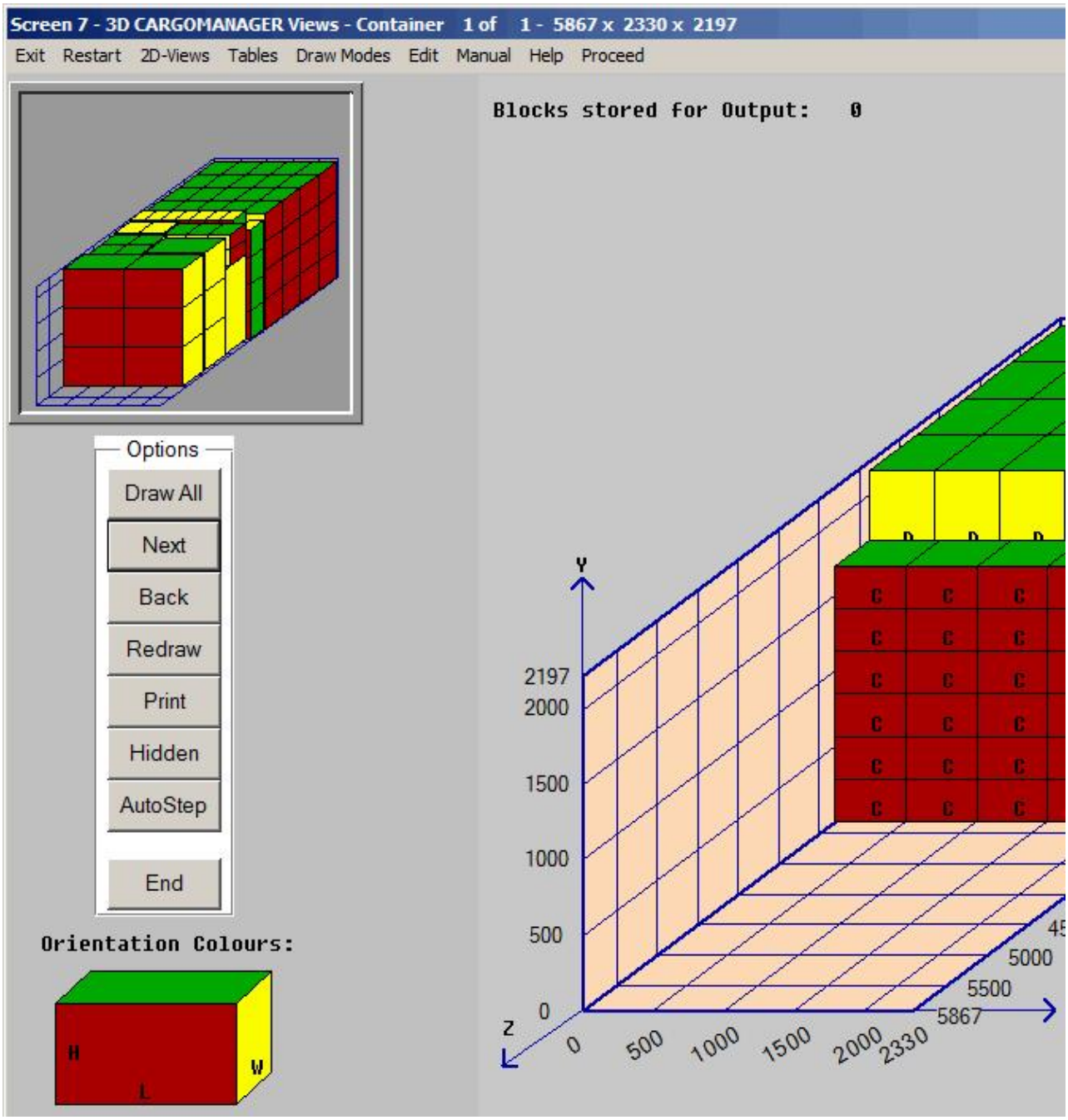
The **All** option will draw ALL the cases which form the cargo. Gradually, all the items packed will be placed in the container, and as they are, they obscure those towards the rear of the container. If you wish to simply obtain an overall impression of the arrangement then selection of this option will achieve this. Each case has a descriptive label (e.g. A, B), though the **DrawModes** option can be selected which 'toggles' the display of these labels on and off.

Once one of the **Next** or **All** options have been selected other options will become available:

The **Redraw** option erases the current screen display of the container and returns to the 'empty container' screen.

The **Back** option, redrawn the container arrangement up the point when **Back** was selected **Except for** the last group of cases drawn. This effectively reverses the action of the last **Next** selected.

Autostep will automatically produce (ready for later printing) a set of load plans for each section of the container. It is equivalent to actioning **Next** followed by **Print** repeatedly for the whole consignment. The number of diagrams produced is shown near the top of the screen.



The menu buttons **Print** and **Hidden**, when used in conjunction with the buttons already described, allow you to easily specify which views of the container are to be output to printer. Those views selected will be output in a similar graphical form to that on-screen but with the addition of descriptive information indicating case orientation and the full descriptive information input by you for each cargo item.

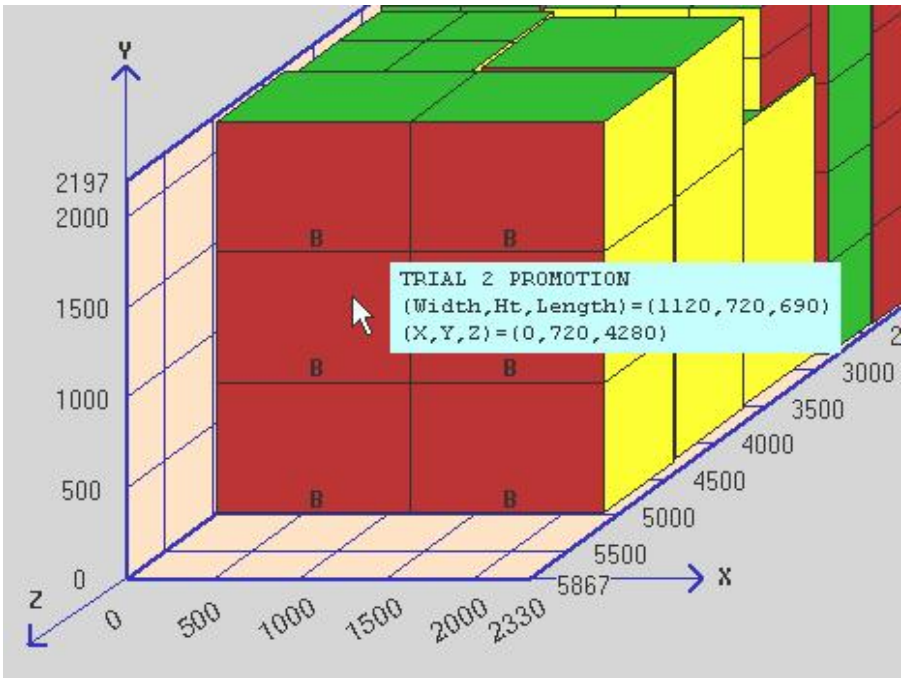
The **Print** option specifies that a printout of the container view as currently displayed is to be **later** output. The effect of this key is to shade the cases on the display to indicate that they have been selected for subsequent printer output.

The **Hidden** option performs a similar function to that of the **Print** option **EXCEPT** that the container view output to printer is that visible **PRIOR TO THE LAST Next COMMAND**. (It is equivalent to selecting **Back**, followed by **Print** , followed by **Next**).

This is best appreciated by referring back to the example detailed in Section 3 - The Guided Tour.

At any time you can also use the mouse to point at an item in the main screen 3D loadplan and display adjacent to the item its description.

Below this is shown the Width, Ht and Length of the item **with respect to the container**, and below this the co-ordinates of the rear bottom left of the item. The X, Y and Z axes are shown on the diagram.



The Codes and Summary options available under the **Tables** option at the top of screen provide in both instances pull-down windows providing additional information about the current display. The **Codes** option provided information on the Codes / Descriptions associated with the on-screen case labels A, B etc. The **Summary** option provides, as might be expected, a summary of the loaded cargo and the container characteristics. Both these sets of information are provided automatically on printed reports, but their provision (on-request) on screen may well help your appreciation of the cargo plan as it is developed.

Once all the cases have been drawn on-screen, the option menu will indicate that **End** may be selected. Users will (probably) have selected a number of container views to be printed. **CARGOMANAGER** will always have available, in addition to any views that the user selects to be printed, a view of the final, fully loaded container.

Selecting **End** will result in a further menu being displayed. This allows:

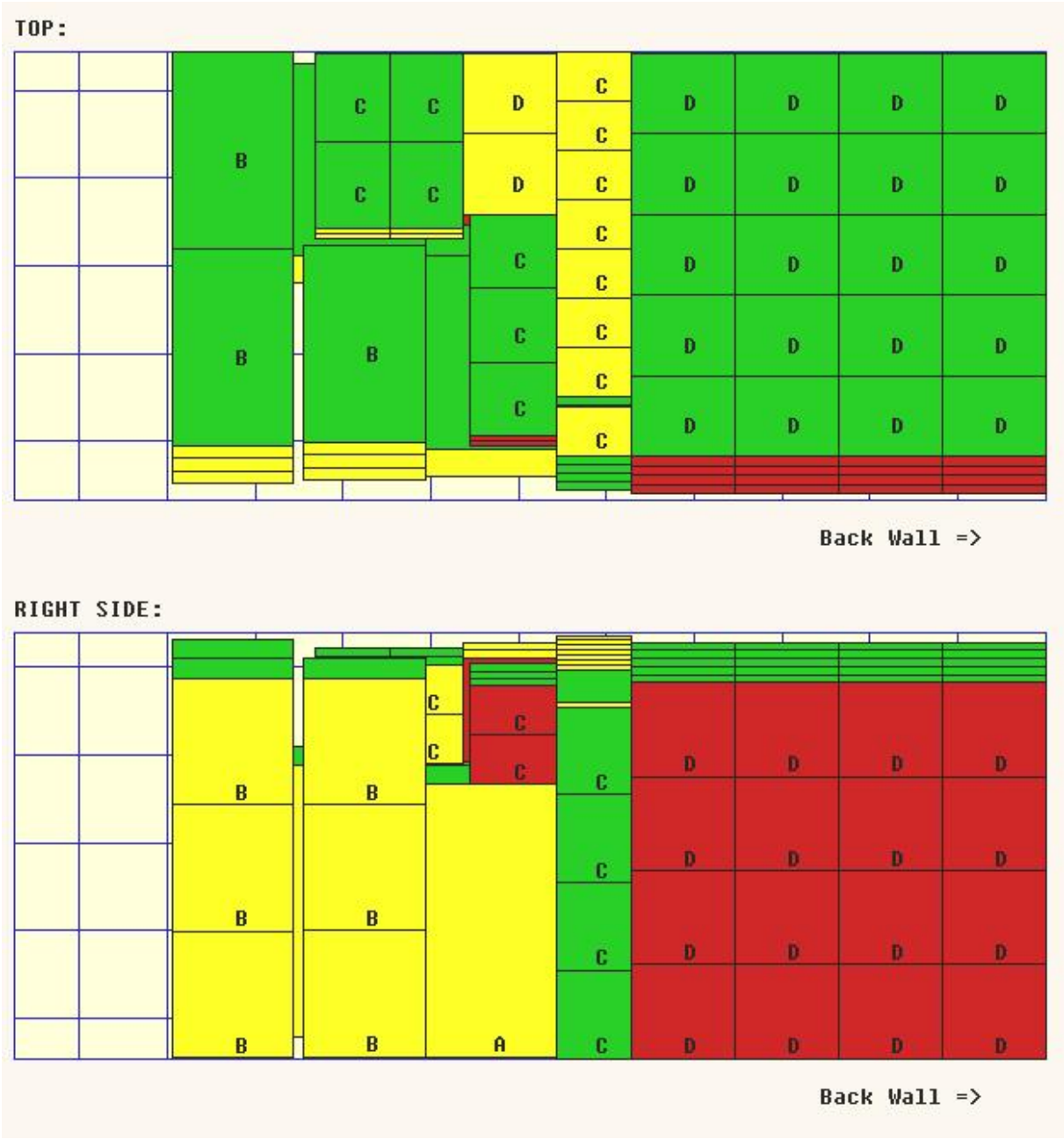
- Print the diagram(s) selected.
- Printing of a report giving the exact co-ordinates within the container of each item loaded.
- Level the cargo so as to provide an even more stable packing.
- Add further cargo to the load.
- Back - return to the screen providing a tabular summary of the items packed.
- Cancel - return to the graphical display of the packing.

The screen also indicates the number of pictures which will be output if **Print** is selected - and indicates that it is possible not only to produce 3D pictures of the packing but also 2D pictures (including floor plan and views from the side).

Two-Dimensional Diagrams.

In addition to the three dimensional screen view and three dimensional printer picture(s) it is also possible to view and print two dimensional views from the side and top of the container as well as a container floorplan. From the top of screen on which the three dimensional view is constructed the **2D Views** option can be selected.

This allows the screen display of left and right hand side views of the container (both displayed at a slight angle so as to indicate the widthwise pattern of cargo). In each instance a top view is also provided. A strictly two dimensional floorplan may also be viewed.



Any or all of the 2D views may be selected for viewing / printing.

Selecting **Main Window** returns you to the 3D display and the **End** option.

Printing

On selecting End you then have the opportunity (as described earlier) to print the diagram(s) selected. These printed view(s) provide information not only on which case types are to be placed where (using the case codes A, B, C etc), but provide, in addition, an indication of the orientation of each case.

This is always done using the coding scheme described below, but can also (optionally) be done using colours / shading - as per the screen display described above. The user is prompted prior to printing whether a 'normal' colour / shaded picture is required, or just a line diagram. This option is provided to restrict ink usage on an inkjet printer.

During data input a '**height**' dimension for each case was entered.

This may have been the only valid vertical dimension in packing, or others may have been acceptable. In addition each case was defined as having a '**length**' and a '**width**'. In order to place a case in the container so as to match the three-dimensional drawn view it is necessary to identify the direction in which the dimension defined as '**height**' is placed and the direction in which the dimension defined as '**length**' is placed.

Each of these could be vertical in the container, widthwise across the container, or depthwise into the container. In order to identify the orientation, a code is printed for each case placed, in addition to the letter coding (A, B, C etc). These are detailed below and also on each printout:

Code & meaning	*Code and meaning*
1 Height vertical, length depthwise.	2 Height vertical, length widthwise.
3 Height widthwise, length depthwise.	4 Height depthwise, length widthwise.
5 Height widthwise, length vertical.	6 Height depthwise, length vertical.

Further Options:

The **Coords** option allows you to output to the printer a report listing each item in the consignment and its exact co-ordinates within the container.

The **Add** option allows you to add additional cargo to that already placed. This procedure is discussed in detail in the next section of this manual.

The **Level** and **UnLevel** options provide for the levelling and un-levelling of the cargo. As discussed earlier there may well be situations in which a cargo is to be carried which is significantly less than the volumetric capacity of the container. In such instances a 'spreading' of the cargo over the container floor may be required for stability.

Thus at any point in time for a given cargo there are two possible packing arrangements:

One in which the cargo is packed towards the closed end of the container (Un-levelled).

One in which the cargo is 'spread' over the container base - thus minimising height usage. (Levelled). A user who has specified a cargo and progressed through packing to immediately display on-screen a cargo arrangement is faced with an un-levelled load.

Selecting **Level** at this stage will cause levelling calculations and the display of the levelled arrangement to be performed. Likewise the selection of **UnLevel** will result in the display of the un-levelled load.

The menu displayed will **only** display **one of Level** and **UnLevel** at any time. If you have just viewed (on screen) an Unlevelled load (pushed to one end) then **Level** for levelling will be displayed. If you have just examined on screen a levelled load then only **UnLevel** will be available.

Selection of either will result in a delay whilst the screen picture is built up. The selection of **Level** (on the first occasion for a particular cargo) will, in addition, necessitate the calculation of the best arrangement prior to display.

Obviously the output presented on the printer takes account of both the drawing mode in operation and the levelled or un-levelled form of arrangement in use. The view(s) printed will always match those of those of the last on-screen view examined.

As discussed earlier the 'block' approach to drawing provides for quicker screen and printer drawing where their are either a large number of cases in a load, or where there a small number of case types. The 'sectional' approach may be found to be more suitable where there are a large number of case **types** in a cargo.

Next Container Option

If the consignment has not been fitted into the container then this option will also be displayed. The 'leftover' cargo will automatically be entered into the **CARGOMANAGER** input screens ready for packing into the next (and any subsequent) containers.

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SECTION 9 - END PACKING.

(Covers end packing input and calculation procedure)

At various stages when using **CARGOMANAGER** additional cargo can be specified for packing into the container. This may be done **before** any attempt is made at packing the container (i.e. before the end of the Input procedure), or, the additional cargo may be added to a container **after** some cargo has been packed into the container by **CARGOMANAGER**.

These two situations differ in that in the former instance the additional items are added to the complete cargo list which **CARGOMANAGER** will attempt to pack, whereas in the latter the additional cargo specified will be packed (where possible) into spaces available around the cargo which has already been packed.

This section of the manual covers all aspects of the **latter** situation. This procedure is referred to as **End Packing.**

It should be emphasised that End Packing is **Always carried out on an Un-levelled packing arrangement**. Levelling can be re-selected if required **after** packing has been carried out.

Specifying the Cargo.

At various stages in **CARGOMANAGER** after cargo has been packed, the user may select an option to **Add additional cases** to the cargo already packed within the container.

This can be done immediately after the calculation phase or following the on-screen display of the packing arrangement.

The option **Add** is selected from both screens.

Having selected this option the user is faced with completed Cargo Data Entry screens very similar to that used to specify the original cargo (which has already been packed). It differs in two ways from the earlier screen.

The 'quantity' entry, which originally contained the quantity of each product available for packing, now contains zeros.

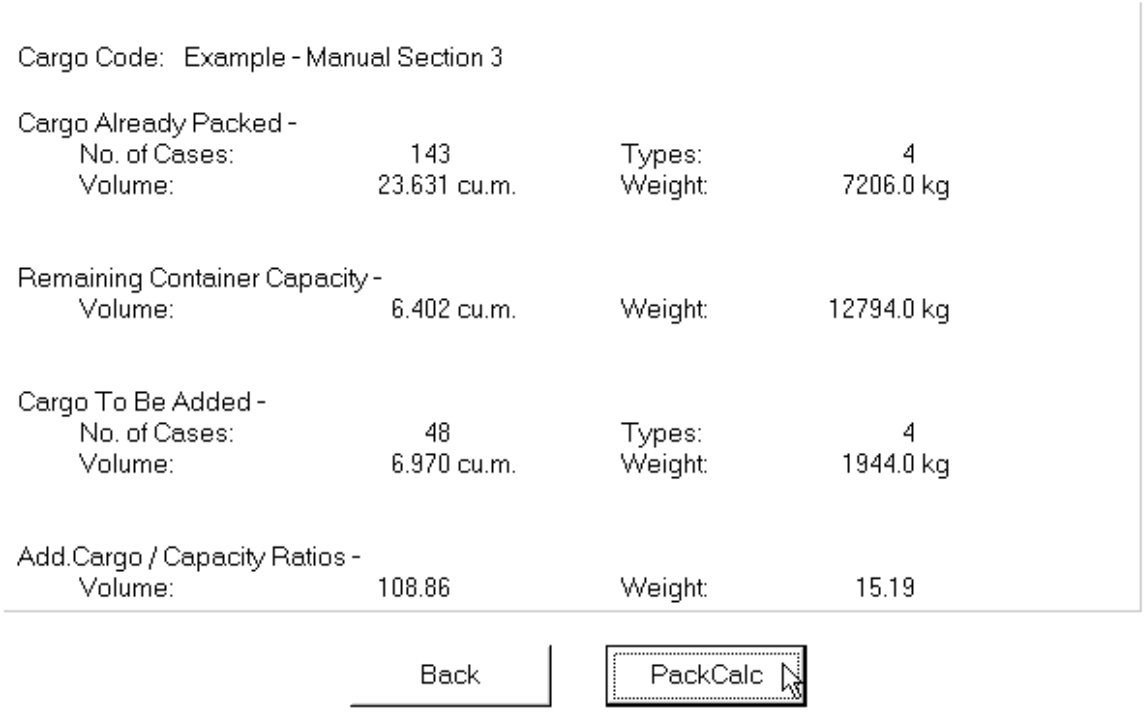
With this release the remainder of the product information (Description, sizes etc) can be accessed - thus you could change (for example) orientation constraints.

Normally just the quantity entries for existing cargo types are changed, though you could add Additional items of another case type.

Once data entry is complete select **EndEdit** to move on to the Summary of Input Screen.

This screen provides details of the cargo already packed, the remaining capacity in the container, and the volume and weight of the additional cargo.

Once again, selecting **PackCalc** will move on to the End Packing Calculation Phase.



End Packing Calculations.

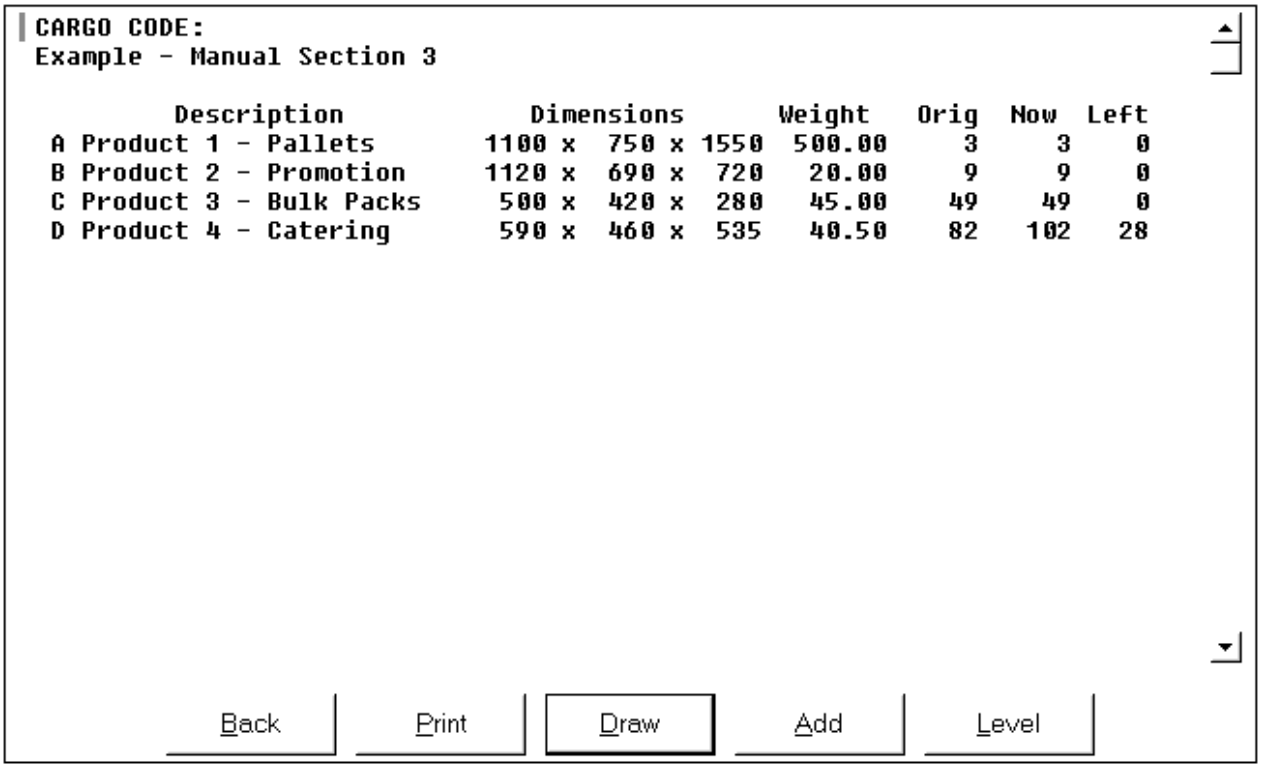
During this phase details of the items already packed and the spaces remaining in the container are retrieved.

The additional cargo is then packed into the available space and, as with the initial packing calculation process, details of the progress of calculations is provided on screen. Unlike the Calculation Phase for an empty container, only one stage of packing is required. Fragile and heavy items in this additional cargo will be packed taking into account their packing constraints, but they will **not** be 'mixed' with fragile or heavy items already packed.

Once calculations are complete, the total number of Cases packed is displayed together with details of the weight/ volume of the additional items successfully packed. Selecting **Continue** proceeds to the Tabular Loading Results.

This screen is similar to that produced when packing an empty container, except that details of previously packed items are displayed as well as details of the additional items.

The **Orig** column contains details of the number of cases of each type packed prior to adding the additional items, **Now** refers to the total number now packed, **Left** gives details of those additional cases which remain unpacked.



Those items which are unpacked by the End Packing process are **not** retained for subsequent packing. **Only** cases which are unpacked when packing an empty container are stored in a file for subsequent packing (if required). This is discussed in more detail in Sections 4 and 6.

End Packing does have the advantage that items originally input (and packed) are left in place and the additional cargo is fitted into the spaces remaining in the arrangement.

Although, from a practical viewpoint this second method of adding additional items may well be preferable, it is important stress once again that **CARGOMANAGER**, as with manual load planning, is best able to provide high quality packings when the whole of the cargo to be packed is known at the outset.

Within **CARGOMANAGER End Packing** attempt to fill spaces remaining in the container with the specified additional cargo. However, in doing so it takes account of the user setting of the question in the Packing Options selection relating to whether a Multi-Drop load is involved.

If the user **has** specified a multi-drop load then **CARGOMANAGER** assumes that the unloading of the cargo for each destination has to be achieved without removal of any cargo due to be unloaded at 'later' destinations. Thus, once the cargo for a particular destination has been packed, any spaces which may remain to the rear of the current packing 'face' will not be utilised.

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SECTION 10 - THE CARGOMANAGER ITEM DATABASE.

(Covers the database program, database size, automatic update and use of end user datafiles, the MAKEIB database utility)

In order to speed the input of cargo information into the product input screen of **CARGOMANAGER** (where information on product sizes / orientations are requested), it is possible to set up a database containing information on the most common items encountered. In this release this 'Itembase' can hold details of up to 25,000 items (v4.9).

The contents of the Itembase are automatically displayed on Screen 3 (Data Input) when the database contains 2 or more items.

Information can be added to this database in three ways which we will examine in turn:

1. By using the purpose built 'Itembase' database program, accessed from the Main Options Menu. This allows database entries to be added, deleted, or modified, as well as providing browsing and printing functions. **THE FIRST ENTRY INTO THE DATABASE MUST BE MADE THIS WAY**, though subsequent entries can be added using either this method or method 2. described below. If the MAKEIB utility (3. below) is to be used then this will create the complete database. Any new system is distributed with a few sample entries already in the file so that these can be added to immediately.

2. By selecting the Itembase option on the screen providing a summary of the input data - Screen 4. In this mode of operation all those case descriptions and dimensional information input to form the cargo currently being examined will be added to the current Itembase file. Where the description given duplicates that already held in the database, the database entry is NOT updated.

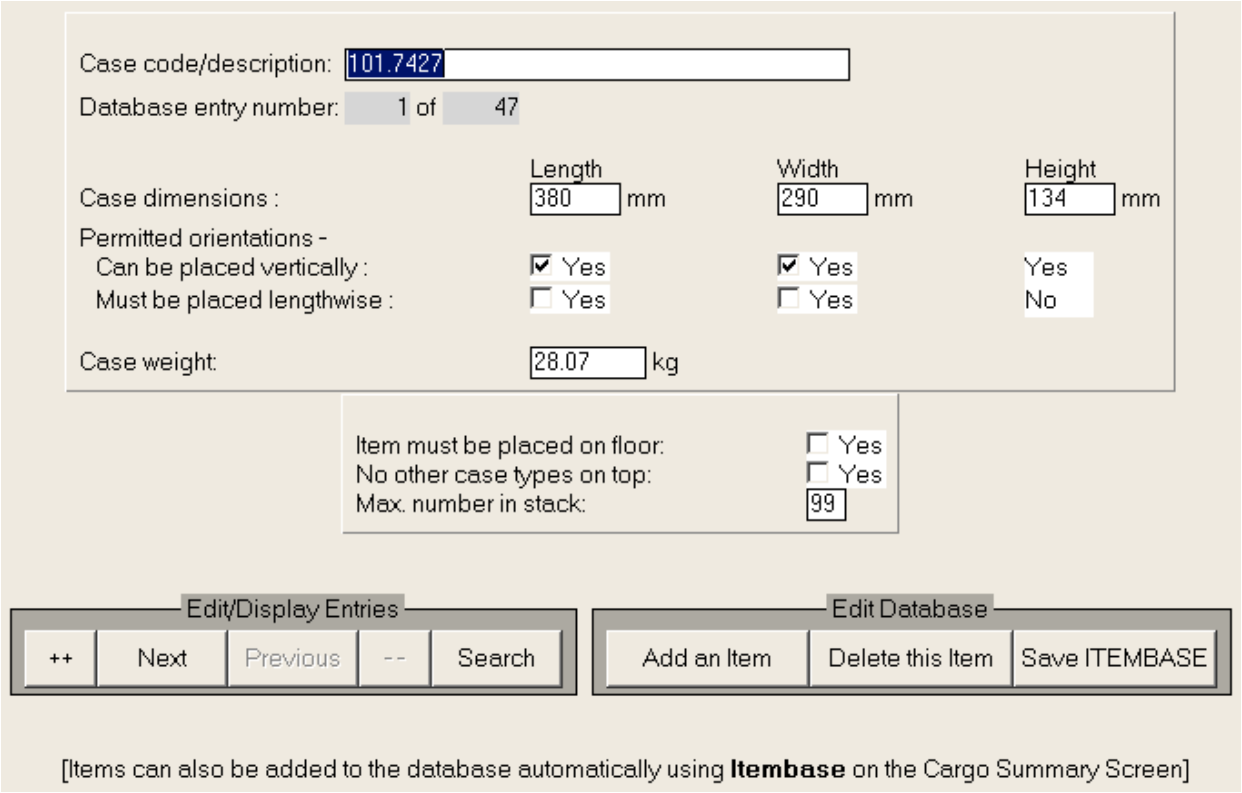
3. By using the MAKEIB utility to create an initial Itembase using data from other sources. Details can be accessed here.

The Database Program.

In order to either initially create, or to subsequently change the database, you should select the **Item Database** option from the **CARGOMANAGER** Options Screen. You may also create the initial database by using data from other sources (e.g. via a spreadsheet), and this is described later in this Section.

The database (if any currently exists) is then read in and the number of entries in the database displayed. If no database exists then a new file will be created for you.

The format of the database file is such that it would probably be possible for you IT staff to create a suitable database from information which may already be held on other computer systems within your organisation. However the database program we provide enables you to quickly and easily set up such a file yourself.



Having entered the Itembase module you can then add, delete or modify items in exactly the same manner as with the case details input screen. Obviously no entries for 'number' or 'priority' are requested.

To move through the database next and previous options are available and also ++ and -- entries which jump further through the database. (Their action depends on the size of the database)

Data entries can, of course, be deleted. The database is sorted into alphabetic order on entry / exit. The database can, of course, be output to a printer, and when this is done then additionally a file CMDBOUT.TXT is created in the CARGOMANAGER folder containing the same information.

Database Size and Speed of Operation

A database of up to 25,000 case entries (CARGOMANAGER v4.9) may be created with **CARGOMANAGER**. As you might expect this is a fairly large volume of information and when entering or leaving the database program all this information has to be read or updated as appropriate. With the largest possible database size this could take several seconds, however this will normally only occur on first use of an unsorted database.

Automatic Database Update.

Whilst may users will be happy to utilise to Item Database program (as accessed from the main Options Menu) to build up a database of case information, the ability to automatically update the information held based on the information just input as part of a **CARGOMANAGER** examination is clearly a very useful feature.

By selecting the Itembase option on the screen immediately following case detail input, all those case descriptions and dimensional information input to form the cargo currently being examined will be added to the current Itembase file. If there is duplication in terms of Case Code / Description between the database entry and the current data (that just entered) then the database entry will NOT be updated. If there happen to be duplicate Codes / Descriptors within the current input data, then the first entry encountered will be used.

All data held in the database is in **UPPER CASE,** though data is entered on all screens is not case sensitive. The use of upper case ensures that the alphabetic display of entries follows a logical sequence. Automatic translation to upper case will be made as the entry is added to the database, and details of Case code / Description made on entry screens (where the match with database entries is attempted) will be matched regardless of the case in which they are entered.

A User Generated Itembase File.

As indicated earlier it may be possible for your IT staff to set up a suitable file for use by **CARGOMANAGER** as an Itembase. Many companies may have case information (e.g. Codes, dimensions and weights) held on other computer systems, and it will usually be possible for this information (together with other default values for valid orientations), to be output to a simple (ACSII) PC file which can be used as an Itembase.

In summary a user who has (say) a spreadsheet containing the following information:

Product Code; Case length; Case width, case height and case weight

should be able to have this information (for up to 25000 products) ready populated into their Itembase for immediate use, using if required the utility program described below.

The Make Itembase (MAKEIB) Utility Program.

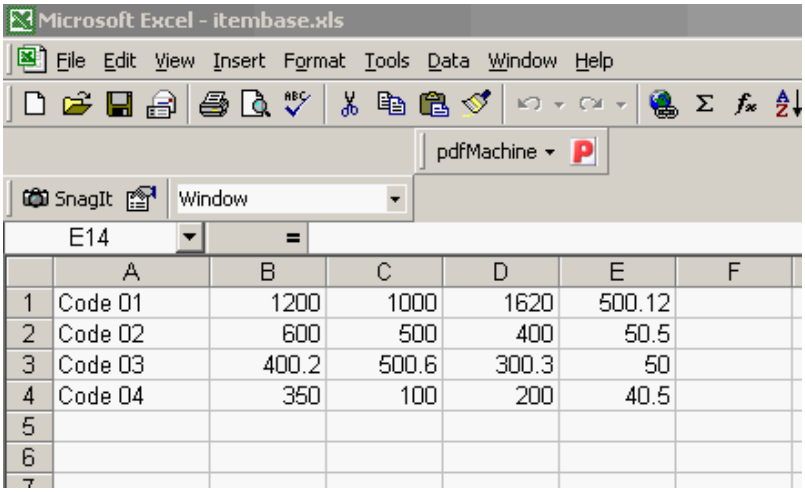
As described above most users will be in a position to generate much of the data held in the **CARGOMANAGER** ITEMBASE.CAR file within other systems. The MAKEIB utility is designed to make the conversion of this data into a suitable database file as simple as possible. The description below is based on a user who is able to provide some basic data in a **spreadsheet format**.

Step 1:

If we assume that the following information is available:

- A product description (the first 40 characters [CARGOMANAGER v4.9] will be used in CARGOMANAGER)
- The length of the product (mm.)
- The width of the product (mm.)
- The height of the product (mm.)
- The weight of the product.(kg)

Within a spreadsheet this might look as follows:

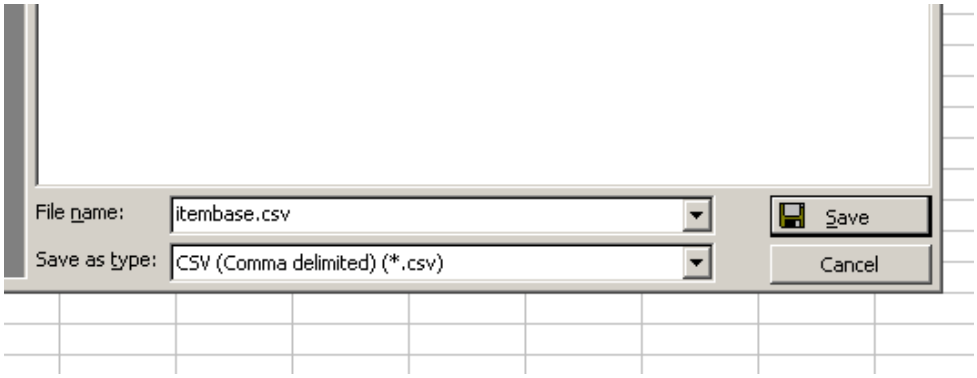


	A	B	C	D	E	F
1	Code 01	1200	1000	1620	500.12	
2	Code 02	600	500	400	50.5	
3	Code 03	400.2	500.6	300.3	50	
4	Code 04	350	100	200	40.5	
5						
6						

Note that we have removed all headings from the columns. The dimensions may be integer or have a decimal point according to the format available to you. Other data could exist in columns F onwards but the content / order of columns A-E must be observed. Up to 25,000 lines of data (CARGOMANAGER v4.9) may be converted to the ITEMBASE format.

This file (named here itembase.xls) can be converted to a comma separated format by selecting **File / Save As** and

saving as ITEMBASE.CSV. This file name MUST be used for the file name that is used as an input to the MAKEIB utility.

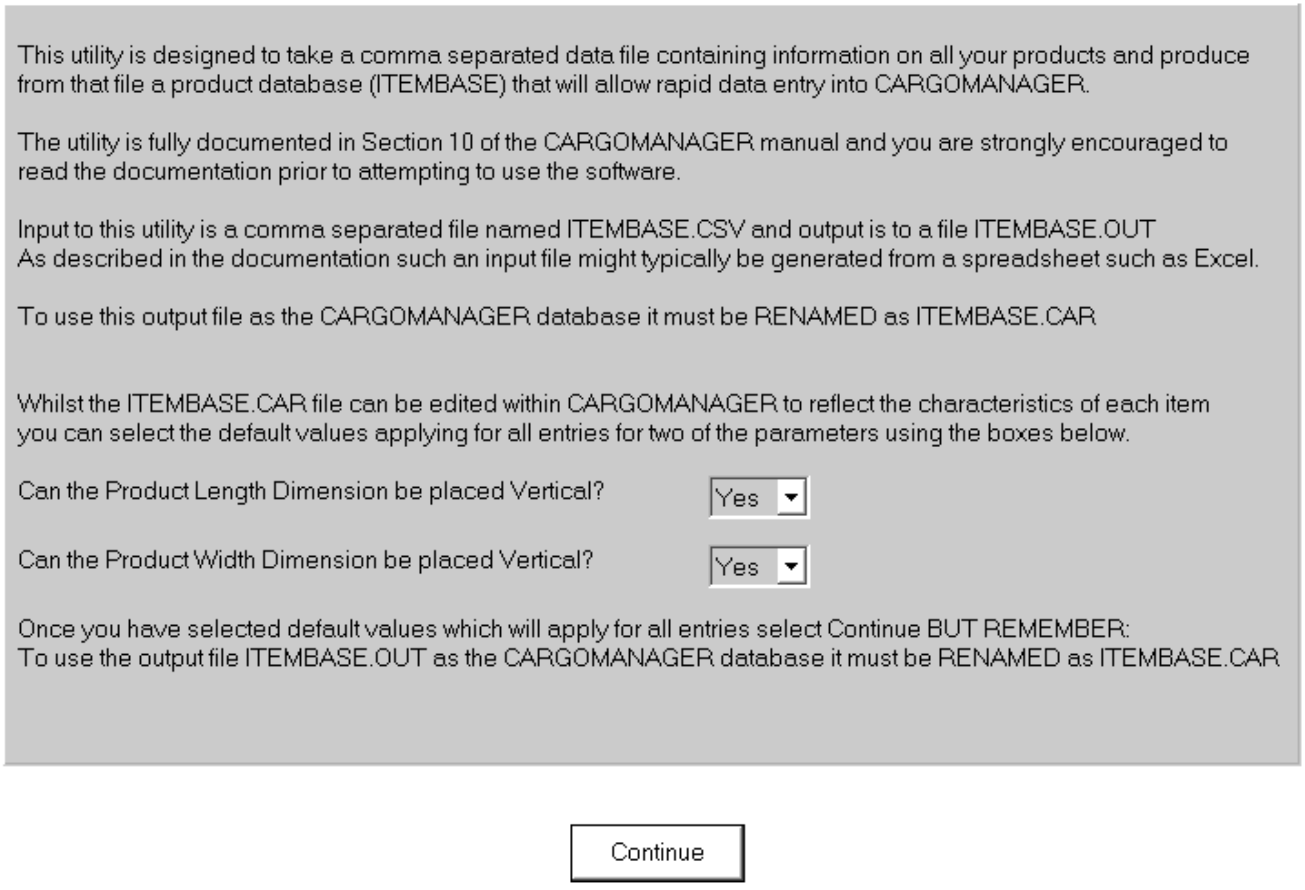


Step 2:

Having created the .CSV file ITEMBASE.CSV (which must be saved or copied to the **CARGOMANAGER** installation folder), the next step is to run the MAKEIB utility to create a suitable database output file. The program MAKEIB.EXE will be found in the **CARGOMANAGER** installation folder (or may be supplied separately).

If supplied separately it must be copied to the **CARGOMANAGER** installation folder, as must the ITEMBASE.CSV file. [The utility will only function within the **CARGOMANAGER** installation folder].

The utility can be run by double-clicking on the MAKEIB file when viewing the folder in Windows Explorer. The following screen is then displayed:



The screen describes the function of the utility and allows you to decide whether the data on product length and width obtained from the .CSV file will have associated with it default orientation values of Yes or No. Thus if most products MUST have their height placed vertical when packing then default entries of 'No' for both questions should be selected. If most items can be placed in any orientation when being packed then **yes** is appropriate for

both.

Naturally any / all values can be edited once the database is set up.

When you select **Continue** the output file ITEMBASE.OUT will be created. This will normally only take a couple of seconds. ***If there appear to be any problems at this stage then please refer to Appendix 1.***

Step 3:

The file created using the above process is called **ITEMBASE.OUT.** However this is NOT the correct name for the file used with **CARGOMANAGER** as we did not want the utility program to overwrite any existing Item Database. To action the new file as the appropriate database **RENAME** the file ITEMBASE.OUT as ITEMBASE.CAR after making sure that any existing ITEMBASE.CAR file is not required.

If there appear to be any problems with the database then please refer to Appendix 1.

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SECTION 11 - The CARGOMANAGER BestCont Facility.

(Covers: Configuration of active containers; Data Entry; Selecting BestCont mode; Interpreting results)

In all the previous sections of this manual the focus of discussion has been on the packing of a single selected container size in the most efficient manner. A container size is selected, a set of cargo defined, and the best packing of that cargo set into one or more identical containers is carried out.

It should perhaps be emphasized that having carried out a packing into a container / containers of a given size it is easy to step back, change the container size in just a few seconds, and re-pack using another container size. However the two facilities described below make such repetitive actions un-necessary.

CARGOMANAGER provides users with **TWO** facilities to tackle problems where the container size / sizes to be used are uncertain, and assistance is required to determine the most suitable container size for use with a given consignment.

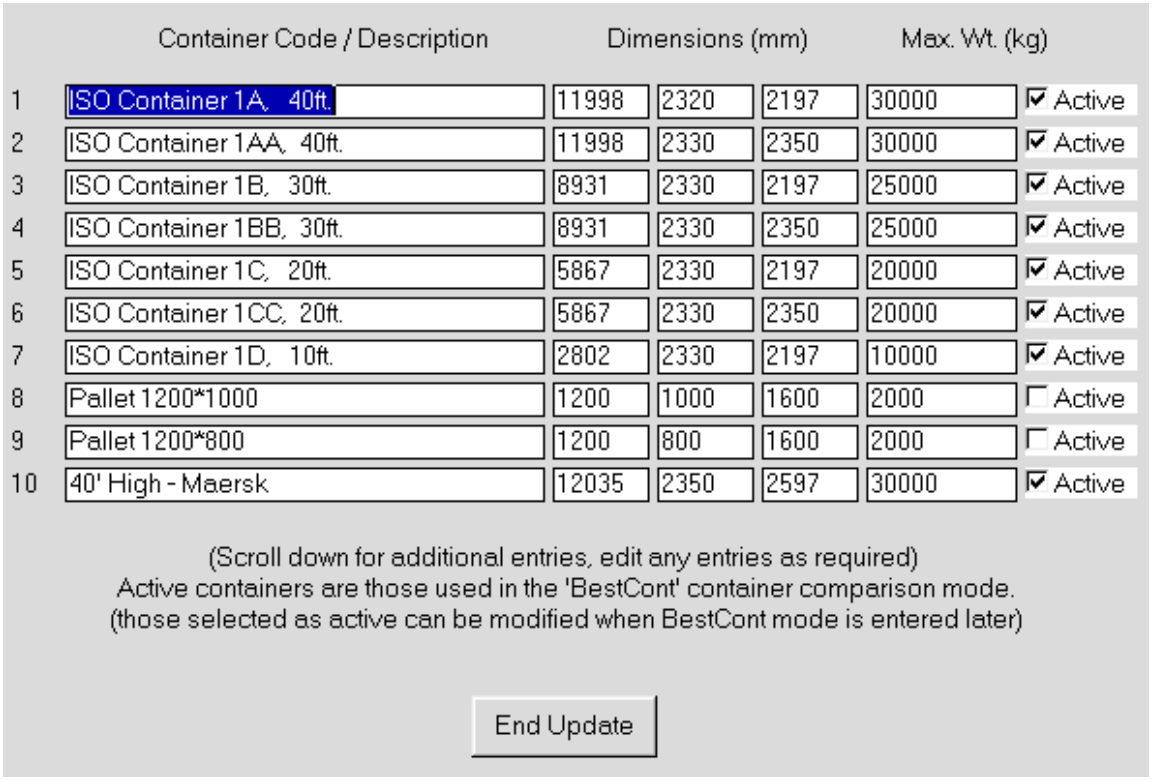
1. The **BESTCONT** mode of operation (described in this Section) tackles problems where the final consignment is likely to require just a SINGLE container, and the user wishes to determine which of a number of available container sizes is most suitable for the load.

2. The **MULTICONT** mode of operation (described in Section 12) tackles problems where a number of identical containers are likely to be required for a consignment, and the user wishes to determine which container size is most effective / most economical for loading the given cargo.

The remainder of this section considers the BestCont option in which multiple container sizes can be examined and ranked in efficiency in a single step.

Container Selection & Configuration.

As in all previous modes of operation the container database is the starting point when carrying out a BestCont analysis. The **ContBase** option on the opening screen provides access to the database of **50 container sizes** which can be edited to meet you own container / trailer sizes and configurations. This screen is shown overleaf:



	Container Code / Description	Dimensions (mm)			Max. Wt. (kg)	
1	ISO Container 1A, 40ft.	11998	2320	2197	30000	☑ Active
2	ISO Container 1AA, 40ft.	11998	2330	2350	30000	☑ Active
3	ISO Container 1B, 30ft.	8931	2330	2197	25000	☑ Active
4	ISO Container 1BB, 30ft.	8931	2330	2350	25000	☑ Active
5	ISO Container 1C, 20ft.	5867	2330	2197	20000	☑ Active
6	ISO Container 1CC, 20ft.	5867	2330	2350	20000	☑ Active
7	ISO Container 1D, 10ft.	2802	2330	2197	10000	☑ Active
8	Pallet 1200*1000	1200	1000	1600	2000	☐ Active
9	Pallet 1200*800	1200	800	1600	2000	☐ Active
10	40' High - Maersk	12035	2350	2597	30000	☑ Active

(Scroll down for additional entries, edit any entries as required)
Active containers are those used in the 'BestCont' container comparison mode.
(those selected as active can be modified when BestCont mode is entered later)

End Update

What is important for using **BestCont** mode are:

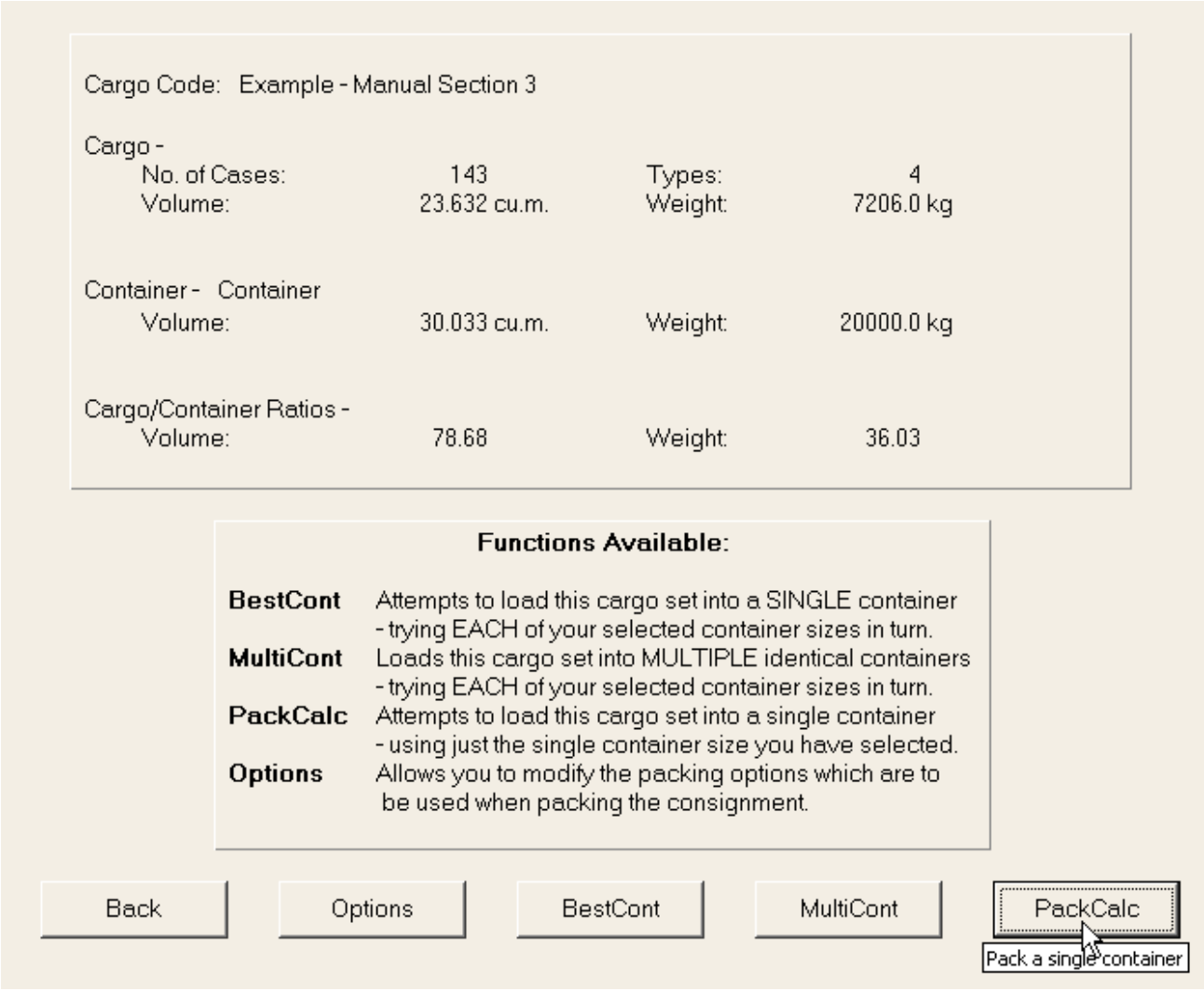
- That suitable dimensional and description information is held for each container / trailer size which might be considered for use. If the dimensional / description information needs to be changed details then this is achieved using the **Contbase** option on the **opening screen**.

- That those which are to be made available for BestCont mode are marked as **Active**. (This selection can be changed immediately prior to running as will be illustrated below).

Having configured the Container Database appropriately the next stage is to enter details of the consignment which is to be loaded.

Data Entry.

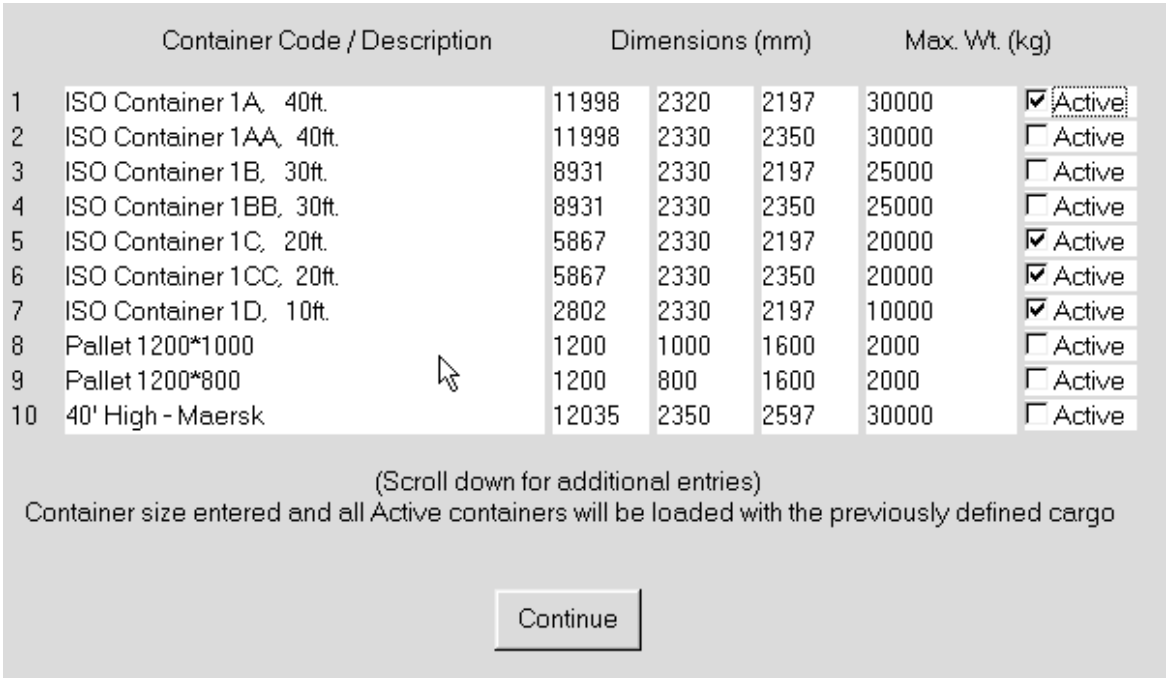
Data entry in this mode follows an identical procedure to that used in other modes of operation. If a new data set is to be input then firstly a container size is selected (for the purposes of this mode of operation this may or may not be one of those Active containers in the database. Then cargo items are input as in other modes of operation. Alternatively a previously saved cargo dataset may be selected. Having entered all cargo items the Cargo Summary Screen is shown as below:



The buttons at the base of screen allow 3 different packing procedures to be followed - the description of the function of each is clearly shown on the above screen.

BestCont Selection.

When BestCont is selected you once again have an opportunity to define Active containers for examination in this mode, though on this occasion you are **not** able to modify the container dimension and descriptions. This screen is shown below. Remember that (depending on version) up to 50 containers may be available in the database - scroll down for further entries.

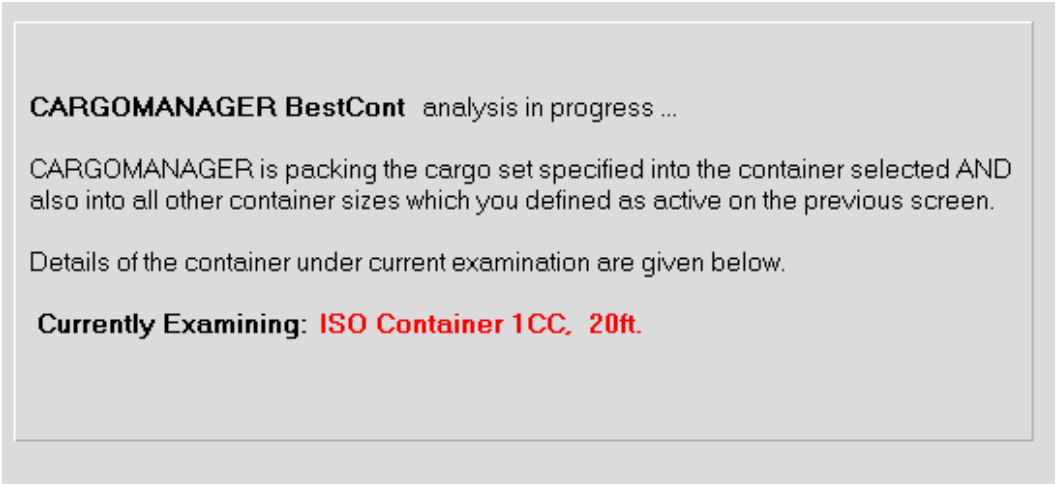


	Container Code / Description	Dimensions (mm)			Max. Wt. (kg)	
1	ISO Container 1A, 40ft.	11998	2320	2197	30000	☑ Active
2	ISO Container 1AA, 40ft.	11998	2330	2350	30000	☐ Active
3	ISO Container 1B, 30ft.	8931	2330	2197	25000	☐ Active
4	ISO Container 1BB, 30ft.	8931	2330	2350	25000	☐ Active
5	ISO Container 1C, 20ft.	5867	2330	2197	20000	☑ Active
6	ISO Container 1CC, 20ft.	5867	2330	2350	20000	☑ Active
7	ISO Container 1D, 10ft.	2802	2330	2197	10000	☑ Active
8	Pallet 1200*1000	1200	1000	1600	2000	☐ Active
9	Pallet 1200*800	1200	800	1600	2000	☐ Active
10	40' High - Maersk	12035	2350	2597	30000	☐ Active

(Scroll down for additional entries)
Container size entered and all Active containers will be loaded with the previously defined cargo

Continue

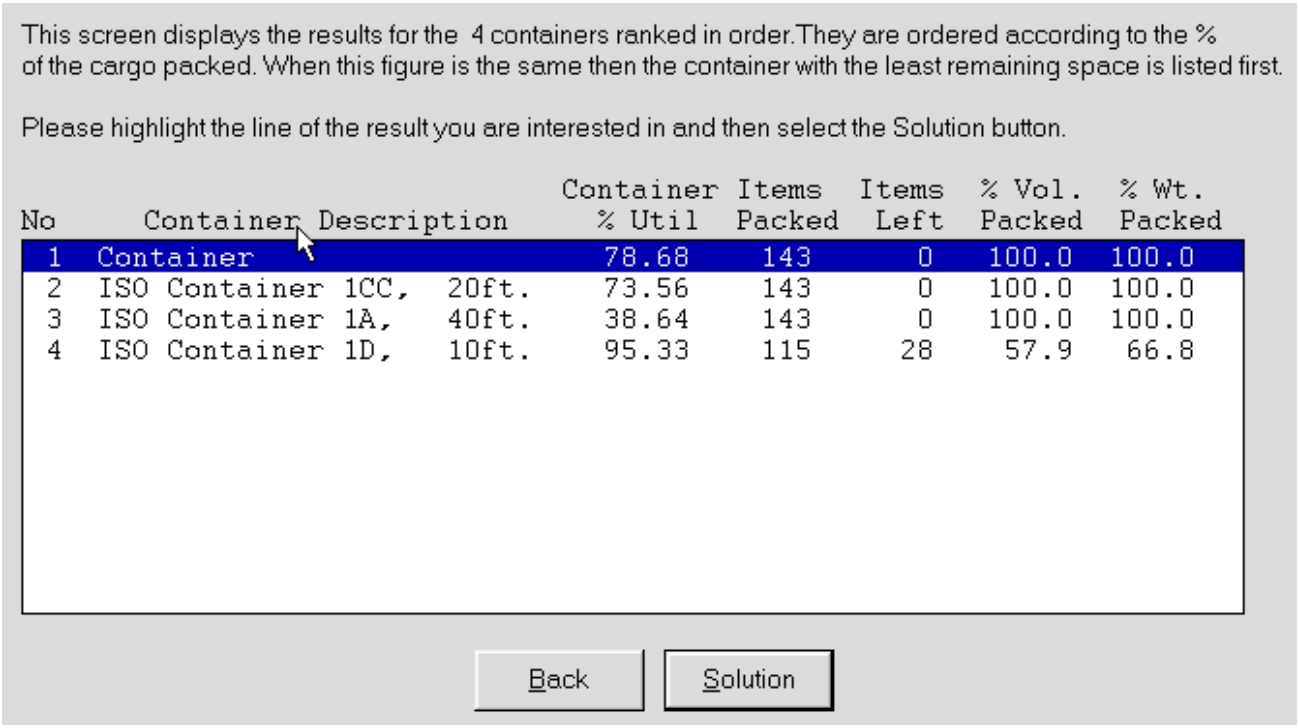
Having made any changes necessary to the set of Active containers the continue button leads you on the a screen where you are kept informed of the progress of the analysis:



following which the a results summary screen is shown.

Results Display and Interpretation.

The results screen then displayed is shown below. In this instance just 4 containers have been listed but all 50 containers (plus the container size entered during data entry) could be marked as Active and examined in a single step. As you will see the time taken to perform such an analysis is usually just a few seconds per container size.



The results are ranked according to their performance. All (any) containers which fit all the stated cargo are listed at the top, with those that fail to fit the entire cargo listed below. For those fitting all the cargo they are ranked with the container with the highest utilisation (i.e. that with the least remaining space) highest on this list. Where the consignment has zero weight then (naturally) no figures will be displayed in the % weight packed column.

Having examined these results you then need to highlight the result you wish to examine in more detail and then select **Solution**. This will then perform the analysis needed to draw the load arrangement and, prior to this, allows you to examine in tabular form the quantities of each product loaded / excluded for your chosen container.

It is important to note that:

- The solutions obtained for each container are identical to those which would have been achieved had the specified container size been selected originally and used with the cargo set in 'normal' single container **PackCalc** mode.
- If the container size originally entered and that of one of the active containers match exactly, then the duplicate entry will not be examined.
- The **Options** used when packing each of the containers are once again identical to those which would be used in either PackCalc (or MultiCont) mode, as specified on the Options Selection screen.
- After carrying out a BestCont analysis the tabular results for the selected container sizes can be accessed from following screens using a **BestCont** button - thus you can display the tabular / graphical results for any / all of the containers before selecting which to use.
- If the **Back** button is used to return to the Cargo / Container data entry screens then the container size then in use will be that **originally entered** during data entry and not any entry highlighted and examined in BestCont mode.
- The ranked list will be deleted once a new cargo set is entered / loaded, additional cargo added or the packing options changed. You can then choose to run BestCont again (with perhaps a modified cargo list or modified list of Active containers).

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SECTION 12 - Multi-Container Mode.

(Covers the Introduction, MultiCont Operation, PrintAll, Adding Cargo, Levelling Cargo, Further Points)

12.1 Introduction.

As described in Section 11, **CARGOMANAGER** provides users with **TWO** facilities to tackle problems where the container size / sizes to be used are uncertain, and assistance is required to determine the most suitable container size for use with a given consignment.

1. The **BESTCONT** mode of operation (described in the **previous Section**) tackles problems where the final consignment is likely to require just a SINGLE container, and the user wishes to determine which of a number of available container sizes is most suitable for the load. In such instances **CARGOMANAGER** will load the maximum amount (volume) of cargo into the various container sizes selected. It will, of course, take into account aspects such as cargo fragility, heavy items and priority / priority grouped cargo.

2. The **MULTICONT** mode of operation (described in **this Section**) tackles problems where a number of identical containers are likely to be required for a consignment, and the user wishes to determine which container size is most effective / most economical for loading the given cargo.

Earlier in his manual, in Section 4.2, the basics of **MultiCont** operation were introduced in the context of determining the number of identical containers of a **single stated size** that were required for a given consignment.

In summary, whenever running **CARGOMANAGER**, following data entry of a Container Size and the Consignment Details **three packing modes** are available to users:

1. **PackCalc** packs as much of the given consignment as possible into **single container of the stated size.**
2. **BestCont** examines how well each of a **number of container sizes** selected by the user perform when packing the consignment into a **SINGLE** container, the results being ranked according to performance.
3. **MultiCont** examines how well **the stated container size** (together with - if requested - **each of a number of other container sizes** selected by the user) perform when packing the consignment into **MULTIPLE** containers of each size - once again ranking the solutions obtained.

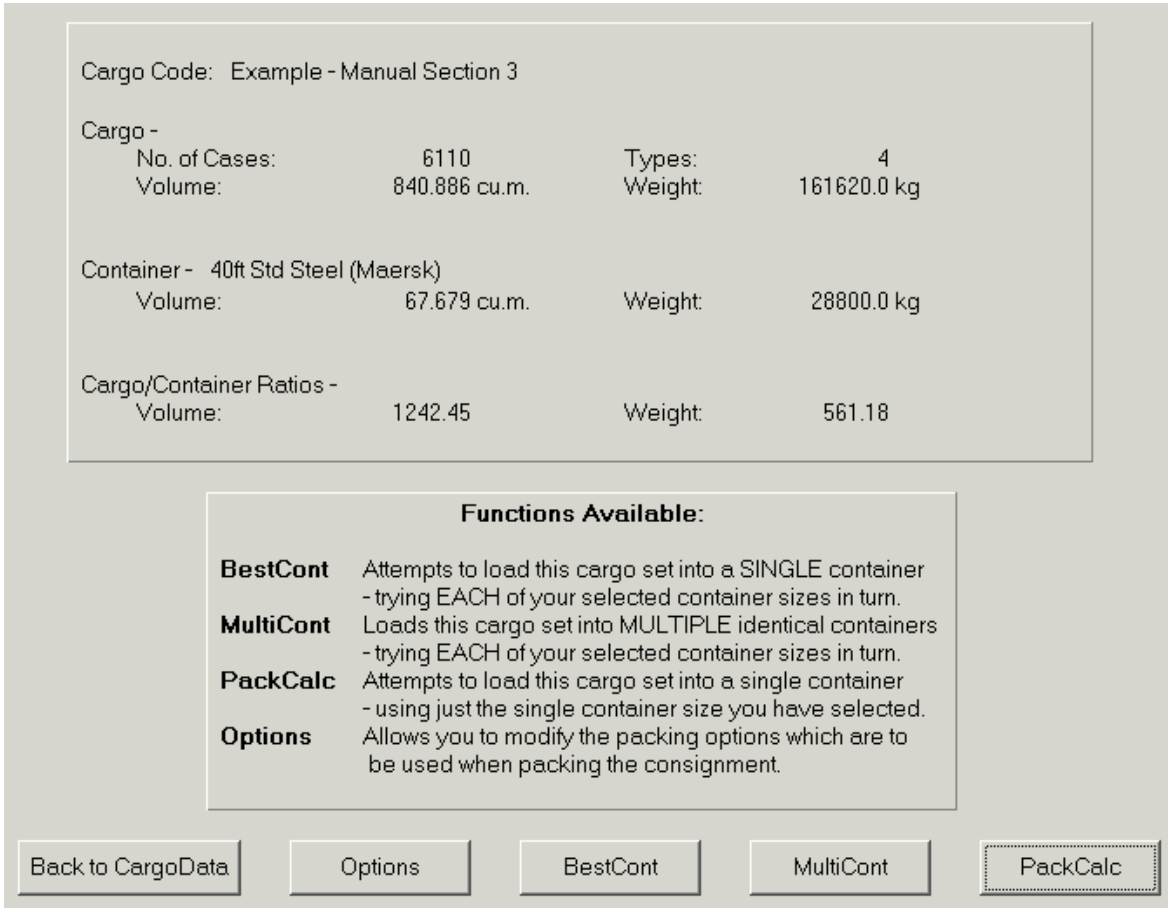
The **PackCalc** (standard) mode of operation was introduced in Section 3, **BestCont** is dealt with in Section 11, whilst the remainder of this section covers **MultiCont**.

12.2 MultiCont Operation.

Before going on to describe the operation in detail it is important to emphasize one important characteristic of multiple container loading - that is that packing as much as possible into the first container, then taking the remaining items and packing as much as possible into the 2nd container and so on may **not** lead to a multiple container solution which minimises the number of containers used. Using this approach items that 'pack efficiently' may be used up in the early containers, with 'awkward' items being left for later containers.

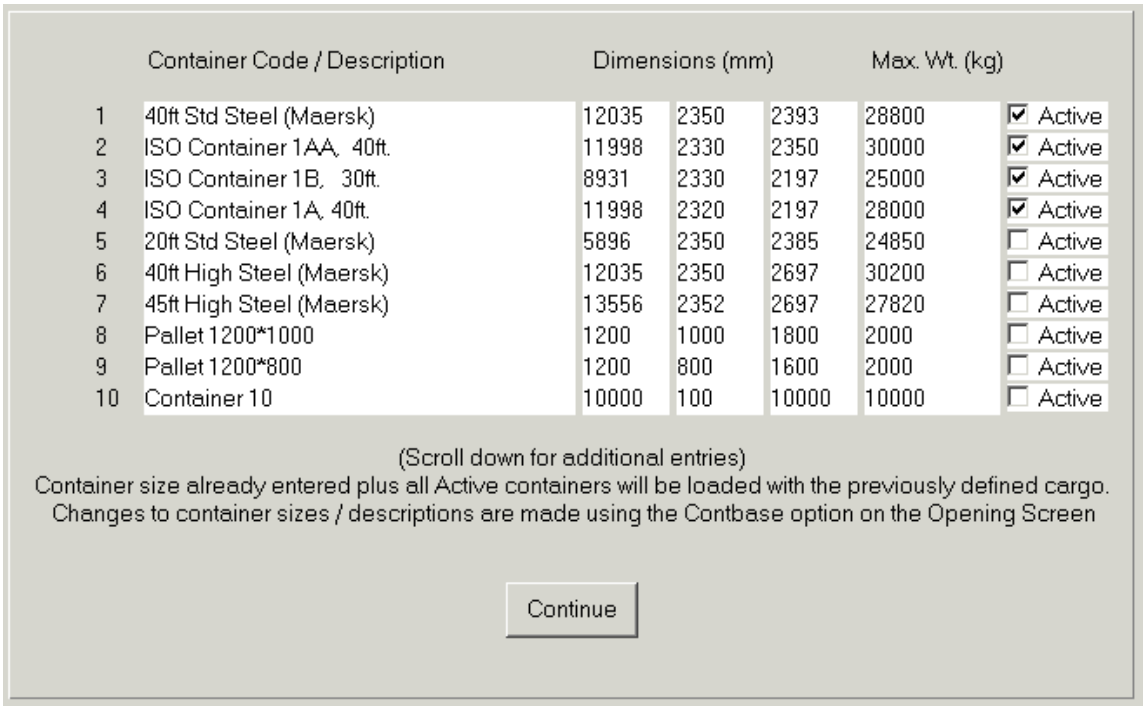
Whilst **CARGOMANAGER** **initially** uses similar packing techniques in loading both single and multiple container loads (i.e. in BESTCONT and MULTICONT), it uses additional packing steps in MULTICONT mode which take account of the characteristic described above. Thus, for example, MULTICONT might utilise a solution for its 1st container which fitted a little less than was possible using BESTCONT, but overall the efficiency over the multiple containers will be at least as good, and probably better, than multiple uses of BESTCONT.

In all instances, following data entry of a Container Size and Consignment Details, **MultiCont** can be selected from the packing options available. The screen from which it is selected provides you with information on the volume / weight of cargo specified when compared with the volume / weight limit of the container you initially selected. An example of this screen is shown below:



On selecting **MultiCont,** after firstly saving the cargo list to file, you are then presented with a screen from where you can select which (IF ANY) alternate container / trailer sizes should be examined in addition to the one already defined during data input. If none of the container sizes are ticked then CARGOMANAGER will load the given consignment into multiple containers of the size already specified.

This screen is shown below:



This screen details the container details held in your Container Database (up to 50) and when first run all the Active boxes to the right of the screen will be blank (unticked). Changes to descriptions / dimensions can only be made by

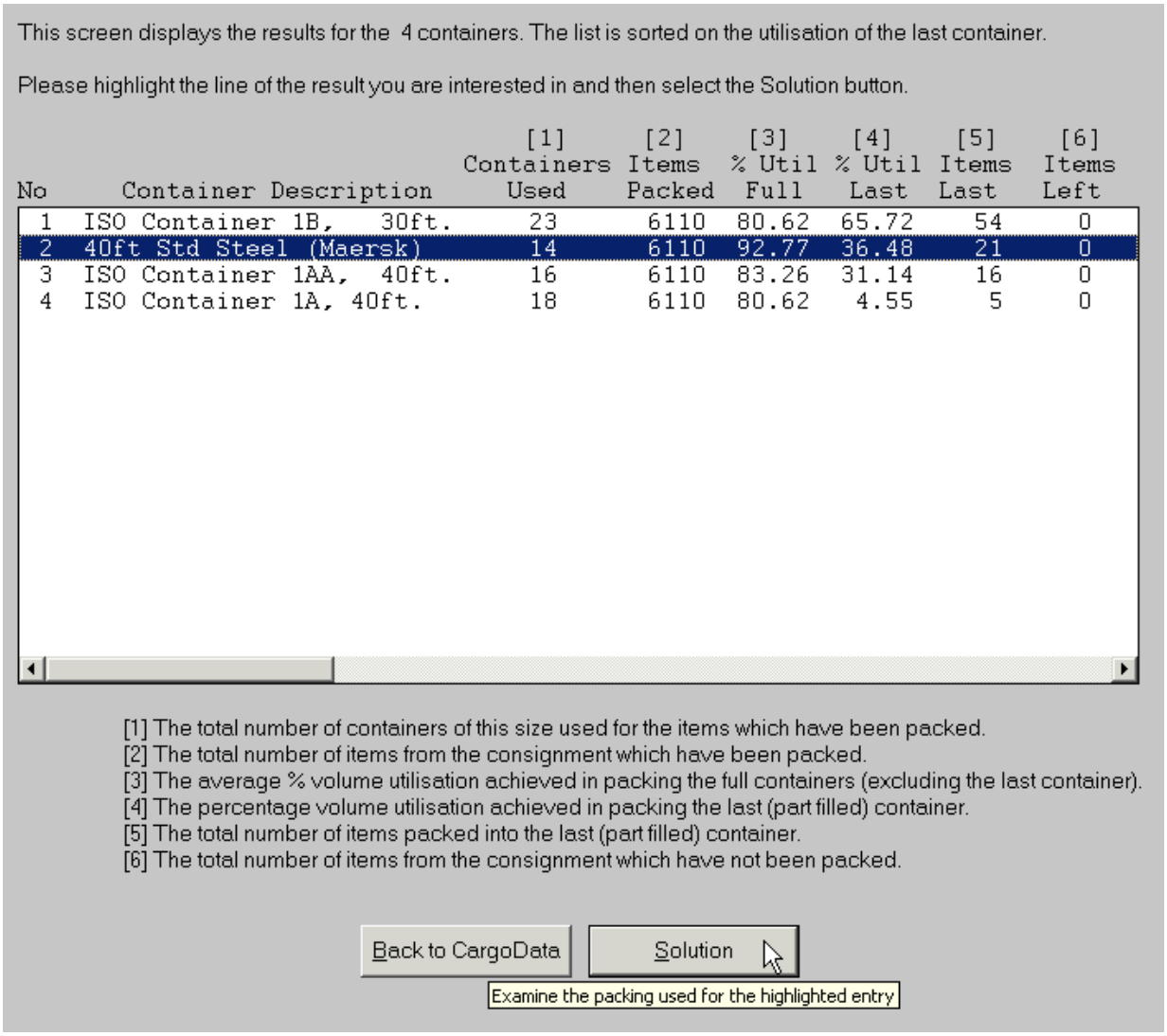
selecting ContBase on the opening screen.

- **IF the container size you wish to use for this multi-container load is FIXED**, and no other container size is available / can be used, then you should ensure that **none** of the Active boxes are ticked and then select **Continue**. A packing will be carried out of the given consignment into the given (input) container size, and the number of containers required will be calculated.
- **However, IF you are interested in the possibility of using another container size** in place of the one size originally input then you can mark those container sizes as active before selecting **Continue** (as in the above diagram). **CARGOMANAGER** will then pack the given consignment into multiple copies of the container size you originally selected, and then repeat the exercise using each of the other container sizes you have marked as active. The results are then tabulated and you can select the solution you believe is most suitable. For any given consignment, and any selected container size, a load of up to 248 containers will be packed.

Before actually packing the cargo you will, as in other modes of operation, be able to save your cargo / container data to file (using either a default filename or a name selected to identify this particular consignment).

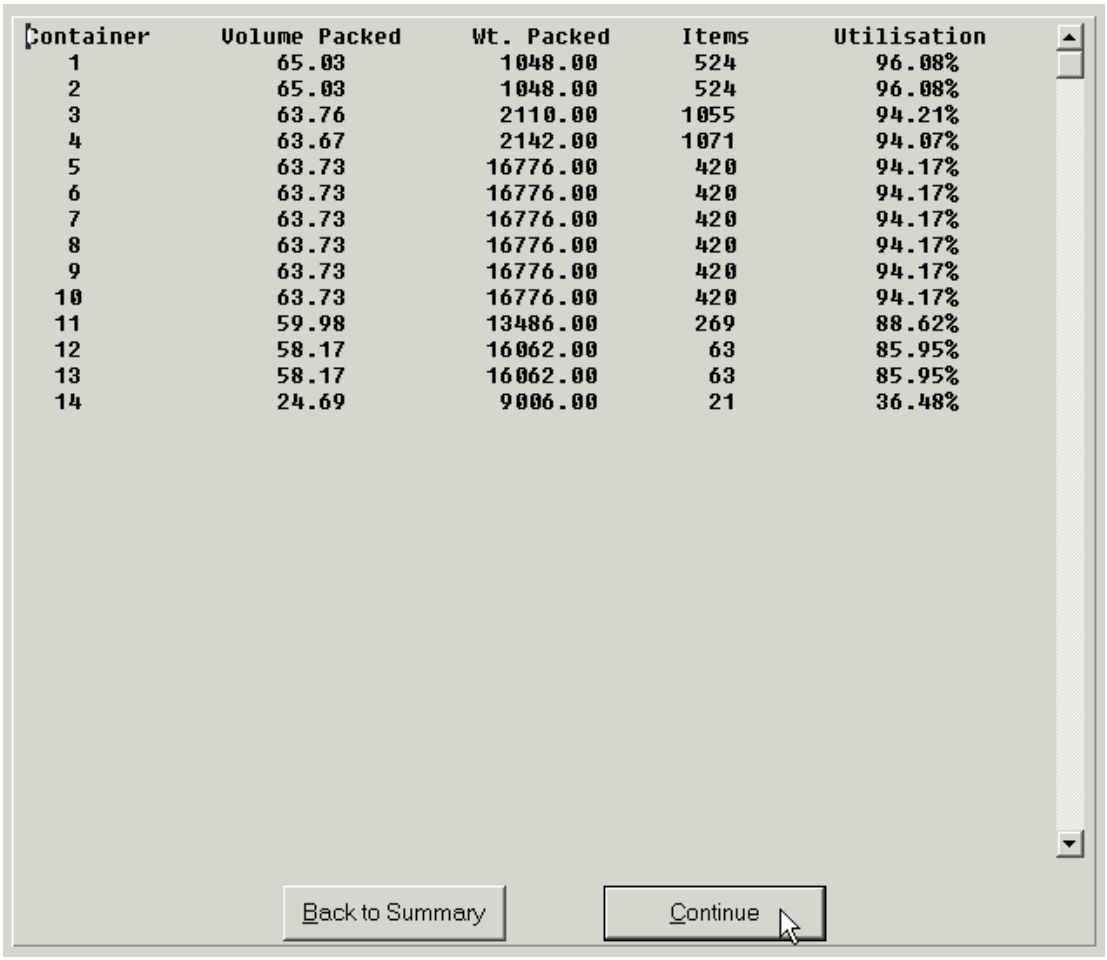
Having done so a Calculations screen will be displayed showing the progress of the packing process. Following this a screen is displayed which displays the performance of the 1 (or more) container sizes for this cargo. When just one container size has been specified (and no additional ones from the container database), then you will proceed directly to the results for that one container.

In Multi-Container comparison mode, from the screen (shown below) you can select the container size you are interested in (here we have chosen 40' Std Steel (Maersk) and proceed to display a summary of the cargo loaded into each container.



The text on the above diagram explains what each column represents.

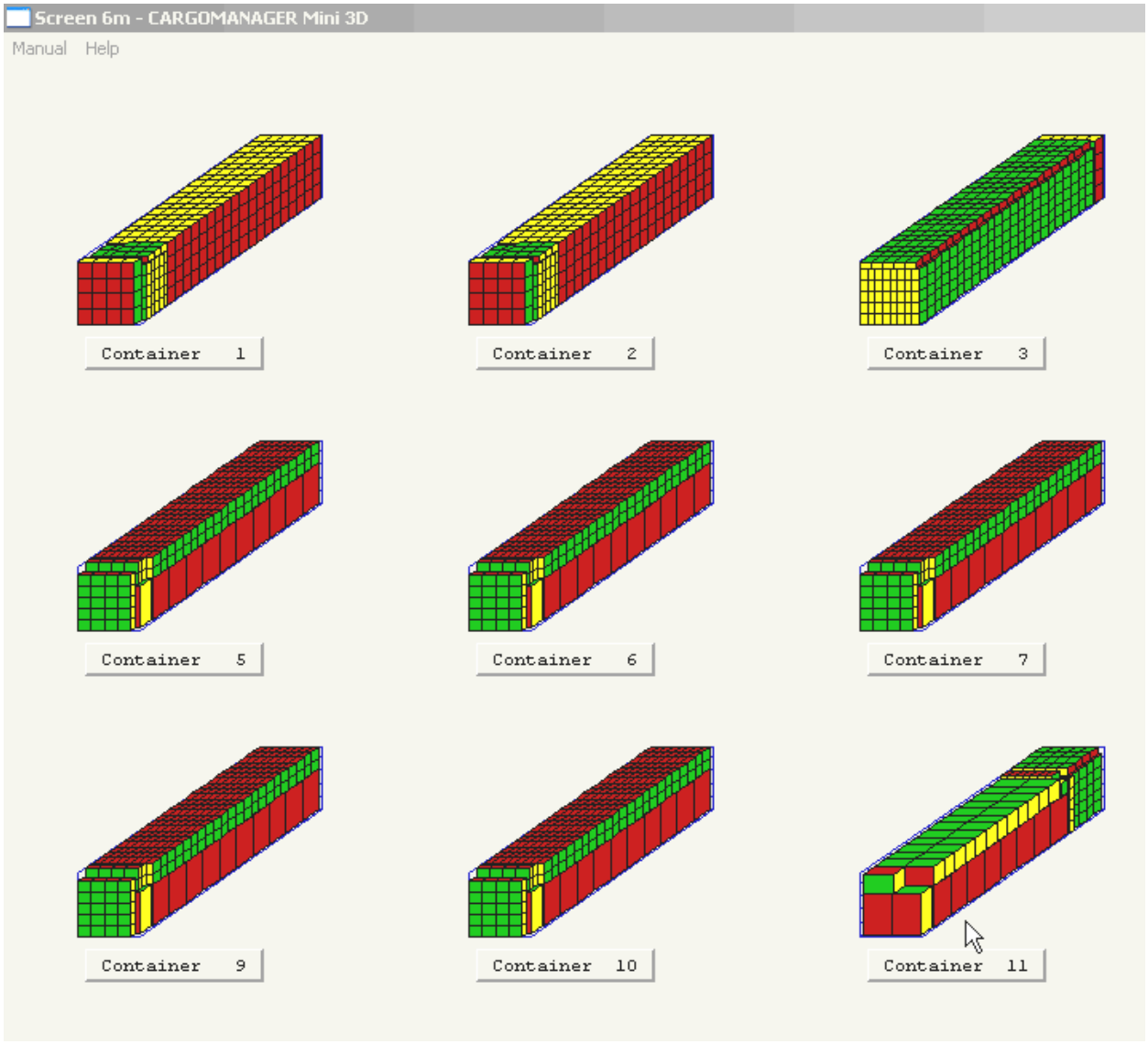
Having selected **Solution CARGOMANAGER** will calculate and display the number of items packed and utilisation of each container as is shown below.



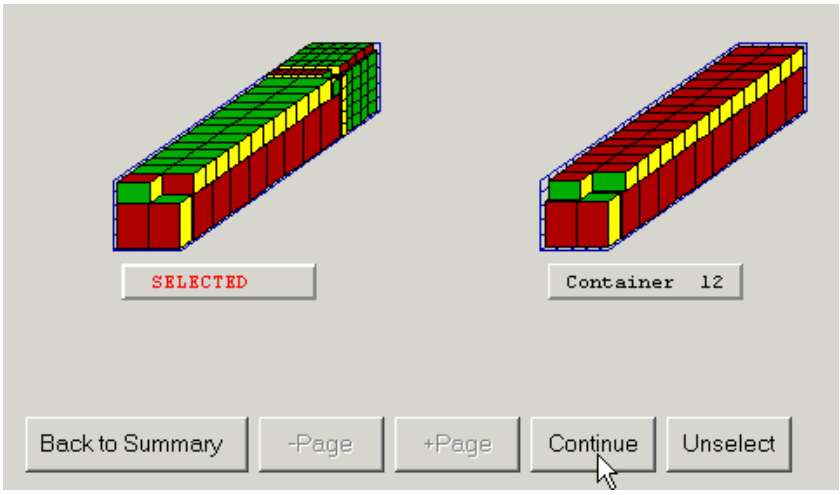
In this example we have 13 'full' containers and a final 14th container which is less than half full. CARGOMANAGER will allow you to add cargo to the final 14th container, and also (if for example some small additional cargo were available) to add items to any / all of the 'full' containers.

Selecting **Continue** saves the consignment details for each container to disk and then displays miniature 3D pictures of the containers - 12 pictures to a screen.

[Just the left hand part of a full screen is shown below]



From this screen any / all of the containers can be selected individually and detailed 2D/3D pictures and Cargo Lists can be produced. The bottom right of the screen has a menu which invites you to select a particular container (or view other pages of solutions - e.g. Containers 13 and 14 in this instance), and then having selected a container continue to display the solution in detail.



The 'Mini 3D' screen acts very much as a menu for further container selection and load plan printing purposes.

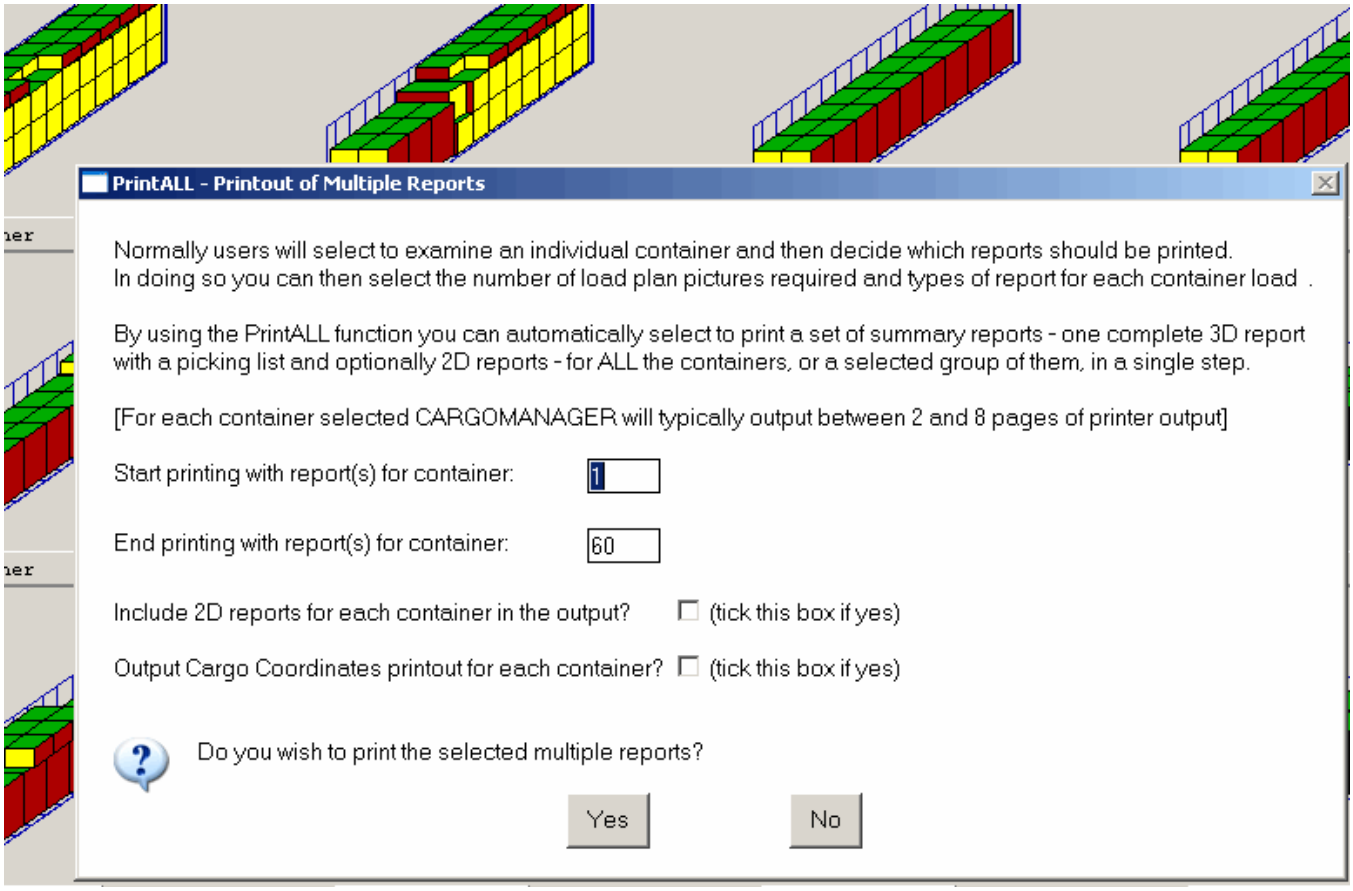
We have recently added a further facility to the menu on the above screen - **PrintALL**, which allows you to print out immediately a 3D load report and consignment picking list for either ALL containers or a selected range of these. You

can in addition select whether the three 2D reports associated with each container are to be output, and whether the Cargo Co-ordinate Report is also to be output. When using this function you should note that

a) Just one 3D fully loaded container diagram is produced for each container and

(b) you can generate a large volume of paper output very quickly!.

Users who select to examine each container individually (as per previous versions) can naturally select the number of type of reports needed for each container individually.



When **PrintALL** is used a single 3D report (with picking list) and optionally 2D and Cargo Co-ordinate reports are output. With most utilities which can be used to produce PDF or other image formats (Adobe Acrobat / CutePDF / Broadgun PDF) for saving to **DISK** the default filename will be based on the Container Description you input and a **single file** will be produced containing all the selected reports.

12.3 Adding Cargo.

The packing carried out by **MultiCont** will normally result in the packing of all the consignment. The two exceptions to this are (a) if an item is too big to fit into the given container size or (b) if the consignment requires 248 containers (or more).

Until the user selects to Add Cargo to any container it will still be possible to return to the Cargo Data (using the Back to CargoData button) and make changes to the data. Once you **Add Cargo** to any of the containers the additional cargo you enter will be added to any remaining items in the original consignment.

Additional cargo can be added to any / all of the containers (space and weight limits permitting) - this being done by selecting a particular container, selecting Continue and then selecting Add Cargo from the screen which follows. At any time, when returning to the 'Mini 3D' screen the most up to date loading plan for each of the containers is displayed. However you will NOT be able to go back from the Mini 3D screen to the original cargo set.

Thus a user might, for example, select Container 4, and then Add Cargo. The original cargo descriptions would be shown (with zero quantities against each). Additional quantities of these, or more usually new cargo items, would be added and the new cargo set would be packed (as far as possible) into Container 4. If then, Container 5 was highlighted

for examination and, once again, Add Cargo selected, any unpacked items remaining in the Cargo Dataset would form the initial Add Cargo dataset and this, together with any additional items then added would be loaded into Container 5 etc.

Thus once you select to Add Cargo to any container in the solution an 'Additional Cargo' dataset is created which can be used with any container.

12.4 Levelling the Load.

At any time when viewing (full screen) the load a **Level Cargo** option is available. This will level the load (where possible) in the current container and allow the user to print out load diagrams as required. The original (Unlevelled) load is always used as the base to which cargo is added using Add Cargo.

Only when the user selects to Load further containers with Remaining Cargo (an option only displayed when working with the final container) will the set of multiple container load plans be deleted and a new set of load plans produced.

12.5 Further Points to Note.

- During the calculations phase **CARGOMANAGER** calculates the loading of each container size in turn, and whilst it is doing so details of the container being examined are displayed on screen. A display window is also presented in the middle of the screen which shows you how the packing is progressing. Normally just 5-20 seconds are required to complete the packing of each container. The display window also contains a 'Break Early' button. This allows you to shorten the calculation phase associated with the packing of each container, but if this is used then the solution obtained may well not be as good as that which would have been obtained if no action had been taken.
- The results (naturally) take account of both the characteristics of the consignment and the container. Thus on occasion a result may appear unusually poor - perhaps due to container weight limits. This would be stated in the results if the US container was selected and a solution requested.
- The only attempt made in the table to rank solutions is by utilisation of the last (part-filled) container. Clearly you may have costs figures available comparing the costs of using each selected container size.
- Having selected the Solution button a table (Screen 6 - Tabular Packing Results) giving the load efficiency of each of the containers (of the selected size) is displayed. Following this you can examine the load plan for any of the containers, to which you may wish to add additional cargo or level the load.
- Also, from Screen 6 - Tabular Packing Results - you can select **Best/MCont.** This returns you to the screen displaying the various container sizes and their performance. You can then select an alternate container size and examine this in greater detail.

12.4 Obtaining Loading Plans.

MultiCont clearly has an important potential role as a quotation 'estimation' tool, but as shown above the complete set of overall load plans is immediately available. These load plans take full account of cargo and container restrictions, and thus the word estimation is in-appropriate - the quantities reported CAN be fitted.

It may be of interest to users to note that **CARGOMANAGER** does maintain a list of the items packed in each container after each loading in a file **mcontent.out** located in the **CARGOMANAGER** folder. Whilst a few users do utilise this file as a data source, most users will naturally require full graphical reporting.

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SECTION 13 - Cylindrical Packing.

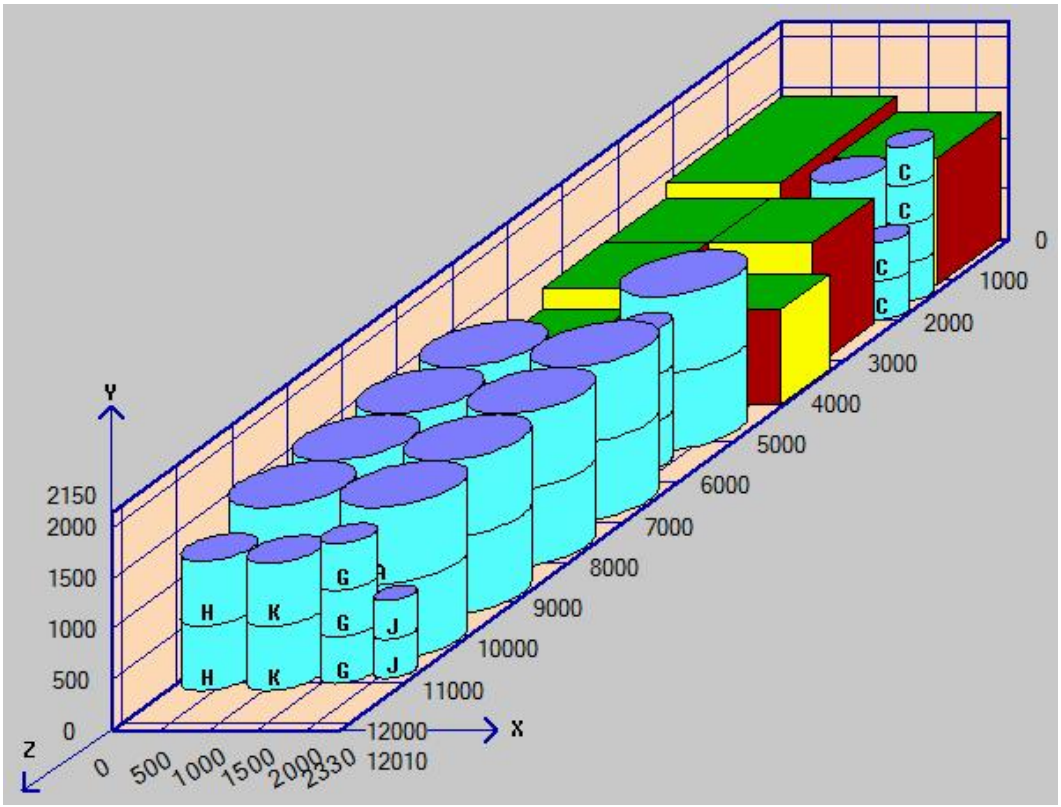
(Covers: Introduction, Data Input, Obtaining practically appropriate solutions, Cylindrical items and the Linkfile)

13.1 Introduction.

The ability to input details of both Cubic and Cylindrical items is a feature of this release and this section of the manual considers how this should be done in order to obtain the types of packing that meets your practical needs. It should be emphasized that this work is ongoing and user feedback on facilities they would like to see incorporated would be much appreciated.

Also, if reading this Section from a **printed manual** you might wish to reference the electronic version within the software application to see if changes have been incorporated following manual printing.

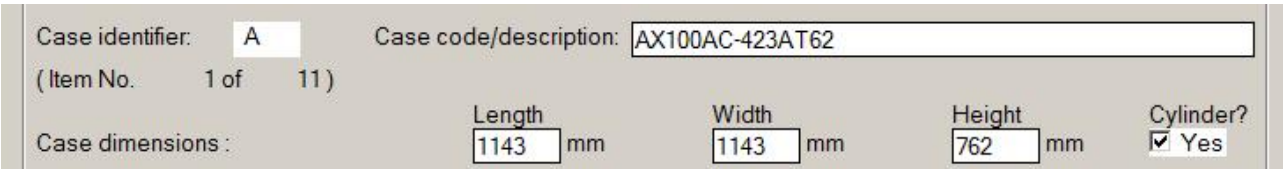
An example of the type of solution you can obtain is shown below:



Obviously such a complex packing can be output for loading purposes as a series of load plans and picking lists for sections of the container.

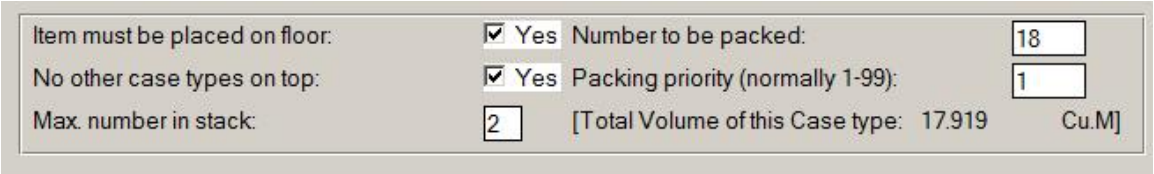
13.2 Data Input.

When entering data on cargo items into the main cargo input screen you have available a tick-box which is available to you in instances where the length and width of the item are the same so that the cylindrical nature of the item can be specified:



Having done so you may also need to make some changes to the characteristics of the item such as those indicated

below:



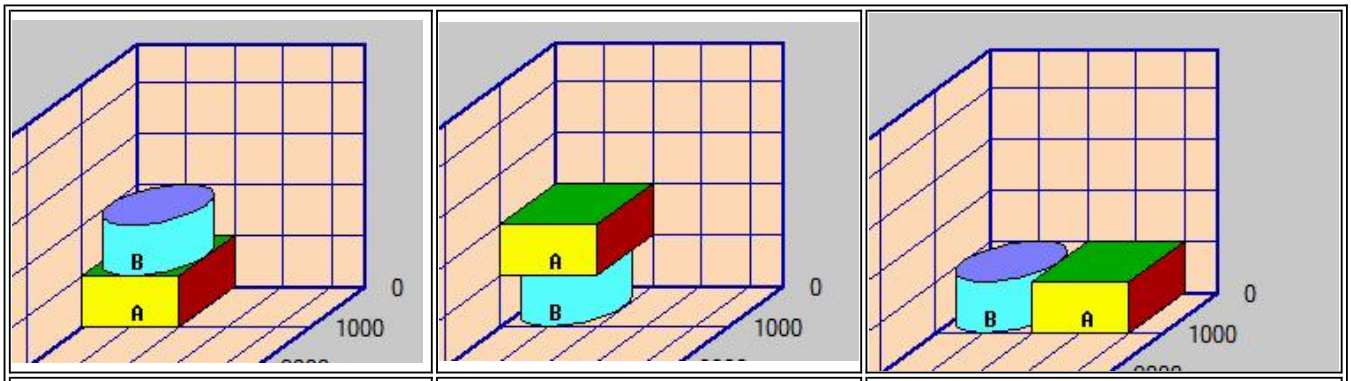
In the container load shown above the various cylindrical items are all required to be placed on the floor of the container and can be loaded 2, 3 or 4 units high depending upon their individual characteristics. What is important, and is the subject of the paragraphs below, is that settings for Item Characteristics and/or Packing Priorities / Packing Rules result in solutions that meet the practical requirements of your cargo set.

13.3 Obtaining practically appropriate solutions.

In practice several different types of solution might be valid depending upon the characteristics of the items being packed.

The full container load shown earlier is, in our experience, the most usual type of load encountered. Cylindrical items are NOT mixed with no-cylindrical ones (all the cylinders are defined as being on the container floor, a number of units high, and having no other case types - cylindrical or otherwise - on top).

However one might wish to obtain any of the 3 solutions shown below:



A.	B.	C.

To obtain solutions of the type **shown in A. above** one needs to ensure that all the rectangular cargo is packed first before attempting to pack cylindrical items. This could be done by packing all the rectangular items first and then using the 'Add Cargo' option to add-in the cylindrical items. Alternatively one could specify that all the rectangular cargo was of priority 1 and that cylindrical items were of priority 2 and load the cargo strictly according to priorities.

To obtain solutions of the type **shown in B. above** (should this be a real requirement - we think not!), then the reverse of the procedure discussed for diagram A. can be adopted. If the cylinders are set to be 'on-floor', and other box types are allowed on top, and the boxes are not set as floor based then this type of will be automatically be obtained.

As previously discussed we believe that the most usual requirement is as shown in C. above, and as adopted in the fully loaded container shown at the start of this manual section. The cylindrical items should be set 'on-floor and no other case types on top'.

Once again this is a relatively new feature of the software and feedback on practical needs would be much appreciated.

13.4 Cylindrical Items and the Linkfile.

As is described in Appendix 3.8 the format for the Linkfile has been extended to deal with Cylindrical Items in a manner which is also compatible with previous format Linkfiles. An additional single parameter may be specified as the last entry on a line as 0 or 1 and this will define the type of item - cubic or cylindrical.

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SECTION 14 -GLOSSARY OF TERMS.

Additional Cases.

Those cases which do not form part of the cargo as originally specified.

Alternate Packing Strategies.

Case arrangement rules developed during a **CARGOMANAGER** run. Used to attempt to provide improved packing solutions.

Calculation Screens.

Those screens displayed during and immediately after the packing has been carried out by **CARGOMANAGER**.

Cargo.

The cases etc. which are to be loaded into the container.

Case.

A general term used in this manual to represent any individual cargo item.

Case Characteristics.

The numeric and descriptive information input on each product to be packed.

Complexity.

A numeric selection between 0 and 4 which indicates the degree of sophistication of the layouts which will be tried. A value of 1 indicates simple patterns.

Container.

Any rectangular unit into which cargo is to be loaded.

Container Characteristics.

The numeric and descriptive information on a container.

Drawing Mode.

When drawing on screen and printer two approaches are available. A 'block' mode in which a complete block of identical boxes in an identical orientation are drawn in one step, and a 'sectional mode' in which box drawing is based on individual boxes.

Effort Once Packed.

A numeric value between 1 and 3 entered on the Packing Options screen. A value of 1 indicates that the user is only interested in whether the load will fit and not in obtaining a 'tidy' packing. A value of 2 is probably appropriate in most instances.

End Packing.

The process whereby additional cargo is specified for loading AFTER an initial placement of cases in the container has been made.

Esc Operation.

This button is used in both INPUT and Calculation phases for user action. See appropriate sections of the manual.

Fragile.

A cargo item is unable to have items other than of an identical type placed on top of it. The number of layers may also be restricted.

Heavy Item.

A cargo item must not be placed on top of any other type of cargo item. Normally such a cargo would need to have each item placed on the container floor.

Input Screens.

Those screens used to request user input or to report on the characteristics of the intended cargo.

Levelled Load.

An arrangement obtained (by selecting Level Load) in which the cases are 'spread' so as to occupy as much of the container base as possible. Two approaches are utilised depending upon settings on the 'Packing Options' screen.

Link Option.

A facility providing for the input of a user generate input data file.

Loading Arrangement.

The physical arrangement of cargo in the container.

Multi-Drop Loads.

Instances where parts of the cargo are to be unloaded at a number of different destinations without the complete container being unloaded at each destination.

Packing Display Screens.

Those screens which provide on-screen and printer diagrams of the arrangement to be used.

Packing Restrictions.

Constraints which may need to be applied to the way in which each type of cargo is packed. See also fragile and heavy.

Priority Code.

A value between 1 and 99 which indicates which items in a cargo are most important in terms of their packing.

Un-Levelled Load.

An arrangement in which the loaded cases are placed as far to the end of the container as possible, thereby allowing space for additional later packing.

Volume Utilisation.

The percentage of the total internal container volume which is occupied by cargo.

Weight Limit.

The limit imposed by the user on the total weight to be loaded into any one container.

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APPENDIX 1 -FURTHER TECHNICAL INFORMATION.

Introduction.

This Appendix covers a variety of additional technical aspects of **CARGOMANAGER** operation. You should also note that additional information is also available on our website at www.goweralg.co.uk

1.Installation Folders.

The **CARGOMANAGER** files themselves (of a fully licensed system) can be installed in any suitable location. (TRIAL systems MUST be installed on a local drive). Around 20Mb is typically required initially, but when used to tackle complex problems - perhaps loading 200 containers, 100Mb of temporary files may be created. As described below (point 2), the location of data files created by **CARGOMANAGER** can be configured to meet user needs. Using the default installation folder (CARGONT on your C drive) is useful to us from a support viewpoint. Currently up to 120 characters can be used for the path length.

2. Location of User Files.

It is possible to set up **CARGOMANAGER** so that files created by the user (these are files with a .DAT extension), and in addition the Container Database (CONTBASE.CAR) and the Cargo Database (ITEMBASE.CAR), are located on a different drive / folder to the one where **CARGOMANAGER** programs are installed. Whilst, for simplicity, **we do not recommend this**, the steps involved are straightforward. In any event users can always browse to another folder when opening or saving files.

In the **CARGOMANAGER** folder a file CMCONFIG holds details of the pathnames which should be used for different types of user files (but **not** for the main set of **CARGOMANAGER** installed files). This file on installation has 4 blank lines (and 4 lines following these describing the potential function of each of these lines). This file should **only** be modified if you need to re-direct file access, and when doing so an editor such as Wordpad / Notepad should be used.

Long folder and filenames are supported up to a total of 120 characters. Comments in the CMCONFIG file should be self explanatory.

3. ERROR Messages.

Routines are included in the **CARGOMANAGER** suite which trap errors and display meaningful messages as to the cause of any such problems.

Jot down the details displayed and, if appropriate, contact your supplier giving as full a description as possible of what actions lead to the error.

4. Computer Specification.

CARGOMANAGER requires a minimum of a Pentium PC running Windows 98 or NT/2000/XP or Windows Vista/ Windows7. Development currently takes place on Vista and Windows 7 machines. A Screen modes of 800*600 (standard small fonts) will work, but a more realistic specification will have 1024*768 or better resolution. Most machines will usually have installed Internet Explorer - though not necessarily as the default browser. The default **CARGOMANAGER** manual (accessed from most screens) uses some IE components to display the full online manual. On systems where IE4 or later is not installed then an alternate (identical content) manual is available which does not depend on IE installation - please see Section A1-10.

Whilst not essential for general operation some more advanced display functions do require that the pc display is set (Control Panel / Display / Settings) **into 32bit / True Color mode. Setting in this mode will provide a far better user experience**

5. Printers.

CARGOMANAGER has been tested on a wide range of Windows systems. Your normal printer driver should prove perfectly suitable for use.

6. Networking.

If **CARGOMANAGER** is installed on a network server, then ideally the network system should prevent multiple access. If this is not possible, then a mechanism within **CARGOMANAGER** can be enabled to prevent multiple access. See the file CMCONFIG for further details. It is essential that such multiple access be avoided otherwise data loss will occur.

7. Backup of Files.

In the event of hard disk failure most of the **CARGOMANAGER** files can be installed from the original CD. The main exceptions to this are:

- Any files saved by the user - all of which will have the extension .DAT and will normally be held in the **CARGONT** (installation) folder.
- The file ITEMBASE.CAR - the Cargo database - (where used).
- The file CONTBASE.CAR - the Container database.

Also see Section 2 for a full list of files.

Your I.T. support staff can best advise on the most appropriate way of keeping backup copies of these files. All files are relatively small in size.

8. The Cargo Database

The Cargo Database created within **CARGOMANAGER** can hold up to 25,000 records. The first record of the file ITEMBASE.CAR contains details of the number of records in the file and, in addition, the number of significant characters to be used to identify products. These two numeric items are separated by a comma. After making an appropriate backup, the second of these two values may be edited (using for example wordpad/notepad) to lengthen or shorten the number of significant characters used during entry of cargo data. The default setting is 12 characters. You should also note that the first entry into this database must be made using the 'Itembase' database program accessed from the opening screen. As standard the database is already populated with a few entries on installation. As described in Section 10 subsequent entries may either use this data entry program or be automatically carried out from cargo data sets as they are entered into the system. (See Section 4.6). In addition facilities are provided to create a database from spreadsheet / database sources. See Section 10.

9. The Link Option.

The interfacing of **CARGOMANAGER** with other applications and databases has already been discussed with respect to the Item Database (see Section 10). An additional powerful feature is the ability of **CARGOMANAGER** to link with a user created cargo datafile containing information on a potential consignment. This file might have been produced from, for example, a mainframe order-entry system. A number of **CARGOMANAGER** users already utilise such a link.

This could naturally be done by creating a .DAT file containing the appropriate details, which could be opened in the same manner as that of .DAT files created by **CARGOMANAGER**. The .DAT files are simple comma separated 'flat' files which could be generated by most applications. What is more crucial is the availability of all the required information within the 'other' system.

Please see **Appendix 3** for a detailed discussion of this facility.

10. Manual and Web Access

Many screens and menu entries provide access the the full manual which is held on disk in compiled HTML format. (In folder manual found immediately below the installation folder). Two versions are provided named **cmmanual.exe** and **cmmanalt.exe**. The former of these is the default and assumes that your computer has Internet Explorer installed (though not necessarily as the default browser), whilst the latter file provides a completely self-contained working environment but a rather less sophisticated search mechanism. If the default configuration fails to work, then renaming the cmmanual.exe file as (say) cmmanual.hld will result in **CARGOMANAGER** automatically using the alternative file cmmanalt.exe.

'Features' introduced by Microsoft (to Windows 2000/XP/Vista) mean that we can no longer provide direct access to our website from within the **CARGOMANAGER** application. However you are encouraged to access www.goweralg.co.uk or www.packyourcontainer.com for further technical, development and support information.

11. The MAKEIB Itembase Utility.

The **MAKEIB** utility allows users to use basic data on products which may be available in a comma separated format to be used to create a product (ITEM) Database. This allows users to more quickly add products to a consignment. The utility is described in detail in Section 10 of this manual but the following points may be of assistance to IT staff should problems be experienced:

The CSV input file must be named ITEMBASE.CSV and must reside in the **CARGOMANAGER** installation folder, as must the utility MAKEIB.EXE itself.

The CSV file must contain in the first 5 fields, a product description, product length, product width, product height and product weight in that order, each separated by commas. If a value is missing (i.e. two commas with no value between), or the value read is out of range then the value (length, width, height or weight) will be set = 999 / 9999.9. Any extra entries on each line of the input file will be ignored.

The output file ITEMBASE.OUT can be viewed using Notepad / Wordpad etc if required. This is a fixed format file with each line containing data relevant to an item.

When the utility produces the output file ITEMBASE.OUT it also produces a file ITEMBASE.LOG which may be useful if some entries in the original file do not appear in the output file. A further file ITEMBASE.ST1 is also produced but is an intermediate file and of no interest to the user. The log file details the processing of records from the .CSV file.

Important: The utility does NOT overwrite the standard item database file (if one exists). In order to use the file ITEMBASE.OUT as your item database you will need to RENAME the file ITEMBASE.OUT as ITEMBASE.CAR.

12. Operating Limits.

The capacity of CARGOMANAGER to deal with an ever-increasing complexity of problem has been significantly enhanced in recent releases. The actual limits applying to a particular license will vary, but the details below define maximum limits that are currently available (v4.9). If you find that the operation of your system requires a greater value than that apparently available then please contact us regarding an upgrade.

Limits:

Number of containers in Database: 50 (10 for CARGOMANAGER Lite)

Number of containers which can be compared against each other for a given load: 50 (10 for CARGOMANAGER Lite)

Total number of individual items forming a consignment: 50,000

Total number of item types (lines of data) forming a consignment: 15,000

Total number of container loads which can be planned in a single step: 998 (1 for CARGOMANAGER Lite)

Cargo Priority range: 1-32000 (normally 1-99 - use of a minimum range of values from 1 upwards will result in faster operation)

Size of Product (Item) database: 25,000 products.

13. Wide Screen Displays.

Wide screen displays are becoming increasingly popular and, depending upon the operating system in use, users may well wish to use the right hand side of the display to display, at all times, useful tools (such as a clock!).

To ensure that the software display does not take over the full screen when it is being used on wide screen displays the window generated on such screens is automatically reduced so that it initially occupies around 70% of the screen (depending upon screen ratio), with the window being positioned to the left top of the screen. The window can be moved (using the mouse), or expanded to full screen (by clicking on the top title bar of the window). However the automatic re-size will ONLY apply when the graphics resolution used by the graphics adaptor differs from the standard width / height ratio of 'normal' screens - that is 1.33 or 1.25. Thus re-sizing would apply, for example, when using a graphics resolution of 1680*1050 - a 1.6 ratio.

The vast majority of users will normally have set a standard font size (of 96dpi) and the automatic reduction in the screen width utilised as described above will NOT result in information being lost off the display area. However, if using a larger font size (e.g. 120dpi or as sometimes described a 125% font size), then information would be lost. In such instances we would strongly recommend users set the software to utilise the full area of the screen as described below, or alternatively set a standard (96dpi) font size.

If a user would like to software to utilise the full area of the screen at all times then it is possible to configure this to happen as described below.

To set the software so that it always uses the full screen on wide screen displays:

Either use the utility program **CONFIGSCREEN** which will be found in the software installation folder **on most recent systems** (navigate to the software install folder using Windows Explorer and double click on the CONFIGSCREEN program) **OR** use the manual procedure below**:**

Create in the application installation folder a file named USEFULLS - this could be done using an

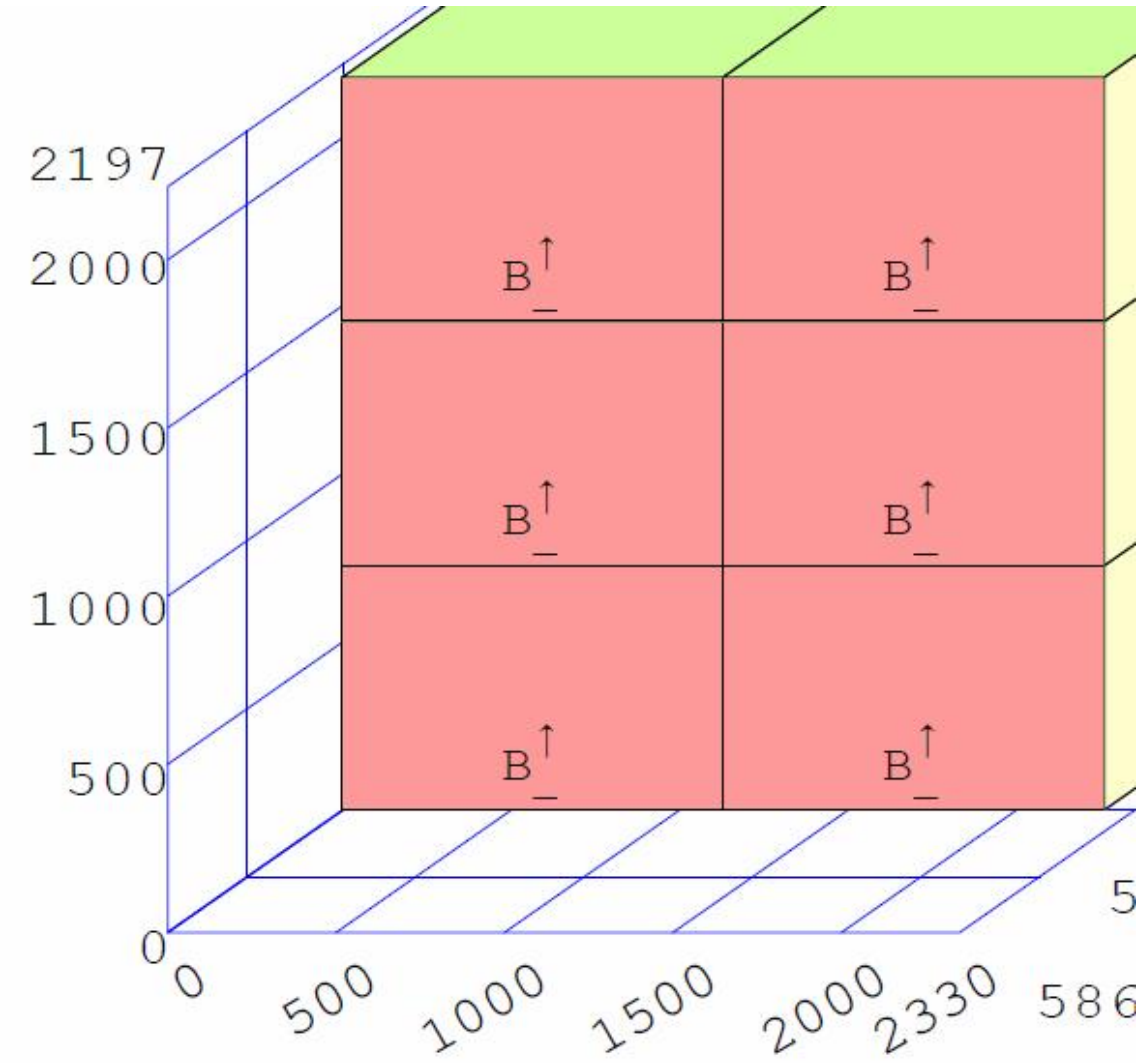
application such as notepad / wordpad / word etc. The content of the file does NOT matter, the fact that the file exists is the only requirement to give a full screen display on a wide screen monitor..

Files created with most such applications will NOT immediately have the correct name as the application will add a file extension to the filename (e.g. USEFULLS.TXT, USEFULLS.DOC etc). However an additional complication is that depending upon the machine configuration this extension may not be displayed in the file list. To ensure the file created has NO file extension at all it is suggested that having created the file using the procedure above you highlight the file name in Windows Explorer, then right click the mouse and select Rename and then replace the whole of the displayed name by (just) USEFULLS

14. Alternate Display Codes.

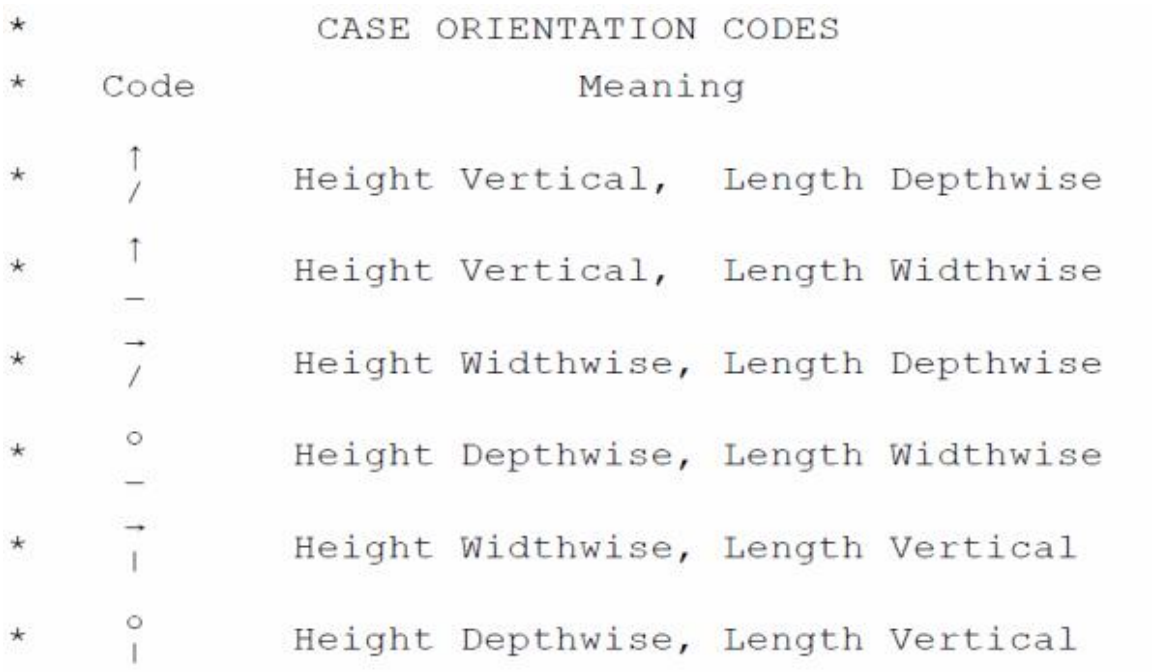
The 2D and 3D printed reports produced by CARGOMANAGER have for many years utilised codes 1 to 6 (following the product identifier) - e.g. B2 - to indicate the orientation of product B within the container, and an index to these codes is printed on the first page of the report(s). Here 2 would mean 'Height Vertical, length widthwise.

This release now allows graphical symbols to be used as an alternate means of orientation identification on printed reports and the picture below illustrates one of these in action.



Here a set of 2 graphics symbols have been used to replace the number 2 and to (hopefully) represent to the reader a unit with height vertical and the longer dimension _ placed across the container width.

Unfortunately there are issues with many printers actually having suitable graphics symbols available in their set of printable characters, however we have chosen a set of symbols which we believe are found on nearly all printers (and also in PDF and other graphics software) to represent the 6 possible orientations of any unit. These are illustrated below as they would appear on the first page of the printed report IF graphics symbols are activated (see below).



Other symbols might possibly be used but as discussed below the range available on printers is generally rather restrictive.

By default the numeric symbols familiar to established users will continue to be the default, however users can select to use graphics symbols instead as detailed below.

1. The set of characters / symbols used is held as part of the content of file GRPARAMS which is installed in the application folder.

2. The default file GRPARAMS and the file GRPARAMS.NUM found there are identical [thus copying to .NUM file to the name of just GRPARAMS (no extension) would return a system to numeric codes)].

3. The file GRPARAMS.GRA contains the graphics characters and then copying this to the name of just GRPARAMS will set up the printing of graphics codes.

In fact the GRPARAMS file contains a number of other default values but the codes used could be changed by using a basic editor (wordpad/notepad) to make changes to the first 12 characters on line 4 of the file. If one were to do this then you would see that whilst most of the above characters are there in the form in which they can be entered from the keyboard the 'right arrow' symbol used for 2 of the descriptors is NOT available on a standard keyboard and thus a 's' (little s) character is used as a substitute in the file with this being translated to a right pointing arrow within the program.

You should note that the range of characters which can be actually printed by your printer may not even include all the keyboard characters.

15. Yes / No Defaults.

When entering New data into CARGOMANAGER using the keyboard the default settings for item orientation placed against the 3 'box' dimensions have for many years been set as 'Yes' indicating that any of the 3 dimensions entered can be placed as the height dimension. Obviously users have been able to set this

as desired for each item in turn. In this release a new mechanism is available which changes the default from Y to N. If a file 'nodefault' is created in the installation folder (no file extension - content irrelevant) then the default will be set to 'No' for all new input from the keyboard.

CARGOMANAGER

We at Gower Optimal Algorithms Limited very much hope that **CARGOMANAGER** will prove to be a very successful tool within your company. Any comments you are able to supply on the operation of the software and on this documentation will be most welcome, as we are very keen to ensure the continued development and success of the product.

Every effort has been made to ensure that both the **CARGOMANAGER** software and documentation are as accurate as possible. However, as with all other software products, GOAL cannot in any event be liable for errors in the software or documentation, or for any loss or damage resulting from these.

We would stress in particular the fact that although the software does attempt to provide both volume efficient and stable consignments given the range of environmental and handling conditions experienced in practice it is essential that experience operatives determine the suitability of individual load plans for any particular application.

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APPENDIX 2 - e-CARGO - Integrated emailing of load specifications.

A2.1. Introduction.

This section describes the low cost easy to use add-on module for **CARGOMANAGER** that enables users to email container load specifications directly from within the application in a format identical to that normally produced on the printer.

Given the size of files required **this is not available as part of the web trial download and is distributed as a separate application to CARGOMANAGER itself.**

The email attachment produced uses the widely popular Adobe PDF format - already in extensive use for web pages - e.g. the download of all the UK tax forms! - and simply requires the users to have installed the free Adobe Reader. A majority of PC's are likely to already have this installed or it can be downloaded from Adobe (www. adobe.com)..

A2.2. How the email facility works.

Normally **CARGOMANAGER** users might print out a load specification and then fax this to one or more locations.

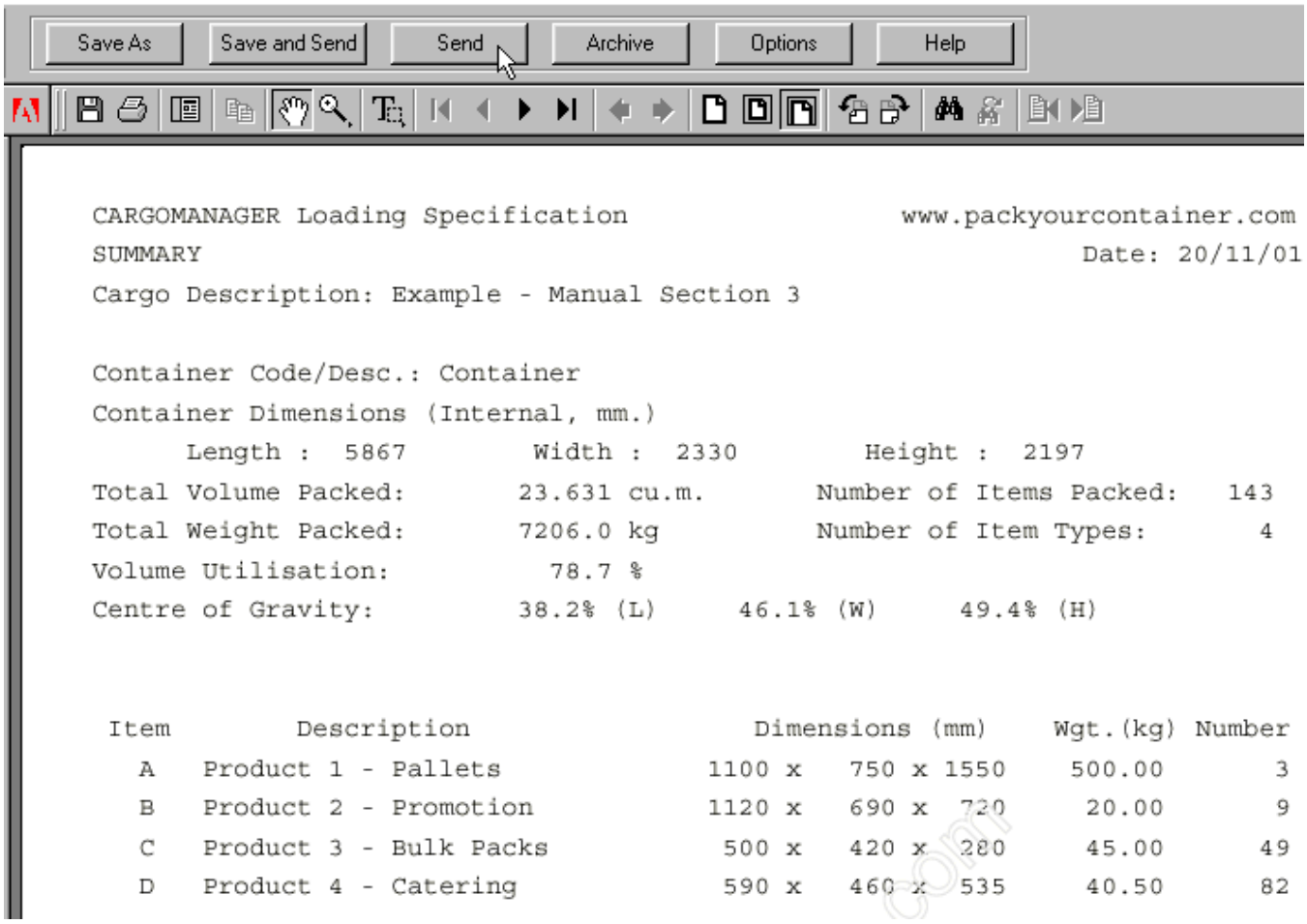
With this add-on facility, at the point where a printout might typically be requested users select the **Email / Print** option.

The PDF Email option is then selected from the following user dialog.

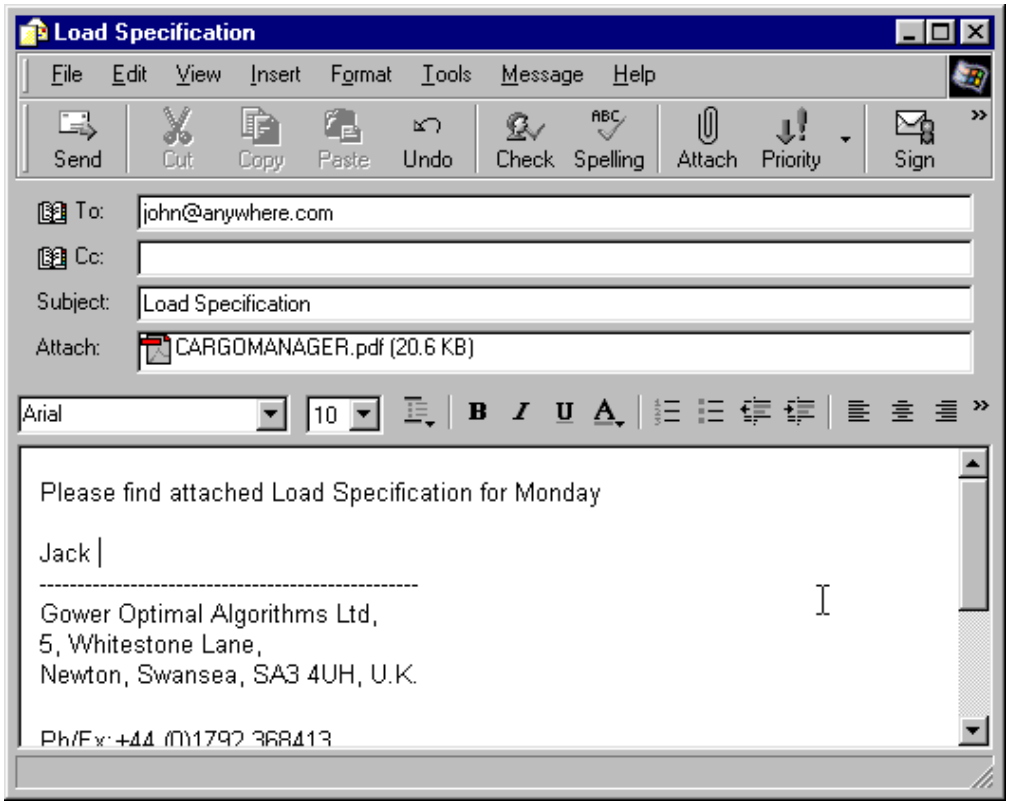
The resulting output which would 'normally' have gone to your printer is then displayed on screen in PDF format. You can then select to either save this PDF format file to disk (one way of saving specifications for future recall) and/or select Send to launch your email system with the report already set as an attachment. This is illustrated below.

The add-on requires just a licenced PDF / Email driver system. Users may already have access to such a system (e.g. Adobe Acrobat) or might wish to use a system such as PDFMachine which can be downloaded and puchased from the developers - www.pdfmachine.com .

The first screen below shows the screen display after selecting the PDF Email option. The full report (in PDF format) is shown on-screen. You can naturally view any / all and select printouts if you wish. Then you select Send.



and the screen below (in this case Microsoft Outlook mail) is automatically launched with the attachment already set in place. You just enter the recipient details and any message and send it off!



The recipient just clicks on the attached file to see the load specification which they can of course

print out if required.! In addition the latest version of the PDF software allows multiple A4 pages (e.g. 2 or 4) to be compressed onto a single A4 page. Thus multiple loading diagrams can be even more efficiently distributed.

A2.3. Installation.

As described earlier the e-CARGO facility uses the popular Adobe Acrobat file format for transmission of the specifications. This provides a compact file attachment which can be read on any PC using the free Acrobat reader. It is likely that this will already be installed on many machines.

A CD containing all the necessary files and full instructions on installation can be supplied by GOAL or (as indicated above), direct by download from www.pdfmachine.com .

A2.4. Additional Questions & Answers.

Can the default filename be changed?

Normally the filename attached to the email will have the name CARGOMANAGER.PDF (if blank or _ used for code), or a filename based on the consignment label you enter as the first detail when inputting details of a new cargo. You have the opportunity to change this.

Can I use the PDF printer selection without selecting the Email option?

The 'normal' **CARGOMANAGER** print programs may produce multiple reports and output text and graphics. If you selected the PDF printer option without selecting Email (i.e. in a normal print sequence) then (a) some text pages would not be printed and (b) each report would generate a separate PDF file - thus you might end up with 5 or 6 different PDF files. The special Email program bundles all the reports together to produce a single neat PDF file.

Can I use the PDF printer selection with other programs?

You will be able to supplied (licenced) PDF program to email output from many other Windows applications in PDF format. It will depend on the procedure used to produce print files within each application but in general this will be possible.

Can I use a PDF printer from another supplier?

The basic procedure adopted by many such software products is that of creating a virtual PDF printer and sending output to that 'device' rather than a physical printer. It is highly likely that any other PDF system set up on your machine will be suitable for use with CARGOMANAGER.

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APPENDIX 3 -Data Interchange with other systems.

(Covers: Summary of Data required, Consignment Title, Container Details, Items in the consignment, Missing Data and the Itembase, Technical details, Results output to other systems, Previous Linkfile Formats, Cylindrical Items).

Introduction.

This section of the manual discusses how complete sets of consignment data could be input into CARGOMANAGER from other system. If you require information on how (just) a product / item database can be created from other systems (to enable data entry of consignments via point and click), then this is described in Section 10.

CARGOMANAGER users can not only input consignment data quickly and easily into the system using the powerful inbuilt screen based data entry features but can also feed data directly from other applications into the system. This can be accomplished in a number of ways. For example some users already generate fixed format data files from within their own applications, the format of these files exactly matching the internal formats used by **CARGOMANAGER**.

However a far easier and more flexible input mechanism is available using free format comma separated (flat) data files which can be generated from virtually any database / spreadsheet application including applications such as Microsoft Excel and Access, as well as from far more sophisticated systems. This appendix describes the type of data required, and describes the default values which **CARGOMANAGER** will provide in the event that some data is not available from the selected data source. Included in this description is detail on how **CARGOMANAGER** can retrieve some missing file data (e.g. product dimensions) from the Item Database which is an integral part of the software.

Datafiles created to this specification will normally be given a .CSV file extension and will be input into **CARGOMANAGER** using the **'Input a .CSV file Linkfile'** menu option on the opening screen. It is also valid to give such files a .DAT extension (an extension normally used for consignment files generated by keyboard entry into CARGOMANAGER screens), and in this case files will be input using the **'Recall a .DAT Datafile'** - accessed once again from the opening screen.

Summary of the Data Required.

CARGOMANAGER requires the following information on each consignment:

1. A consignment title / description or code for identification purposes;
2. Details of the container / trailer size to be used (where available);
3. Information on the items which are to form the consignment.

Item 2. above may or may not be available. Indeed the object of the exercise may be to determine which container / trailer size should be used for a given cargo set. **CARGOMANAGER** enables the user to select a specific container size or perform a comparison between any or all of the container sizes held in the **CARGOMANAGER** container database, and there is no requirement for a container size as part of the input data.

Whilst information on the products in a consignment (Item 3) are naturally required, it may be that some of the characteristics of individual entries (e.g. weight, stacking characteristics etc) may not be available via the external source. Once again **CARGOMANAGER** is designed to deal with any limitations in the data, whilst allowing user modification of any of the values prior to performing load planning.

The following sections of this appendix describe what information is required by **CARGOMANAGER**, and how it deals with missing data.

Before doing so we have illustrated below a typical spreadsheet containing the complete set of data used to tackle a specific problem - that used as an illustration of data input in Section 3 of the manual. To provide greater clarity extra headings have been added (in red) in Row 1, Columns B to J, to reflect the meaning of the consignment data of Rows 3 to 6. As will be illustrated below, the information requested exactly mirrors in both order and type the information input into the data input screen of **CARGOMANAGER**.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Example - from Manual	Length?	Vert?	Width	Vert?	Ht?	Wt?	Hvy?	Fragile?	Layers?	Qty?	Pri?
2	5867	2330	2197	20000	Cont. Desc.							
3	Product 1 - Pallets	1100	N	750	N	1550	500	Y	N	1	3	1
4	Product 2 - Promotion	1120	Y	690	Y	720	20	N	Y	99	9	1
5	Product 3 - Bulk Packs	500	Y	420	Y	280	45	N	N	99	49	1
6	Product 4 - Catering	590	Y	460	Y	535	40.5	N	N	99	82	1

The headings in the spreadsheet could in fact be left in place in any spreadsheet used as excess data on any line of the input file is ignored. In Excel a valid datafile could be created by simply saving the above datasheet (a copy of spreadsheet.xls will be found in the installation folder) using a .CSV format - a standard option (a copy of spreadsheet.csv will also be found in the installation folder).

IMPORTANT: Note that the number fields do NOT contain any commas (i.e. a value of 2300 is shown as 2300 and NOT 2,300. It is essential that NO commas exist in the numeric fields - Excel allows you to decide the way numeric fields are displayed.

The file itself which would then be input into **CARGOMANAGER** might look something like:

```
Example - Manual Section
3,Length?,Vert?,Width,Vert?,Height?,Wt?,Heavy?,Fragile?,Layers?,Qty?,Priority?

5867,2330,2197,20000,Container Description,,,,,,,

Product 1 - Pallets,1100,L,750,N,1550,500,Y,N,99,3,1

Product 2 - Promotion,1120.6,Y,690,Y,720,20,N,Y,99,9,1

Product 3 - Bulk Packs,500,Y,420,Y,280,45,N,N,999,49,1

Product 4 - Catering,590,Y,460,Y,535,40.5,N,N,99,82,1
```

A3.1 Consignment title / description.

The first line of any file provided to **CARGOMANAGER** provides a textual description describing the consignment.

Consignment title / description	The first 40 characters of this field will be used as a descriptor on printed / emailed reports.

The only restriction on the contents of this line is that it **MUST NOT** begin with a " quotation mark. Any occurrences of " or ' elsewhere within the line will be replaced by blanks.

Any extra entries on the line **will be ignored** (thus in the above example the extra entries Length? etc on the first line would be ignored).

A3.2 Container size / Description.

The second line of the input file contains dimensional information on the container together with a textual description. This line must always exist in the file, however if the details are not available (and as described below just a set of ,,,, are provided) then a default container size will be selected. The end-user can always change the container size or make a selection of any container in the inbuilt container database as the file is being input into **CARGOMANAGER** (or thereafter).

Container length (mm.)	An integer value **(no decimal point)** up to 32000.
Container Width (mm.)	An integer value **(no decimal point)** up to 32000.
Container height (mm.)	An integer value **(no decimal point)** up to 32000.
Container weight limit (kg).	A real (decimal point) **or** integer value up to 99999.0.
Container description.	A textual string - the first 25 characters will be used.

Thus valid lines might include:

5896, 2350, 2385, 27000, Maersk 20 ft Std

5896, 2350, 2385, 27000.0, Maersk 20 ft Std **or**

, , , , or ,,,, (4 [or more] commas with or without spaces before/between).

In the latter 2 cases **CARGOMANAGER** will initially set the container size / weight limit and description to be a 20' standard Maersk container, but the user is prompted to change this when the file is input.

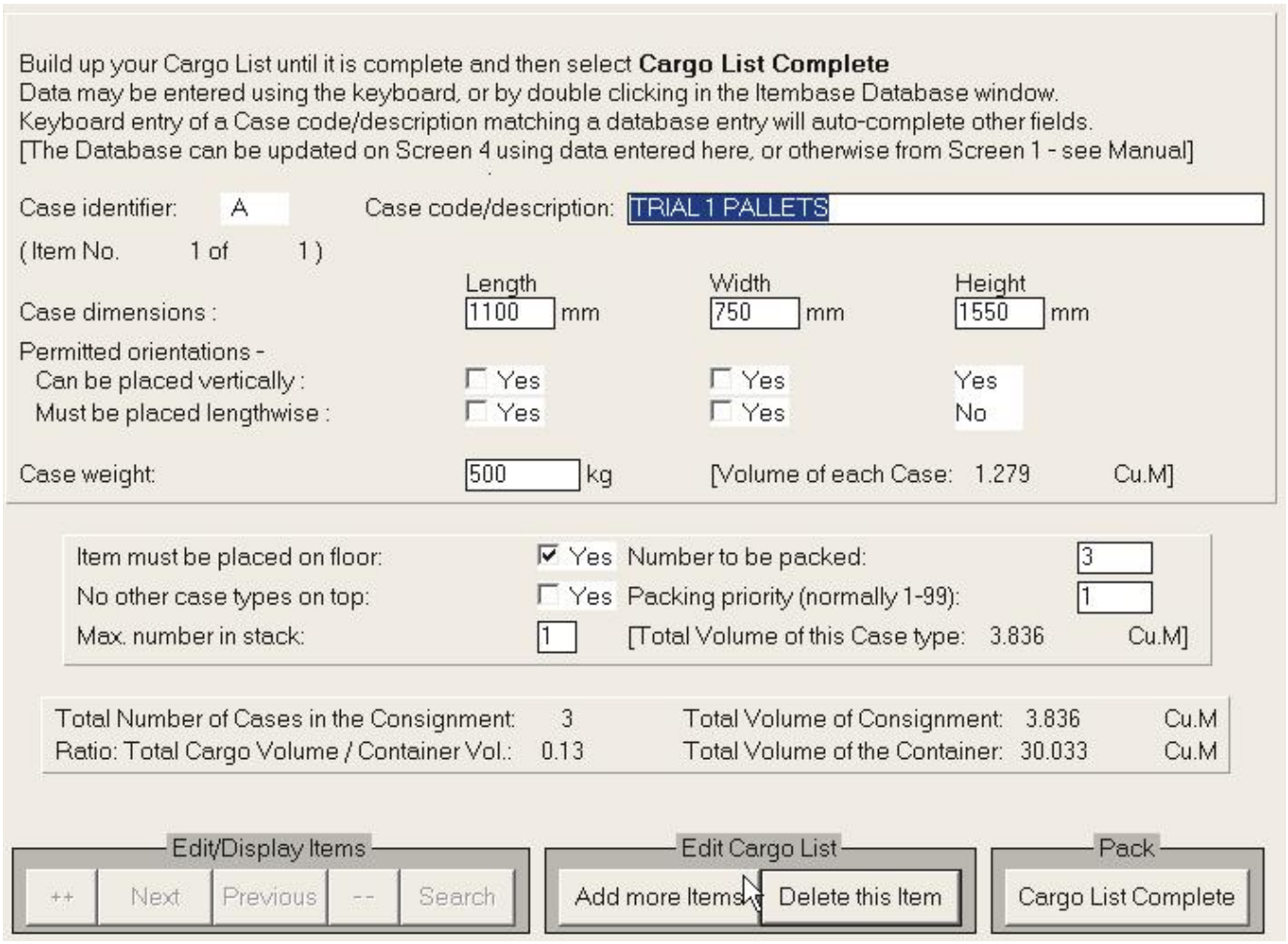
Once again any extra entries on the line **will be ignored**.

A3.3 Items in the consignment.

A typical shipment will consist of one or more lines of data, with each line detailing information about a specific product **type** in the consignment - description, dimensions, the quantity to be shipped etc. A shipment can comprise of tens of thousands of individual items of up to 600 product types (i.e. up to 600 lines of data).

[**CARGOMANAGER** will perform packing operations such that any individual container may contain up to 20,000 items, with up to 998 containers loads being planned in a single step.]

The information required for each product type in the consignment reflects the data requested on the **CARGOMANAGER** data input screen. An example of this screen (as used in an earlier section) is shown below:



In this instance the first 'Case' type being loaded is actually a loaded pallet. This is one of 4 item types being loaded in the example detailed in Section 3 of the manual. The datafile entry for this product will look something like:

```
Product 1 - Pallets,1100,N,750,N,1550,500.0,Y,N,1,3,1
```

which follows in sequence the responses which a user would provide in completing the above screen. If some of the data is not available in your external data source then the missing blank values will be substituted as detailed below.

Note that the above line of data has 12 items separated by 11 commas, and any line of consignment data must contain (at least) 11 commas with data as available. A entry such as:

```
Product 1 - Pallets,1100,,750,,1550,500.0,Y,N,1,3,1
```

is valid, with the 3rd and 5th blank entries being replaced by default values as described below.

Case code & description	Text describing the item type - just the first 40 characters (if there are that many) are used by CARGOMANAGER.
Case Length	An integer value (no decimal point) up to 32000. See Note 1.
Can Length be placed vertical?	N or Y or L (alternatively 0 or 1 or 2) - if no entry then N assumed. (see Note 2 at foot of table)
Case Width	An integer value (no decimal point) up to 32000. See Note 1.
Can Width be placed vertical?	N or Y or L (alternatively 0 or 1 or 2) - if no entry then N assumed. (see Note 2 at foot of table)
Case Height	An integer value (no decimal point) up to 32000. See Note 1.
Case Weight	A real (decimal point) or integer value up to 9999.9. (Default 0.0)
Is the item heavy (must be floor based)	N or Y (alternatively 0 or 1) - if no entry then N assumed.
Is the item fragile (nothing else on top)	N or Y (alternatively 0 or 1) - if no entry then N assumed.
Max Number in a stack	An integer value 1-99 (no decimal point) - if no entry then 99 assumed.
Number to be packed	An integer value 0 - 20000 (no decimal point) - if no entry then 0 assumed.
Packing priority	Normally an integer value 1-99 (no decimal point) - limit of 32000 possible. if no entry is made then 1 is assumed.
Note 1: CARGOMANAGER works in mm. units and data for the case dimensions are required as integers with no decimal point. As an extension, data on Case Length / Width and Height may be input here with a decimal point and in such instances the decimal part will be ignored. (e.g. 23.1 becomes 23).	
Note 2: As seen on the above input screen it is possible to specify that length or width of the item (here a pallet) must be placed lengthwise in the container (to cater for, for example, a 2 way entry pallet). A value L or 2 as defined in the above table may be used to indicate this for one of these entries.	

Thus a simple line in this file representing the data in the above sample screen might look like:

```
Product 1 - Pallets,1100,N,750,N,1550,500.0,Y,N,1,3,1
```

Alternative valid formats would include:

```
Product 1 - Pallets,1100,0,750,0,1550,500.0,1,0,1,3,1 (0/1 used for N/Y)
```

```
Product 1 - Pallets,1100,,750,,1550,500.0,Y,,1,3,1 (default No values will be inserted for missing values)
```

```
Product 1 - Pallets,1100.1,N,750.45,N,1550.27,500.0,Y,N,1,3,1 (decimal parts of case length / width / height will be ignored)
```

Essential elements in each line of consignment data are:

(1) That there are the **correct number of comma delimiters** on each line (11), though excess commas / data after these on each line do not matter. For example the following would be valid:

```
Product 1 - Pallets,1100,N,750,N,1550,500.0,Y,N,1,3,1,,,,,
```

If there are insufficient commas on any line then generally the line will be ignored.

(2) Where a value is not available then either 2 successive commas or two commas with one or more blanks between them are provided.

(3) The file should have a file extension **.DAT**. The user will then be able to select to load the file from within the normal **CARGOMANAGER** data input process.

A3. Missing Data.

The above descriptions of the datafile requirements included information on the defaults which are applied when specific input data fields are blank.

One additional feature of **CARGOMANAGER** is the ability to automatically insert information on products which are already held in the inbuilt **ITEM ASE** (the database of Case Codes / Descripitions and dimensions) into an input datafile which lacks certain information. How this is done is described below.

If any item in the consignment file has a Case Code / Description, but has dimensions (L/W/H) all set = zero, then on reading this data **CARGOMANAGER** will scan through the ITEMBASE to see whether the Case Code / Description matches one already held in the database. If it does then the ITEMBASE details will be retrieved (Length, Width, Height, Orientation and Layer constraints) and inserted to replace all the fields in the consignment file with the exception of the quantity to be shipped and the priority. Thus for a product held in the Itembase the input file need only contain a description, quantity and priority with all the other fields being set to blank.

A3. Technical / Support Issues.

In situations where a .DAT/.CSV file is successfully created according to the above format then the detail provided in this section is likely to be irrelevant. However if problems are experienced when reading such a file into **CARGOMANAGER** then the following information will be of assistance.

When **CARGOMANAGER** attempts to read a .DAT/.CSV file then one of 2 input procedures may be called.

- If the first character in the .DAT file is a **"** then the file is assumed to be a fixed format file using the standard **CARGOMANAGER** data format. **This is unchanged from previous releases and is not covered in this Appendi .**

- If the first character is **NOT a "** then a free format file conforming to the above data description is assumed and this file is then read in and automatically converted to the internal formats used within **CARGOMANAGER**.

For the benefit of those experiencing problems is generating a suitable file this process is described in detail below.

Step 1: The input file is first read (but is never changed), and a file FREEOUT1 is created. During this process a logfile is created in the installation folder called **REE ORM.LOG** to which comments and errors in the read process are output. During creation of the FREEOUT1 file the focus is on checking the input file format and creating the intermediate file FREEOUT1. If an invalid line is encountered in the input file then a warning message will be posted to the logfile, and where possible a repair (of FREEOUT1 - not the input file) using default values will be carried out. If a repair is not possible then the record in the input file will be ignored and a warning message posted to the logfile.

Step 2: The second stage of the process takes the file FREEOUT1 and converts this to the final CARGOMANAGER format file FREEOUT2 - this is the file which is then (automatically) processed by **CARGOMANAGER**. During this stage the validity of the values supplied is checked and appropriate defaults inserted where necessary.

The content of all the files referenced immediately above will be of no interest even to the user or their technical support staff, except in the case of problems reading files created from other applications. Any of the files can be examined using a standard text read program (Wordpad, Notepad etc), and the files referenced above will not be deleted until the next input file is read.

A3. Output to other systems.

In addition to providing a highly flexible system for input of load data **CARGOMANAGER** also outputs information on loads created to file for input to other systems. Given that in most instances some graphical representation of the load plan will be required then in most instances, after a cargo set has been loaded, users will wish to proceed with the inbuilt display of the 2D/3D load plans and print these (or save in Adobe PDF format).

However, when the only requirement is to produce a list of the items to packed into each container then a file MCONTENT.OUT will be of assistance. This file, which will be found in the installation folder, contains details of the items loaded. Whether the load is packed into a single container (BestCont / PackCalc) or multiple containers (MultiCont) this same file will provide information on items packed.

An extract from a typical file MCONTENT.OUT is given below, in which the codes F2000.. are the end user product codes:

Load Description Date: 10/05/04 : Suppl

Trailer

Container: 1- Items Packed: 46

1, F2000011002259> C1 Q>240 , 1300, 1100, 495, 1
1, F2000011002260> C1 Q>30 , 1300, 1100, 495, 6
1, F2000011002261> C1 Q>15 , 1300, 1100, 495, 4
1, F2000011002263> C1 Q>240 , 1300, 1100, 495, 1
1, F2000011002264> C1 Q>300 , 1300, 1100, 495, 1
1, F2000011002265> C1 Q>600 , 1300, 1100, 495, 1
1, F2000011002267> C1 Q>1200, 1300, 1100, 495, 1
1, F2000011002269> C1 Q>120 , 1300, 1100, 495, 1
1, F2000011002270> C1 Q>120 , 1300, 1100, 495, 2
1, F2000011002281>SPEC 11 Q>30 , 2000, 1100, 1200, 5
1, F2000011002282>SPEC 11 Q>25 , 2000, 1100, 1200, 4
1, F2000011002292>SPEC 11 Q>25 , 2000, 1100, 1200, 6
1, F2000011002293>SPEC 11 Q>30 , 2000, 1100, 1200, 3
1, F2000011002307>SPEC 10 Q>15 , 1650, 1100, 1180, 4
1, F2000011002308>SPEC 10 Q>15 , 1650, 1100, 1180, 6

Container: 2- Items Packed: 64

2, F2000011002266> C4 Q>60 , 1300, 1100, 1180, 4
2, F2000011002271> C1 Q>120 , 1300, 1100, 495, 2
2, F2000011002272> C1 Q>60 , 1300, 1100, 495, 1
2, F2000011002273> C4 Q>60 , 1300, 1100, 1180, 4
etc etc etc.

Each line comprises - Container Number, Product Code, Dimensions, and Quantity Loaded.

For a specific application it would clearly be possible for alternate files / formats to be generated. Please contact GOAL for further information.

A3. Old Linkfile formats.

In previous versions of **CARGOMANAGER** we utilised a comma separated user generated file named CMLINK.FIL to provide the link to other systems. This format was far more difficult to generate than the format now used. In this release:

- No facility is provided to input a file of this name.
- If the file CMLINK.FIL is renamed to give it an extension .CSV then the Linkfile menu option WILL still import such a file successfully.
- In doing so all necessary data will be imported BUT IF the first item displayed immediately following import has a zero quantity then this can be deleted.

- We would strongly encourage users to move to producing link files using the far simpler format specification described earlier in this appendix.

A3. Cylindrical Items.

Since this chapter was first produced we have introduced the facility for each item in a consignment for it to be denoted as a cylinder / drum.

All such entries are assumed to be placed in the container with the circular base at the bottom. This obviously means that the length and width of the cargo item (drum) must be equal and that neither the length or width can be placed vertically. If these factors are not met then the drum indicator (a tick box) will not be available in manual data entry.

It is possible to flag up cylindrical items in the Linkfile. This simply requires that a '1' (drum) or '0' be placed at the end of the input line of data.

Thus in the earlier description a unit might be entered as:

```
Product 5 - ,750,N,750,N,1550,500.0,Y,N,1,3,1
```

would now be entered as:

```
Product 5 - Drum,750,N,750,N,1550,500.0,Y,N,1,3,1
```

If no entry is found then the non-cylindrical item will be assumed. Thus previous format linkfiles will work as expected without change.

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