MARKET TECHNOLOGY
A.B.N. 47 060 313 359

RMS – IRESS Risk Management System

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RMS

RISK MANAGEMENT SYSTEM

RMS Overview

RMS is a specialist market making and risk management system for the Australian market. Markets supported by RMS include:

- SFE options and futures
- ASX Exchange Traded Options (ETOs)
- ASX warrants and convertible notes.

Market making in RMS is unique, because it allows two kinds of hedging, cross-market hedging and hedge checking for auto-quotation. The market making component of RMS creates orders, responds to quote requests and executes trades. These functions are controlled by rules defined by the market maker. Users can set the values that will trigger trades, create automatic bids and asks and perform hedging calculations.

When generating automatic calls and puts for options, RMS takes into account volatilities, dividends and Risk Free Rates. These values are taken from ETO scenarios in IRESS or from scenarios created in RMS.

Further rules can be defined to protect trades, including automatic step-back and bid/offer spread values and market re-entry limits.

The risk management component of RMS includes comprehensive position and risk management tools. It provides real-time portfolio valuation, and displays the profit and loss based on underlying share values, and Gamma and Delta values (hedge position).

Risk management is performed via a risk matrix based on the price of the underlying stock, volatility and Risk Free Rate. Exposure can be viewed as actual values or as a chart.

RMS is fully integrated with IRESS (Integrated Real Time Equity System) and IOS (IRESS Order System). All the live pricing data in IRESS is available to RMS, and the links with IOS provide seamless access to the markets.

Features of the Market Making Component of RMS

The RMS market making component:

- has real-time auto-quoting in each market. This allows cross-market hedging, for example using ASX SEATS trades to hedge ETOs.
- performs automatic trading, by monitoring the market for orders that match specific valuation criteria and executing a trade when it locates an eligible order.
- records custom pricing changes for the underlying stock that will generate orders for the securities in the group. For example, a price movement of two cents or a volume movement of a specific number of shares.
- performs hedge checking for auto-quotation, by calculating bid and offer values based on the underlying share prices.
- automatically generates quote requests.
- responds to quote requests. Responses are generated within a user-specified time frame and remain in the market for a specified time. Responses can be generated automatically or manually.
- performs live hedge checking and posts notifications about this activity.

- Includes a trader alert function for efficient market making in many stocks simultaneously. The alert function acts as a running sheet of activity. The types of activity that will be notified are pre-determined and all notifications are displayed in one window for simple monitoring. Automatic notifications can be displayed for:
  - bids and asks that have been placed
  - trades in specific securities
  - personal trades
  - hedging activity.

Trade protection features

Market makers safeguard against unwanted trading by defining trade protection rules. The rules include:

- automatic quote, request and auto removal of un-traded bids and offers.
- automatic step back or step out based on a specific bid/ask spread for the underlying stock or a pre-determined number of fully traded orders.
- re-entry limits, for example if the variation in new bid or ask values and the current bid or ask is greater than two cents, or if more than 60 minutes have elapsed since the last order was sent.

Features of the Risk Management Component of RMS

The risk management component of RMS:

- can be used with market making or can stand alone.
- uses the groups defined in the market making component of RMS. Where market making is not used, the groups can be created in risk management.
- links to IOS trading accounts, and updates holdings as trades occur.
- displays summary information based on the underlying stock value and detailed data for derivatives positions in a single window.
- can be customised in a similar way to IRESS, which means that columns of data can be organised in a preferred order and data in the columns can be sorted in a number of ways.
- includes functionality for creating a risk matrix based on price of the underlying stock, volatility and RFR values. Changes in values can be expressed as either percentages or units.
- calculates Profit and Loss, the change in underlying share values or the ß profit movement from the risk matrix. For example, a matrix with the price of the underlying stock on the X axis and the volatility on the Y axis, can display profit and loss based on these values in the body of the matrix. Matrix output can also be displayed as a chart.
- includes the functionality to create a sub-matrix of values that require closer monitoring.
- uses default scenario values from IRESS or custom scenario values created in IRESS or RMS. Scenarios are based on single securities and it is easy to toggle between custom and system scenarios.
- indicates when a specific profit margin has been achieved.
- compares the value of a holding with the values of other derivatives from the same underlying stock.
- values current holdings historically.

Working with RMS

RMS requires minimal setup before trading can commence. An IOS trading account must be set up, and the following items must be set up in RMS:

- groups and the securities in each group
- rules for each group
- scenario details. For warrants these must be set up in RMS, but for options they can be set up in RMS or the default or custom scenarios in IRESS can be used.

Groups

To simplify order creation in RMS, securities are arranged into groups. Groups can be based on any criteria, for example options or warrants for the same underlying security, the same industry group, or exercise date.

Trading for securities in each group is controlled by a set of rules. RMS uses these rules in association with the volatilities, dividends and Risk Free Rates defined in ETO or warrant scenarios.

Risk management valuations are also performed on these groups.

Rules for groups (market making)

The categories of rules that can be created for groups include:

- Triggers setting rules: define the values that will create or stop automatic trades. These include price or volume movement in the underlying stock, variation in bid and ask values for an option or warrant and the frequency with which bids and asks are placed in the market. Monitoring price and volume movements in the underlying stock allows orders to be amended as the underlying volume changes, thus ensuring that there is enough underlying stock for hedging purposes. A trigger can be set to remove automatic trades or to generate a step back or step out, based on the bid/ask spread for the underlying stock.
- Market making rules: define how bids and asks will be created. The parameters include pricing rules such as the volatility spread, minimum bid value, and whether bids and asks will be based on the underlying stock price or the smart last price. For auto quoting, the maximum and minimum volumes to be put in the market and the volume to be put into the market in response to a quote request can be specified. The default times that bids and asks remain in the market before the next order is sent can be specified separately for quote requests and for market making. The number of full trades that are allowed before withdrawing from the market can also be set.
- Auto trading rules: define how call and put contracts for both long and short buying and selling will be generated.
- Hedging rules: specify the hedging security and whether hedging is based on current bid or ask price, market price, last price or best price. The hedging security is used to check hedging and to hedge against. It is used instead of the underlying security. Daily trading volume limits and the size of price steps can also be defined.
- Alert rules: define the type of notifications that will be posted automatically to indicate that trading activity has occurred. Items that can be notified include bids and asks generated, trades that occurred, quote requests and hedging checks.
- IOS account links rules: identify IOS trading accounts and hedging accounts.

While the rules apply to all securities in a group, they can be applied differently within the group, for example:

- some securities may trade automatically and some may require manual initiation of trades
- hedging rules can be manually switched off, applied only to bids or asks, or only to specific levels
- price step limit checking can be temporarily disabled.

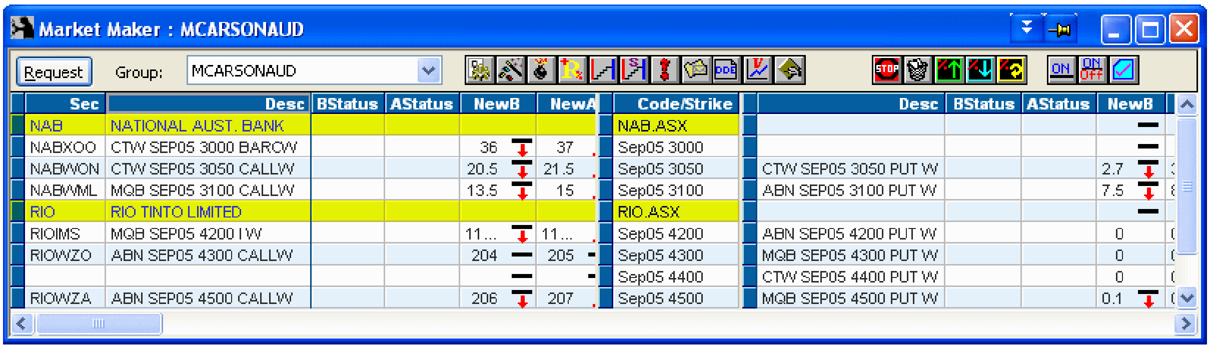
Scenarios

Scenarios are used for both market making and risk management. Scenarios record the values for volatilities, dividends and Risk Free Rates, and can be set up in RMS or in IRESS. Custom scenarios can be created for options in either RMS or IRESS or the IRESS default option scenario can be used. For warrants, custom scenarios can be uploaded easily from external programs such as Excel.

For market making, RMS requires call and put volatilities, dividends and Risk Free Rates to create calls and puts that will be in the market. RMS uses these values in conjunction with the rules to create calls and puts.

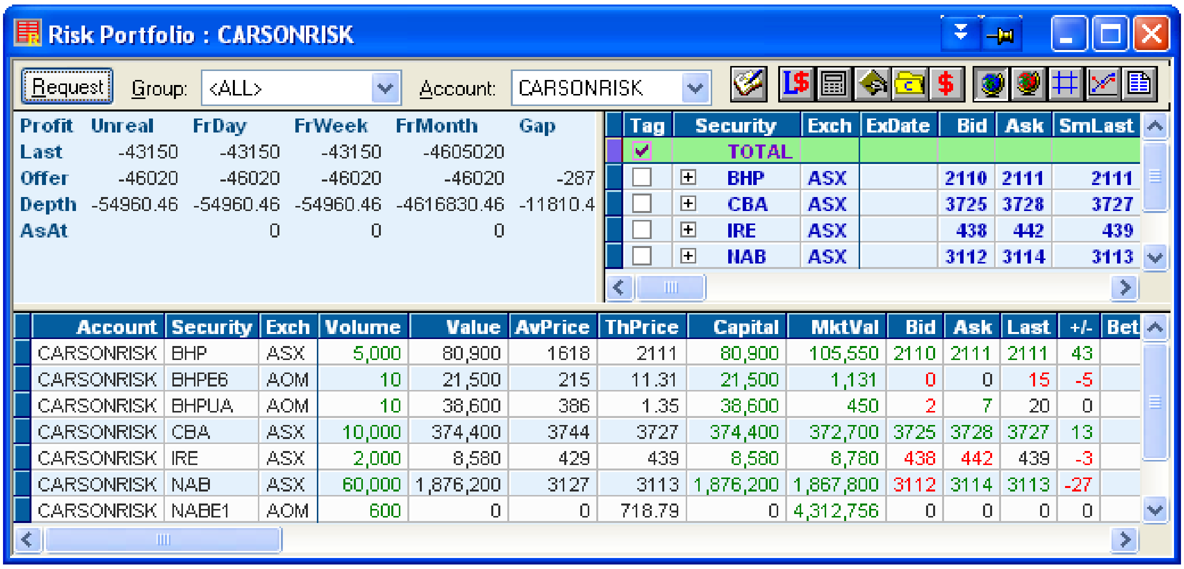
The Market Maker screen

The image below is an example of the Market Maker screen.



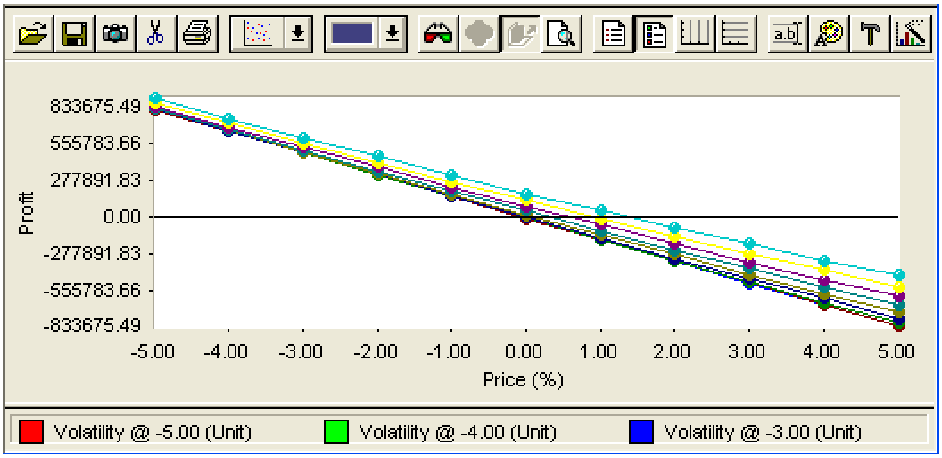
The Risk Management screen

The image below shows a position summary.



The lower section of this screen can display a configurable risk matrix or a chart, as shown in the following two images.

Security: TOTAL	Volatility (Unit)										
Price (%)	-5.00	-4.00	-3.00	-2.00	-1.00	0.00	1.00	2.00	3.00	4.00	5.00
-5.00	810408	810674	810944	811220	811504	811849	815414	824195	835311	858842	890394
-4.00	645283	645546	645813	646084	646357	646637	652940	662953	677864	706994	742030
-3.00	480446	480694	480946	481201	481460	483346	491786	502917	525006	557535	597114
-2.00	315852	316066	316296	316531	316768	321163	330927	344223	374257	409864	453825
-1.00	151517	151642	151815	152030	152264	160220	171518	192126	225635	266141	311212
0.00	-12706	-12596	-12472	-12323	-9682	0	12841	42256	78589	124073	172960
1.00	-176867	-176759	-176648	-176534	-170987	-159552	-140359	-105915	-64329	-17422	43907
2.00	-340999	-340898	-340795	-340294	-330777	-317696	-289704	-252377	-205321	-153179	-83362
3.00	-505124	-505026	-504926	-501378	-490280	-472583	-437345	-394588	-345108	-280555	-209731
4.00	-669202	-669149	-669050	-661563	-648043	-621541	-582676	-534163	-478814	-406294	-331305
5.00	-833272	-833230	-831853	-820572	-804961	-768560	-724393	-671986	-604271	-531337	-446741



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