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(54) Title: ELECTRONIC TRADING SYSTEM

(57) Abstract: AN anonymous trading system comprises one or more matching engines, one or more market distributors and one or more trader terminals for input of orders from institutions trading on the system. The trader terminals are connected to the system through bank nodes. A broker terminal is connected through a bank node and enables voice brokers to trade on the system on behalf of client traders. The voice brokers terminal can be configured for any client trader and will display the market view for that trader. Trades in which the broker terminal participates are not concluded until a manual credit check has been performed.



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ELECTRONIC TRADING SYSTEM

5 FIELD OF THE INVENTION

This invention relates to an electronic trading system, and in particular, but not exclusively, to systems for trading financial instruments, including, but not limited to, forward rate agreements (FRAs), Spot F/X and
10 swaps. It is also concerned with commodity trading systems.

BACKGROUND TO THE INVENTION AND DESCRIPTION OF PRIOR ART

Traditionally, financial instruments such as foreign exchange and forward rate agreements were traded through voice brokers. Traders would call their voice broker with a bid or offer and the broker would attempt to find a match with a counterparty. The voice broker would not necessarily reveal the identity of the counterparty at the earliest stage of the deal but would ensure that each of the parties extended to the other sufficient lines of credit for a deal to be completed. Where a trader trades through a given broker frequently, the broker will get to know with what counterparties the trader has a line of credit and, empirically, will filter out bids or offers of which the trader is aware if he considers that there is a little or
15 no likelihood of the trader being able to trade with the counterparty in question would call their voice broker with a bid or offer. With the advent of computerised trading systems, the importance of voice brokers has diminished and much of the trades executed, for example on the F/X spot market, are conducted through anonymous trading systems or electronic conversational systems which attempt to mimic the role of the voice broker. However, voice brokers have not been entirely replaced by electronic systems and they still play an important role in the market. A trader has a line of
25 credit and, empirically, will filter out bids or offers of which the trader is aware if he considers that there is a little or no likelihood of the trader being able to trade with the

A number of anonymous trading systems have been
 proposed and introduced into the market. At present, two
 systems, provided by Reuters Limited of London, England and
 EBS Dealing Resources, Inc. of New York, New York are
 prevalent in the foreign exchange spot (F/X spot) trading
 market. Both of these systems are anonymous in that
 traders enter bids and offers anonymously and see prices
 entered into the system by potential counterparties but
 not the identity of those counterparties. The identities
 of the parties are only revealed when the deal has been
 completed. To ensure that deals are not effected between
 parties which do not have a sufficient line of credit with
 each other before the deal is made, a complex system of credit checking
 operation is performed before deal completion to ensure there
 is sufficient credit for the deal. In the Reuters system, only
 partially completed deals, Inc. of New York, New York are
 prevalent. One of the Reuters System is described in US Pat
 5,375,055, the disclosure of which is incorporated herein
 by reference. In this system, credit limits set by the
 potential parties to a transaction are stored at a Market
 Access Node to which workstations are connected. An
 institution will set and store a credit limit for each
 potential counterparty with which it is prepared to deal.
 The Market Access Nodes are linked to one or more Market
 Distributors and one or more Arbitrators. The Market
 Distributors distribute prices of bids and offers using a
 pre-authorised matrix derived from the credit limits
 stored at the Market Access Nodes. The pre-authorisation
 matrix is used to inhibit trades between incompatible
 counterparties and to screen bids and offers prior to
 display so that each trader's workstation displays only
 those bids and offers submitted by counterparties with
 whom she has credit. Thus, all displayed prices are
 dealable. It will be set and stored a credit limit for each
 party. The arbitrators' function is to match bids and offers
 and to resolve possible contentions in trades which could
 arise due to the nature of the system. The Market
 Distributors distribute prices of bids and offers using a
 pre-authorised matrix derived from the credit limits

The Reuters system is exemplified in EP-A-0,399,850, EP-A-0,406,026 and EP-A-0,411,748. Both the systems identified above have been accepted by the financial markets and have been very successful.

However, they suffer from the disadvantage that they are separated from the rest of the institutions' trading operations. Thus, only those institutions which have installed one of the systems can trade using it. Trades are limited to the amount of credit which has been assigned. This credit can not be used for other trades, for example outside the system for different instruments, even if made with the same counterparty. This restriction can reduce liquidity. The existing systems also have the disadvantage that traders are limited to trading the specific instruments provided for by the systems accepted by the financial markets and have been very successful.

SUMMARY OF THE INVENTION From the disadvantage that they are separated from the rest of the institutions' trading operations, the present invention aims to address the disadvantages of existing systems mentioned above and to provide a more flexible electronic trading system. Trade using it. Trades are in its broadest form the invention resides in the incorporation of pre-voice broking functions into an electronic or anonymous trading system. More specifically, there is provided a computerised trading system for trading instruments between trading parties, comprising a communications network for transmitting electronic messages; a plurality of trader order input devices connected to the communications network; each for generating electronic orders including bid and/or offer orders and for communication to traders of order information received from other input devices over the network; at least one broker order input device connected to the communications network for generating electronic orders including bid and/or offer orders on behalf of a selected one or a plurality of client traders and for communication to each broker of order information received from other input devices over the network; at least one computerised trading system for generating electronic orders including bid and/or offer orders on behalf of a selected one or a plurality of client traders and for communication to each broker of order information received from other input devices over the network; and at least one computerised trading system for generating electronic orders including bid and/or offer orders on behalf of a selected one or a plurality of client traders and for communication to each broker of order information received from other input devices over the network.

least one matching engine connected to the network for matching bid and offer orders input into the system from the order input devices and for executing deals where prices are matched; and a market distributor connected to the network for distributing order price messages to the order input devices, the market distributor being responsible to the order messages and the matching engine.

The invention also provides a computerised trading system for trading instruments between parties comprising: a plurality of order input devices for entering order information into the system, the order input devices including a plurality of trader input devices for inputting order from traders, and at least one broker order input device for trading on behalf of a plurality of clients; at least one matching engine connected to the network for matching bid and offer orders input into the system and for executing deals where orders are matched; and a market distributor for distributing order price messages to the order input devices, the market distributor being responsible to the order messages and the matching engine, wherein trades conducted between trader order input devices are anonymous as to the parties until completion of a trade, and trades to which the broker order input device is a party require disclosure of the parties to the trade prior to completion of the trade.

The invention further comprises a computerised trading system for trading instruments between parties including a plurality of order input devices for inputting bid and offer orders on behalf of traders, a matching engine for matching bids and offers input by traders and, where matches are made, for executing deals, and a market distributor for distributing details of at least a portion of the bids and offers in the market to traders, wherein at least one of the order input devices comprises a broker terminal for

35 entering bids (and offers) into the system on behalf of
 40 traders operating outside the system. Embodiments of the invention have the advantage that they
 enable voice traders to be linked into an automated
 5 trading system so enabling trades involving voice traders
 to contribute to the liquidity of the trading system.

60 Preferably, the automated trading system is an anonymous
 system but trades involving a voice trader or voice broker
 10 are not anonymous.

3. BRIEF DESCRIPTION OF DRAWINGS Embodiments of the invention will now be described,
 by way of example only, and with reference to the
 15 accompanying drawings in which:

Figure 1 is a screen shot of a known FRA trading
 5 screen system so enabling trades involving voice traders
 to be entered. Figure 2 shows a Factory Detail Panel of the screen
 illustrated in Figure 1;

20 Figure 3 shows an Order Request Panel of the screen
 illustrated in Figure 1;

Figure 4 is an overview of the system architecture,
 in particular the communications network and the various
 workstations and processing nodes associated with it;

25 Figure 5 is an overview of an embodiment of the
 present invention, and with reference to the

30 Figure 6 is a flow chart showing a process where a
 voice broker submits an order to the system.

Figure 7 is a screen shot showing an offer being
 entered by the voice trader on behalf of a client;

Figure 8 is a screen shot showing the market from the
 20 Trader's/client's point of view after the offer from him
 has been submitted;

Figure 9 is a flow chart showing the process when an
 35 electronic trader hits the offer submitted by the voice
 trader.

Figure 10 is an overview of an embodiment of the
 present invention, and with reference to the

Figure 11 is a flow chart showing a process where a

Figure 9 is a flow chart showing the process when an
 15 electronic trader hits a price from an electronic trader's hit the offer;

Figure 11 is a screen shot of the broker's work
 station after the broker's client has accepted the
 5 electronic trader's hit;

Figure 12 is a screen shot of the Broker's
 workstation when the electronic trader's hit has timed
 10 out;

Figure 13 is a screen shot of the Broker's
 workstation once the deal has been completed;

Figure 14 is a flow chart showing the process when a
 trader calls the voice broker with a price request;

Figure 15 is a flow chart showing the process when a
 broker hits a price from an electronic trader's hit the offer;

Figure 16 is a flow chart showing how the electronic
 trader is required to disclose his identity in that process
 5 of figure 15; trader's hit;

Figure 17 is a screen shot showing the electronic
 trader's workstation after the trader accepts a hit from
 20 the broker and allowing the accepted amount to be
 adjusted;

Figure 18 is a screen shot of the Broker's
 workstation after the broker hits a price from another voice trader
 10 operating on the anonymous trading system; request;

Figure 19 is a flow chart showing the process where a
 broker hits a price from a call for a price from outside
 15 the trading system; and a chart showing how the electronic
 trader is required to disclose his identity in that process;

Figure 20 is a screen shot of the Broker's
 workstation showing how the amounts available are shown
 5 apportioned between voice broker's and electronic traders;

DESCRIPTION OF BEST MODE The accepted amount to be
 20 adjust. The following description is given with respect to an
 exemplary FRA (Forward Rate Agreement) trading system. It
 15 is to be understood that this has been chosen only to
 35 exemplify the invention and that the invention is not
 limited to any particular financial instrument or even to
 25 broker hits a price from a call for a price from outside
 the trading system; and a chart showing how the electronic

10 The following are examples of systems which comprise the
11 invention: a) Different order types and trading system; b) c) d)
12 financial instrument trading systems. For example, the
13 invention may be embodied in other financial trading
14 systems for trading instruments such as F/X spot, F/X
15 forwards and swaps or in commodities trading systems.
16 This list is not to be construed as limiting.

WO00/16224 of EBS Dealing Resources, Inc. describes a Forward Rate Agreement trading system. The contents of that document are incorporated herein by reference.

A Forward Rate Agreement (FRA) is a contract between two parties to lock in a forward interest rate, for a period, starting at a specific date in the future. Each FRA contract can be categorised as a spot FRA, an IMM FRA or a broken date FRA. The system to be described is only intended to trade spot FRAs and IMM FRAs although trading of broken date FRAs is within the scope of the invention. IMM is the abbreviation which has become customary to refer to an instrument traded on one of the International Monetary Market dates. IMM FRAs are traded for the four International Monetary Market (IMM) dates next. Spot FRAs are traded for dates associated with today's spot date. A Forward Rate Agreement (FRA) is a contract between two parties to trade FRAs trading screen 10, as shown in Figure 1. The FRA trading workstation presents a set of FRA contracts that may be traded in an electronically brokered format. Each type of contract is known as a tenor. The price information for a particular tenor is displayed on a tenor line 12. For each tenor line, the dealing system presents the best credit-screened bid and offer prices of all active quotes. Upon selection of the tenor line, the workstation presents a detailed view of the associated tenor showing contract dates and additional market information for dates associated with today's spot date. A trader may select a tenor line and then submit one of four order types (Bid, Offer, Buy or Sell) quote. Each type of order requires the trader to specify an interest rate notional amount for a particular tenor. Once submitted, new orders are matched with outstanding orders. Information for a particular tenor is displayed on a tenor line 20. For each tenor line, the dealing system presents

of order order types. Bid, offer, any other order type price/time priority and Compatible orders are matched resulting in the execution of deals. In order to encourage market making, a trader can submit and adjust bids and offers for several tenors at a time. For non-standard FRAs, a price inquiry function allows the trader to issue a system-wide broadcast to request a price for a broken date FRA. A trader may respond to a price inquiry by selecting the entry in the bulletin board.

The credit facility uses pre-screened prices. Trading Floor Administrators (TFAs) at the trading floors enter credit limits for each counterparty group of trading floors. Dealable prices are distributed to those floors that have credit with the price maker. In order to encourage trading, the trading screen shown in Figure 4 provides traders with the facility to enter bids, offers, buy or sell orders by selecting buttons 14, 16, 18, 20 on a toolbar at the top of the screen. The best bid/offer prices are displayed for tenors of various lines in a one window and deals done by the trader and the system as a whole are displayed in other windows 22, 24. The display is better understood with reference to an example of an FRA deal price. As mentioned above, a Forward Rate Agreement (FRA) is a contract between two parties to a lock-in of forward interest rate for a period, starting at a specific date in the future, with a price of a deal. In order to encourage trading, a 6x9 FRA is a contract covering a period that begins 6 months from now and ends 9 months from now. The term "6x9" gap" of such a contract is 3 months. The two counterparties, one buyer and one seller, settle by cash payment at the start of the contract (in this case 6 months from now). The system's display shows the buyer of an FRA will be compensated if future interest rates rise and the seller of an FRA will be compensated if future interest rates fall. The agreement (FRA) is a settlement based on the difference between the actual interest rate prevailing on the fixing date and the that figure is shown in the price maker. For example, a 6x9 FRA is a contract covering a

interest rate specified in the contract for a specific notional amount stated in the contract. Settlement takes place at the beginning of the term. As an example, consider a USD 6x9 FRA trade for \$100 million (US) at an agreed upon rate of 5.5675% executed on September 9th, 1997. The deal has the following characteristics:

- Contract Rate: 5.5675%
- Notional Amount: 100 million (US\$)
- Reference Rate: 3-month LIBOR
- Trade Date: September 9th, 1997
- Spot Date: September 11th, 1997
- Fixing Date: March 9th, 1998
- Settlement Date: March 11th, 1998
- Maturity Date: June 11th, 1998

The period of this deal begins on March 11th, 1998 (the settlement date) and ends on June 11th, 1998 (the maturity date). On March 9th, sometime after 11:30 AM London time, the back office personnel at each bank will look on the appropriate Reuters page to read the 3-month LIBOR (London InterBank Offer Rate) posted for March 9th. If, for example, this rate is 5.5800%, then between the trade date and the fixing date, the interest rate has risen 0.0125 percent or 14 basis points. Therefore, a settlement amount must be calculated based on this reference rate of 5.58%. The settlement amount is the amount on the check paid by the seller to the buyer. The settlement amount is calculated using the following formula:

Settlement Amount = Notional Amount $\times$ (Reference Rate - Contract Rate) $\times$ (Maturity Date - Settlement Date) / 360

On March 9th, sometime after 11:30 AM London time, back office personnel at each bank will

Settlement Amount = (Notional Amount) x (Contract Rate - Reference Rate) x (Days in Period) / 360

Example: A bank enters into a 92-day FRA with a contract rate of 5.58%. The settlement amount is the amount of the check paid by the buyer to the seller. The

Settlement Amount Calculation Example

Assume that the bank enters into a 92-day FRA with a contract rate of 5.58% and a notional amount of \$100,000,000.

Settlement Amount = (Contract Rate - Reference Rate) x (Days in Period) x (Notional Amount) / 360

Example: $(5.58 - 5.5675) \times (92) \times (100,000,000) / 360 = 3,167.6$

The bank must pay the seller \$3,167.6. The settlement amount is the amount of the check paid by the buyer to the seller.

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of FRA contract, is called a tenor. Some examples tenors are listed below:

Examples of FRA Tenors:

Cash 3 month Cash 6 month Cash 12 month

5 USD 1x4 DEM 1x7 USD 1x13
 USD 3x6 USD 2x8 DEM 2x14
 JPY 6x9 JPY 6x12 USD 12x24

IMM FRAs with

IMM FRAs a 6 month gap Broken Data

10 FRAs

 USD Sept97 USD Jun 97-6 USD 3x6 (12)

 USD Dec97 USD Sept 98-6 DEM 2x14 (10)

 JPY Mar98 JPY Sept 98-6 Some USD 10x3 (3)

are listed below:

15 Example: If the Tenor is selected with a mouse or keypad, then

the details of the FRA tenor line are presented in the top

5 section of the screen. The detail area shows the best

dealable, EBS best, and best regular prices for the

selected tenor. The fixing date, settlement date, and

20 maturity date of the active tenor are shown as well.

IMM FRAs Turning again to Fig 17, the screen can now be better

10 understood. The Tenor Detail Panel 26 provides a detailed

view of tenor line information and transaction activity.

The Tab Controls 28 allow user to select one of several

25 user-defined tab sheets. The user may designate the tab

sheet properties and components. The Tenor Line shows a

15 tenor indicator, best bid and offer prices, best amount

available for bid and offer and a big figure. The TFA

Messages area 29 shows messages relating to Trading Floor

30 Administration, such as credit notifications for deal

recovery, help desk message broadcasts. The EBS Deals

20 Listbox 24 shows deals completed on the EBS system. The

Trade Deals Listbox 22 shows deals completed by the trader

10 using the screen, and the Toolbar 130 allows the trader to

35 select common trading commands. The screen also includes a

multi-tenor order limit panels 31 in which single bid and

25 user-defined tab sheets. The user may designate the tab

sheet properties and components. The Tenor Line shows a

15 tenor indicator, best bid and offer prices, best amount

using the screen, and the "Available Bid/Offer" tab sheet to
 35 offer amounts may be specified to limit exposure across
 multiple tenors. A number of tenor lines (more than fifty) may be
 40 visible on the screen concurrently. There may be
 45 additional tenor lines that are not visible on the screen
 due to space constraints, but can be easily brought
 into view. The screen also allows the trader to select to
 50 show fewer tenors (as few as eight) depending upon the
 trader's preference.

10 The Tenor Detail Panel is shown in Figure 2 and shows
 a selected Tenor Line in more detail. It includes:
 15 Tenor Identification 32 (currency and description);
 Offer Tenor Data Information (Fixing Date 34a, Settlement
 Date 34b and Maturity Date 34c);
 20 Regular Dealable Bid and Offer Prices 40 for regular
 amounts 36, 37 satisfying credit screening (the "regular"
 25 amount is an amount at least equal to the system default
 value or representative of a typical trade in a particular
 currency, and may for example be 50M pounds). The amount
 30 is shown at 38, 39; (as few as eight) depending upon the
 trader. Best Dealable Bid and Offer Prices 40, 41 (the best
 35 price available after credit screening for any amount)
 along with the total quantity of Best Bid 42 and Offer 43
 Amounts available at those prices; currency and description);
 40 EBS Best Bid and Offer Prices 42e (the best price
 available on the whole system) regardless of credit (though
 45 this may not be available to the trader) if this differs
 from the corresponding Best Dealable Prices; the Best Bid
 50 amount 43 and Best Offer Amount 45, which shows the total
 amounts available at the best dealable bid or offer price
 for all bids or offers satisfying credit restrictions; and
 55 the "Big Figure" 44 which is the most significant
 digit in the price. Bid and Offer Prices 40, 41 (the best
 60 price available after credit screening for any amount)
 Note that much of this information is also
 65 shown in each Tenor Line of each Tab Sheet (Figure 1) for
 Amount 40, the left of Figure 2 is a bid/buy order status
 70 indicator 46 showing the amount requested and obtained for
 the bid/buy order on the whole system regardless of credit (though
 75 this may not be available to the trader) if this differs

and open Order. The order price 48 for an open order submitted by a dealer is shown to the right of the order amount. If an Offer/Sell Order was pending, its status would be displayed on the right.

Note that the bid (buy) prices are on the left, and the offer (sell) prices are on the right, and that all displayed prices are arranged in ascending order from left to right. The EBS Best Bid Price (if shown) will always be better than the Best Dealable Bid Price. This is because the credit granting entity for this trading floor may not have extended sufficient credit to the counterparty offering the Best Bid Price (or vice versa). Similarly, the Best Dealable Bid Price will always be at least as good as the Regular Dealable Bid Price. In the particular example shown in Fig. 2, the Best Dealable Bid Amount is 120 which is larger than the "Regular" amount of 50, and consequently the same price (504774) is shown as the Regular Dealable Bid Price and the Best Dealable Bid Price. The prices are arranged in ascending order from left to right. On the right of the panel are shown the three last prices paid or given 50, together with the deal time 52, because the Fig. 3 shows the Offer Order Requesting Panel 58, which appears on the right side of the Tender Detail Panel when a particular Tender has been selected and either the Offer or Sell key has been activated. (A similar Bid Order Request Panel appears on the left side of the Tender Detail Panel when a particular Tender has been selected and either the Bid or Buy key has been activated). The Order Request Panel includes an Amount Entry (Field 60) and a Price Entry (Field 62) both of which include up and down spin buttons for adjusting the respective entries up or down, as well as a Send Pushbutton 64 for submitting the order (assuming appropriate validation checks are positive), and a Quit Pushbutton 66 which dismisses the Order Request Panel without any action being taken. As previously indicated with respect to Figures 1 and 2, once a valid order has been submitted, its status is displayed on both the Tender Panel and the Order Request Panel. When a particular Tender has been selected and either the

35 Detail Panel (Fig. 3) and in the corresponding Tenor Line (Fig. 2), with the latter showing only the Amount Remaining in the outstanding order (ie, the difference between the Amount Requested and the Amount Obtained shown in the Tenor Detail Panel).

In the described embodiment, the trading system is an electronic brokerage system having a communication network for facilitating the buying and selling of FRAs by traders each associated with his own Workstation (WS) 77 located at a trading floor of a subscriber bank (client site). The hardware used in the system has similarities to the current EBS system for foreign exchange to which reference may be made, for example as described in USA 5,375,055, line 1 (Fig. 2A) shown in Figure 4, in which each client site has a dedicated client computer (178) ("Market Access Node", or MAN) under the control of a Floor Administrator, in which maintains transaction records, credit limits, and other confidential information originating within its associated trading floor. The WS's and the MAN associated with each trading floor are connected via a conventional self-repairing DEC/VAX network to a nearby distribution node ("Market Distributor" or sub-MD) or computer (179), which typically analyses and distributes current market data by means of dedicated permanent communication links to one or more associated MAN's in a particular city (or other local region), and which may also provide administrative functions for the communication network. Access Node, the MAN. The communication network comprises a credit store, stored at each MAN, for storing an indication of the credits available from the group of terminals associated with that MAN to other groups. As previously explained, a group may be one or more terminals, but is preferably one or more trading floors. Their function of distributing prices is fulfilled by the Market Distributors. The Market Distributors also include a credit filter comprising a yes/no Pre-Authorisation Matrix from which it is determined if a MAN in a particular city (or other local region), and which may also provide administrative functions for the communication network. Access Node, the

15 is determined whether prices should be transmitted to the
 trader terminals for display. Although not considered critical to the present
 invention, a group of MD's is preferably supplemented by a
 5 common trading region processing node 80 ("Arbitrator
 Node" or "ARB"), with the ARB performing those functions
 (such as identifying potential matches between buyers and
 10 sellers) and other aspects of the "Deal Matching" process
 that require coordination with more than one client site)
 which make the most efficient use of the communication
 network if done centrally or regionally, while the MD's
 perform those functions (such as generation of separate
 15 Dealable price information for each individual client
 site) which are readily implemented in parallel in a
 distributed processing network and which make most
 efficient use of the communication network if done locally
 5 or in close proximity to the individual client sites. In that regard, it is possible to have more than one
 ARB with each ARB having a primary responsibility for
 20 trades initiated by Market Makers in the ARB's own trading
 region and being connected to all the MANs and MDs of
 10 that trading region as well as to the other ARBs in other
 trading regions, by permanent dedicated links of the
 communication networks. In the majority of deals, it is
 25 anticipated that both the Maker and the Taker will be
 within the same trading region and this will be directly
 15 linked to the same ARB which can therefore identify a
 potential match and coordinate its final execution without
 5 any communication with the other ARBs, at the same time,
 30 the other ARBs can simultaneously be processing deals
 related to other trades in other regions. Alternatively,
 20 a single Arbitrator could be dedicated to all trades
 involving a discrete subset of all the available financial
 10 instruments, e.g. as presently contemplated commercial
 35 embodiment, a single central Arbitrator is dedicated to
 FRAs trades, while several regional Arbitrators are
 25 collectively dedicated to spot FX trades. Trades will be
 within the same trading region and this will be directly
 15 linked to the same ARB which can therefore identify a

Whether the communication links between nodes are permanent (maintained indefinitely between two network components) or temporary (established dynamically for a short period of time) they are preferably "logical links" which have the property that messages sent in a certain order over the same logical link are guaranteed to reach their destination in the same order. Moreover, the communication network is preferably provided with sufficient error detection error correction, and network self-repair capability to guarantee that messages sent via these logical links are error free.

In summary, each MAN is connected to other MANs by a robust communication network which connects the various trading floors and which supplements the MANs with a number of processing nodes (preferably in the form of CMCs and ARBs) to facilitate the redistribution of price quotations and other market data and to execute transactions by matching eligible Market Makers with eligible buyers and sellers and by monitoring the transactions until they have been completed or aborted, with the MANs being responsible for trading on floor specific tasks such as logging the completed transaction and updating the creditor limit that was previously available to the counterparty trading floor other MANs by a robust communication network.

Although described above in terms of a distributed architecture, it should be noted that a single central computer system could be used to implement the various functions described above. The system of this alternative embodiment would thus comprise a plurality of workstations connected by a network to a central computer system. The central system would include the credit store, distributor and credit filter arranged to filter prices for distribution to the workstations. This is a simpler, but non-preferred, implementation. The distributed embodiment described is considered to be a more robust and secure design for the counterparty trading floor other MANs by a robust communication network.

Although described above in terms of a distributed architecture, it should be noted that a single central computer system could be used to implement the various

non preferred implementation. The disclosed embodiment
 10 A system embodying the invention enables the system
 described, and further detailed in WO00/16224, to be
 15 configured to enable voice institutions to take part in
 the electronic broking process. This enables institutions
 and other customers who do not use the anonymous trading
 system described to participate in it through a voice
 broker. Thus, it broadens the scope of the market to
 20 which they have access without them having to switch from
 the traditional mode of broking via a voice broker.

Figure 5 shows a revised version of Figure 4 in which
 a number of Voice Broker Workstations VWS 81 are included
 in the system. It is through these workstations VWS that
 the voice brokers communicate with the anonymous trading
 system. A number of voice broker workstations may be
 15 attached to the network. Institutions to take part in
 the system supports both voice traders who also
 subscribe to the anonymous system as well as voice traders
 who act through the intermediary of a voice broker. A voice
 broker. The voice brokers, while appearing as any other
 workstation to the network are treated as a special case.
 20 The VWS are supplied with the whole market book for
 specific tenors in price/time order rather than just the
 top of the market book. The voice broker VWS enters orders on
 behalf of voice traders. Both orders submitted by VWS voice
 25 brokers are owned by that broker. In the existing system
 such as described in WO00/16224, the order is owned by the
 trader who inputs the order into the system. take part in
 15 The traders, be they voice traders acting outside the
 anonymous trading system or electronic traders on the
 system, can call the voice broker for a price for a call.
 This is a well understood term in the financial markets
 20 meaning that a trader is asking the broker for a price for
 a particular amount. With the whole market book for
 specific tenors, the voice broker in response to a request for price
 10 for a call, can look at a price on the anonymous system
 but may also work outside the trading system by calling a
 25 number of makers to get two-sided prices, that is, buy and
 such as described in WO00/16224, the order is owned by the
 15 trader who inputs the order into the system. take part in

1 The voice broker's response to a request for bid
 2 sell prices. The voice broker can then select the best
 3 bid and best offer and quote that to the trader regardless
 4 of whether it originated on or off the anonymous trading
 5 system.

6 Traders on the system can call the voice brokers to
 7 place an order as a bid or offer. The voice broker
 8 submits the quote, including the price, size and name, to
 9 the market established by the anonymous trading system on
 10 the trader's behalf. The quote from the trader is

11 included in the calculation of the credit-screened market
 12 view that is prepared for each of the traders on the
 13 system. Thus, if the quote is from a counterparty with
 14 which a given trader's institution has a line of credit,
 15 it will be visible to that trader. Traders on the system

16 can either see the quote submitted or by the voice broker find the
 17 same in the same manner as a conventional process although the deal
 18 completion processes may differ as will be described.
 19 Voice broker inputs quotes can also be hit by voice traders
 20 acting through voice brokers. The price, size and name, to

21 the voice broker has full control of the quotes
 22 that he has submitted to the anonymous trading system. He
 23 can reject or confirm deals against this quote. For
 24 example, if one system hits another, this is different from
 25 quotes inputs from traders on the anonymous system and is

26 necessary as the voice broker may be working manually on a
 27 portion of the quote. That trader's Traders on the system

28 can call a voice broker to buy or sell a
 29 certain amount at a certain price. The voice broker has
 30 the option of executing that order either manually or via

31 the anonymous trading system. If it is to be executed
 32 manually, the deal is completed over the phone and is then

33 entered as a done deal into the system. It should be
 34 noted that although completed outside the anonymous

35 trading system, the presence of the deal in the system can
 36 still affect the system, for example, the deal particulars

37 will be seen by other traders and may affect their bid and
 38 offer process. The voice broker may be working manually on a

39 portion of the quote. That trader's Traders on the system
 40 can call a voice broker to buy or sell a

trading system, one instance of the deal is entered into the system. If the voice broker executed the deal electronically the order is entered into the system as a bid or sell order. The broker then sees the market from that trader or trading floor's point of view. That is the market view he sees is pre-screened for credit to filter out quotes from counterparties with which the trader cannot deal. However, the credit screening is not for credit within the anonymous trading system but external credit. That is, there is a check for credit apart from the credit apportioned to the anonymous trading system, between the trader's institution and possible counterparties. The voice broker can select quotes to be matched against orders received from the trader and may assist in deals. In that case, the deals are no longer anonymous, names are submitted and a manual credit check is made on the side which called for broker assistance. The voice brokers have the power to reject the deal if credit is unavailable with which the trader cannot deal. However, when a deal is complete it is logged into a trade database and passed to back office settlement systems. The manner in which voice brokers interact with the anonymous trading system will now be described in the context of the FRA Trading System described with reference to Figures 1 to 5. Broker can select quotes to be matched against the order book. Each voice broker is treated as an institution and as such is assigned a bank ID. The voice broker has its own market access node as described with reference to Figure 5 and calls visible to the trading floor administrator. Existing trading floors on the system then can assign credit to the voice institution as if it were any other institution with which they may wish to trade. Until that credit information has been entered, the trading floor cannot see quotes input by the voice institution. The trading system will now be described in the context of the FRA Trading System. The voice institution then needs to enter its credit matrix from the anonymous system. Rather than assigning an individual credit amount to each institution, it indicates an allocation to a bank ID. The voice broker has its own market access node as described with reference to

either that it may trade or that it will not trade. All trades are subject to final confirmation by the voice institution and the credit matrix may be updated periodically, for example on a daily basis.

Figure 6 illustrates the process which occurs when a voice broker submits an order to the anonymous trading system on behalf of a voice trader. At step 100 the trader, who may be a voice or electronic trader, calls the voice broker with an offer request. The voice broker enters the offer onto the anonymous trading system including the price, the size and the counterparty at step 102. At 104 the voice broker then announces the best price on the anonymous system which is received at 106 by all voice traders by the voice institution. When the price is submitted to the anonymous trading system it is distributed to the traders at 108. A given electronic trader will see the price as a dealable price at 110, if he has credit with counterparty, otherwise he sees the best price on the anonymous trading system.

Figure 7 shows the screen of the voice broker's workstation showing an offer being entered on behalf of a trader from an institution identified by the four letter code CCTL. The screen is similar to that of Figure 4 with the various FRA tenors shown at the left hand side of the screen and the tool bar across the top. The centre window 112 is configured to show an overview of all quotes in the system and the right hand window is split into a column 114 showing bids and a column 116 showing offers. It will be noted that this display is a little different from that shown in figure 4 and appreciated that the exact display is a matter of design choice for the trading system.

In the toolbar 30, the institution CCTL (at 118) has been set. As a result, the broker is trading on behalf of that institution and the market view is the credit screened view appropriate to that institution and the book is the book for that institution. The left hand side of the screen and the tool bar across the top. The centre window 112 is configured to show an overview of all quotes in the system and the right hand window is split into a column

The voice broker then uses his mouse to check the offer button 120 on the tool bar causing the order request or quote panel 122 to be displayed. The voice broker enters the details of the offer in the queue panel, which is very similar to that shown in Figure 3 with the amount being entered in the box 60 and the price in the box 62. To send the order to the system the voice broker hits the SEND button 64 after which the panel is automatically dismissed. To dismiss the quote panel without SEND, the broker hits QUIT button 66.

Turning now to Figure 8, the quote received from the voice broker is included in dealable, that is credit screened, prices distribution to floors who may be able to trade with that counterparty. However, unlike credit information entered to by trading floors, the credit information entered by the voice broker only indicates that a person may wish to trade. Therefore, a trader hitting the quote cannot be certain that the price is dealable or that his hit will be accepted. The screen shown in Figure 8 is the broker's workstation showing the market from the CITE trader's point of view after the offer has been submitted from him. The order can be seen at 124 as the latest quote in the quote overview window and as the only offer in the traders market panels 114/116. The market panel shows quotes supporting tenor prices in price/time order and are shown highlighted or in a different colour if there is no credit block. In the tenor details panel the quote is shown as entered against the selected tenor and is also displayed against that tenor in the tenor line and it will be seen that up to three quotes can be entered against any given tenor. Figure 8 is the broker's workstation showing the market at this stage. The voice broker announces the ATS (Anonymous Trading System) best price to all his traders some of which may also be electronic traders. Figure 9 illustrates the process which occurs when an electronic trade hits a broker assisted offer which has price/time order and are shown highlighted or in a different colour if there is no credit block. The credit

10 When a quote is submitted, the system has a price that has to be
 15 been submitted as described with reference to Figures 5 to
 20 8. Figure 9 illustrates the process of a quote being submitted.
 At step 200, the electronic trader hits a price on
 his screen. If there is credit, the price will appear
 5 black, although this is a perfectly arbitrary choice of
 colour. At step 202, the anonymous trading system (ATS)
 suspends the quote that has been hit and notifies the
 10 voice broker. At step 204, the voice broker checks the
 status of the order that has been hit and at step 206
 checks credit with the maker. At 208 the trader, who may
 be voice or electronic, checks his institution's credit
 with the electronic trader's institution and, if there is
 15 sufficient credit, tells the voice broker the amount at
 210. At 212, the broker enters the amount of the deal to
 be done into the ATS system and at 214, the system checks
 the taker's credit (the taker is the electronic trader who
 5 hit the price). If the system finds sufficient credit it
 subtracts the deal amount from the quote stand (then
 reactivates it) at step 216 unless the order has been
 20 fulfilled. At step 218, a done deal is acknowledged at the
 electronic trader and at step 220, the broker, 206
 notification from the system, notifies the done deal to the
 10 voice trader who receives the acknowledgement at 222. Credit
 with Figures 10 to 12 show broker workstation screen shots
 25 for the process of Figure 9. A voice broker console amount at
 210. When the quote is hit, the quote entry in the
 15 overview panel 112 will change in appearance, for example
 hit will be changed to green. In the example, the quote that
 5 has been hit is the quote in 124. In the previous
 example, by double clicking the line 124, the broker
 30 ensures that CITE is selected in the combo box and that
 USD-IL Sep 00 is the active tenor. In addition, the quote
 10 overview caption flashes green when there is a hit and the
 quote status information in the Tenor Line and the Tenor
 35 Details Panel was also changed displayed in green, or some other
 colour. The status panel in the Tenor Details Panel then
 25 expands to display "CPTY for nm?" where CPTY is
 210. When the quote is hit, the quote entry in the
 15 overview panel 112 will change in appearance, for example

10 the four letter code for the counterparty who has hit the
 quote, and 11nnn vis the amount. 12 "Yes" and 13 "No" responses
 20 buttons 232, 234, are also displayed, to enable the voice
 broker to respond. The Tenor Sheet Caption also flashes
 5 green such that, if it is not the active one in the
 column, the broker receives an indication that there is a
 hit at a hidden tenor. The highlighting of the tenor line
 10 and a tenor details only occurs when the appropriate
 institution, in this example, CITL, has been selected in
 the combo box on the tool bar 30 by the voice broker. If
 a different institution is selected, the Overview sheet
 caption and the quote 124 will still be highlighted to
 15 alert the voice broker to the lister party who has hit the
 quote. When the hit is received, the broker informs the
 traders who submitted the quote of the attempted hit. The
 5 trader checks that his institution has credit with the
 electronic trader's institution for all the amount of
 the amount and tells the broker the amount. These steps
 are performed outside the anonymous trading system. If
 20 credit is available, the broker clicks the yes button 232.
 The institution will be approached, that the trade ceases to be
 10 anonymous as soon as the taker hits the quote. The taker
 is necessarily identified to the voice broker as the maker
 has to perform a credit check which is external to the
 25 anonymous trading system. The counterparty who has hit the
 quote. Figure 11 shows the broker's workstation after the
 15 broker has hit the yes button. A hit confirmation panel
 1240 appears in the tenor detail panel which identifies the
 5 counterparty (CITL) and the amount. At this stage the
 30 amount is displayed in a panel next to a scrollbar
 enabling the broker to vary the amount. The confirmation
 20 panel also shows the price and has send and quit buttons
 1242, 1244. The broker confirms the deal by clicking the
 10 send button 1242. As the taker hits the quote, the taker
 35 as the maker. If there is an amount of the quote remaining in the
 system, the suspended quotes is reactivated. While the
 25 quote is suspended it is temporarily withdrawn from the
 10. Figure 11 shows the broker's workstation after the
 15 broker has hit the yes button. A hit confirmation panel

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market, but it retains its position in the queue which is
 price/time based. The quote is shown in the quote
 status panel. The shift from the electronic trader will not
 be attended to by the broker within a certain time. This
 is illustrated in Figure 12 where the quote status panel
 changes from green to another colour such as grey. The
 broker can reactivate the hit by clicking the "no" button.
 Figure 13 shows the Broker's Workstations Screen
 showing the market and book, credit screened for
 institution CITL once the deal has been completed. The
 quote 124 which has been traded is shown in the quote
 overview panel as being of an amount 150/300 indicating
 that of the 300 original offer amounts, only 150 has been
 fulfilled. The other panel also shows that the amount
 offered is now 150, reduced from the original 300. Figure 14
 shows the process which occurs when a
 trader calls the voice broker with a price request. The
 trader may be a voice or an electronic trader. The trader
 at step 300 calls the broker with a price request. The
 amount need not be specified. In Figure 14 the call is
 shown as made by the voice trader but it could come from
 an electronic trader. At 302, the broker enters into the
 ATSto the 24 trader's bank code which shows the four digit
 identifier as such as CITL referred to in previous examples.
 At 303 the anonymous trading system displays the credit
 screened book for the trader requesting the price with the
 order book being displayed in price/time order. At step
 304 the broker may put out a call for a price to selected
 voice traders and at step 306 the broker pieces together
 various information he has gathered to provide the trader
 with a two sided price. A two sided price is the buy price
 and the sell price. This price will be deduced from
 quotes available from the anonymous trading system and
 prices provided by other traders and will be the best that
 is available from the two sources. At 308 this best price
 is received by the trader referred to in previous examples.
 At 309 the anonymous trading system displays the credit
 screened book for the trader requesting the price with the
 order book being displayed in price/time order. At step

The following example considers the case where the broker makes a "buy" request on behalf of a trader, who may be voice or electronic. There are three possible scenarios: that the price the broker hits is from an electronic trader; that the price hit is from a voice trader operating on the anonymous trading system through a voice broker; or that the broker hits a price from a call for a price received from outside the anonymous trading system. Figure 15 shows the process where the price hit is provided by an electronic trader. At 400, the voice trader calls the voice broker and informs the broker that he wants to buy at a certain place. At 402 the broker enters the trader's four letter code into the window on his toolbar and at 404 the ATS provides a credit screened book for the voice traders at the institution. The voice brokers workstation that the price the broker hits is from an electronic trader is displayed in price/time order with quotes appearing in black being dealable and quotes appearing in red not being dealable. The broker hits a price from a call for a price received from outside the anonymous trading system. At 406, the broker hits the price ordered by the trader. In this case, the price has been input into the system by an electronic trader. At 408, the ATS reserves the deal amount and at 410 performs a credit check against credit limits stored in the system in the manner described in WO 00/16224 and US-A-5,375,055. If there is not bilateral credit then, at 412, the ATS suspends the quote and enters a manual confirmation mode. At this point, at 414, the electronic trader is provided with the identity of the counterparty on behalf of whom the voice trader is acting and is left to perform their own credit check external to the anonymous trading system. The electronic trader replies "yes" or "no" following the credit check. If the reply is "yes", at step 415 the ATS updates the broker's workstation asking for confirmation. At 418, the broker discloses the identity of the counterparty to the voice trader and asks whether he has credit with that institution. At 420, the trader performs a credit check bilateral credit then, at 422, the ATS responds the quote and enters manual confirmation mode. At this point, at

together with the voice broker. The system then provides an answer to the voice broker. If there is credit and the voice trader can do the deal, the broker sends, at 422, an acknowledgement to the system with a "done deal" message. At 424, the ATS subtracts the done amount, and if there is any amount left, reactivates the quote. The system then updates all the trader workstations. Finally, at 426, the done deal is acknowledged by the system to the electronic trader.

Figure 16 shows a trader workstation screen shot when there is insufficient credit within the anonymous trading system to complete a hit from a voice broker. It will be noted that this screen is essentially the same as that of Figure 15. The screen includes, additionally, a quote overview panel 430 arranged below the trader deals panel. When the voice broker hits at price, that price is highlighted on the trader's workstation screen. In this case the quote 432 is the only quote the trader has in the market and the quote turns green in his quote overview panel. The quote number 436 is also highlighted in green as is the sheet 434 in which the tenor is located. For example, if the trader had a GBP-L quote in the market but was displaying the USD-L tenor on the line, the flashing green GBP-L sheet would show him that there is a hit on a tenor on the GBP-L tenor sheet. By double clicking the quote in the quote overview, the trader ensures that the quote is the active quote. The status panel in the Tenor Detail Panel is then displayed which identifies the counterparty and the amount and gives the trader the option of accepting or declining or accepting for a reduced amount. It should be understood that if this status panel only appears if there is insufficient credit within the system for the proposed trade, the trader is being asked to rectify that. If there is sufficient additional credit external to the system, the flashing green multiple quotes are ordered in Price/Time order from the middle of the panel outwards and change colour depending on their status. A blue quote is a quote that would be the active quote. The status panel in the Tenor Detail Panel is then displayed which identifies the

is in the market, a Red quote is the best in the market, a Grey quote is a done quote and a Green quote is a hit quote. The status of the quote is displayed in the expanded version of this in the Tenor detail panel. The status information reflects the quote currently selected. This quote has a depressed border around the sub-field at the bottom of each quote. These amount sub-fields act like radio buttons. To accept the hit, the trader clicks on the yes button and then enters the amount. If there is insufficient credit for the full amount, the trader may enter a lesser amount. Figure 17 shows the trader workstation after the trader has accepted the hit from the broker acting on behalf of CTL and showing how the amount accepted can be adjusted. This is within the list continuation panel 440. When the amount is decided the trader then hits the send button 442. The system will then update the voice brokers workstation with a request for acknowledgement that a deal can be done. The broker asks the voice trader whether he can deal with that counterparty and, if he can, the broker acknowledges the deal to the system which then performs steps 424 and 426 of Figure 15. Figure 18 shows the process where the price hit has been submitted by a voice broker trading as the anonymous trading system. Steps 500, 502 and 504 are the same as steps 400-404 in Figure 15. At step 506, the price that voice trader 1 has asked the broker to hit has been submitted. If another voice trader, voice trader 2, in the following discussion will be assumed that voice trader 12 is acting through a separate voice broker, voice broker 2 (although he could be acting through the same voice broker as voice trader 1) and, if he can, the broker knows. At 508, the ATS suspends the quote that has been hit and sends a message to the voice broker 2 that there has been a hit, identifying the counterparty and the amount. If submitted by a voice broker trading as the anonymous trading system (steps 500, 502 and 504) are the same as

At 510 the second voice broker identifies the hit to voice trader 2 and enquires whether he wishes to do the deal. At 512 trader 2 checks his credit with trader 1's institution and responds to the voice broker. If there is no credit, the second voice broker records a "deal refused" message in the system at 514. The credit matrix is then updated at 514 to disable temporarily credit between these two traders or trading floors. If trader 2 accepts the deal, voice broker 2 confirms the deal to the system at 518 and, at 520 the system updates the first broker's workstation and asks for confirmation. At 522 the first broker then asks his trader if he has credit, which involves disclosing the identity of the counterparty and the deal amount. At 524 the first trader performs his own external credit check and responds yes or no to his voice broker. If the response is no, the broker enters this into the trading system at 526 and at 528 the credit matrix is disabled temporarily between the two trading floors party to the deal. If there is credit, the voice broker at 530 sends a "acknowledgement" message to the system that the deal is done and at 532 the system subtracts the done amount, reactivates the quote if it is not completely filled and updates the trader's workstation. At 534 the done deal is acknowledged by the first voice broker to the second voice broker who informs the second voice trader who in turn receives the done deal acknowledgement at 536 and responds yes or no to his voice broker. The final case is where a trader calls the voice broker for a price and the broker hits a price on the trading system. The mechanism for this was described with respect to Figure 14. Referring to Figure 19, at 600 a trader informs the voice broker that he wants to buy an amount at a price after the broker has given him the best two-way price. done amount 20 reactivates the quote if it is not completely filled and updates the trader's workstation. That price has been offered by another voice broker in this example and the process followed is the regular deal making process between two voice brokers. At 602, the second voice broker informs the trader that he has received the done deal acknowledgement at 604 and responds yes or no to his voice

the second trader decides to hit the call for a price. At 604 the second trader confirms that he can do the deal and the first either accepts or refuses. If he refuses the process stops. If he accepts, the broker confirming with the first trader at 606. At 608 the first trader confirms that he can do the deal having made the necessary credit checks and the second trader responds with a yes or no. If the answer is a yes, the broker at 610 confirms the deal as done with trader 2 and enters the deal into the anonymous trading system. At 612 the system distributes the deal information to other traders where it will appear in their deals panel. The second trader then receives the deal confirmation at 614 to hit the call for a price. At 604 the broker workstation has a done deal button on the Tenor Detail Panel. Clicking the done deal button displays a deal entry panel, which collects information from the broker as to whether the deal is paid or given, the identity of the counterparty, the amount and the price, and the second trader responds with a yes or no.

Figure 20 shows how the display may highlight prices made by voice brokers as opposed to electronic traders by showing these prices in a different colour, for example in pink on the screen. Although hard to discern from Figure 21, the final quote .710 in the quote overview column has been submitted by a voice broker and is shown in a different colour. This quote is shown in the final tenor at .700 again in a different colour. Also shown in the list of tenors are the best prices which are from voice brokers, again in a different colour. It will be appreciated that both sides of the penultimate tenor and the left side of the fourth tenor are from voice brokers.

As can be seen from the tenors for Dec 01, Mar 02 and Sep 02, the Best Dealable price shown is dual colour. The left hand segment, which may be coloured pink, is for example, indicates the proportion of the prices in the market that have been entered by voice brokers. Thus, for example, the pink (left hand) portion of the Mar 02 Tenor different colour. This quote is shown in the final tenor at .700 again in a different colour. Also shown in the

Panel shows a greater proportion of dealable prices provided through voice brokers. It follows therefore that the remainder of the market has been provided by electronic trades. This may conveniently be shown in cyan.

The manner in which credit processing is performed within the anonymous trading system will now be described.

The credit processing performed for interest rate futures and other derivatives in general, and FRAs in particular, differs significantly from credit processing for spot FX trading. While spot FX is concerned with settlement risk, for FRAs market risk is the primary concern. For this reason, the technical considerations in implementing the system: difference of dealable prices provided for Forward Rate Agreements; three factors are used to calculate credit utilisation; has been provided by the time between the trade date and the settlement

date (start of the contract period), is hereinafter with called the TTS (Time To Settlement) now be described.

2. The volatility of interest rates in the currency of futures the FRA other derivatives in general, and FRAs in particular. The time between the settlement date and the maturity date, the gap of the FRA. FX is concerned with settlement risk, for FRAs market risk is the primary concern. The actual liability for a FRA is not fixed at the time the price is taken because, as can be seen from the formulae above, the actual liability will depend on the difference between the interest rates at the trade and settlement dates. For this reason, a Credit Utilisation formula has been devised and implemented as follows: with included the TTS (Time To Settlement) now be described.

2. The volatility of interest rates in the currency of Credit Utilisation = (Deal size) x (TTS factor) x (# months/3) x (Interest rate volatility factor) x (CCY for conversion rate). of the FRA FX is concerned with settlement risk, for FRAs market risk is the primary concern. The TTS Factor is a Time To Settlement Factor assigned to every month between 0 and 24. When credit is provided above, the actual liability will depend on the difference between the interest rates at the trade and

calculated, the workstation will use the TTS Factor assigned to the TTS month. The workstation will calculate the number of months between the Trade Date and Settlement Date to find the TTS Month. The Credit Utilisation calculation will then use the TTS Factor assigned to that month. This allows the TFA to factor into the Credit Utilisation calculation the time between the Trade and Settlement Dates.

The TTS factor is used in the credit calculation:

This is a non linear calculation method for the time between trade date and settlement date. A table is produced, initially ranging from 0-36 months, of TTS values to be used with the credit utilisation formula. The factors in the table must be able to be set by the TFA.

The table is to be pre-populated with factors calculated by taking the square root of the TTS. The initial values of the table for the 0 and the month TTS are to be 1. to that month. This allows the TFA to factor into the Credit

Utilisation calculation.

TTS	0	1	2	3	6	9	12	15	18	36
Factor	1	1.414	1.732	2.041	2.449	2.846	3.162	3.464	3.742	6.0

This is a non linear calculation method for the time between trade date and settlement date. A table is

The currency volatility parameter must be able to be entered, initially ranging from 0-36 months, of TTS values to be used with the credit utilisation formula. The factors in the table must be able to be set by the TFA. explained, the linear calculation method for the contract period or "gap" (the "three month equivalent") is a fixed value that can't be modified online:

$$3 \text{ mo. Equivalent factor} = (\# \text{ of mos in gap})/3$$

This allows the TFA to factor into the Credit

Utilisation calculation.

All IMM tenors have a 3 month gap between the Settlement and Maturity Dates. So this factor is calculated as 3/3 or 1.

This is a non linear calculation method for the time between trade date and settlement date. A table is

Interest Rate Volatility Factor - The IR Volatility Factor is a percentage value assigned to each currency. The system will store the value as a percentage number. The values to be used in the credit utilisation formula are the currency traded on the local floor. And as previously explained, the linear calculation method for the contract period or "gap" (the "three month equivalent") is a fixed

CCY Conversion Rate -- The currency conversion rate between the Credit Limit Currency and the currency for which the deal is done.

As an example, a USD June 00 FRA traded June 16, 1998 for 100 million has the following characteristics:

Trade Date: June 16, 1998
 Fixing Date: June 19, 1998
 Settlement Date: June 21, 2000
 Maturity Date: September 20, 2000
 Tenor Cap: June 21, 2000 to September 20, 2000
 (91 days or 3 Month Gap)

Deal Size: \$100,000,000 currency conversion rate between the Credit Limit Currency and the currency for which Factors are assigned by the TFA along with the Credit Limit Currency which is assigned on the Market Access Node. In this example, the Credit Limit Currency is USA. The factors that would be used for the above example are derived using the above table 16, 1998

Fixing Date: June 19, 1998
 Using the above formulae, the credit utilisation is:
 Maturity Date: September 20, 2000

$$T(\text{Deal Size}) \times (TFSnFactor)^{2000} \times (\# \text{ of Months in Gap} / 3)^{0.6} \times (\text{Interest Rate Volatility Factor})^3 \times (\text{CCY Conversion Rate})^3 = \text{Credit Utilisation}$$

which $T(100,000,000) \times (4.89898)^{2000} \times (3/3)^{0.6} \times (0.0014)^3 \times (1.000)^3 = \text{Credit Utilisation}$
 Limit \$687586 = Credit Utilisation. On the Market Access Node in this example, the Credit Limit Currency is USA.

The in implementing credit limits on the FRA system, the Trading Floor Administrator (TFA) has the ability to set and adjust the various parameters from which matching criteria are derived. formulae, the credit utilisation is:

A credit utilisation notification is included which issues below credit (warning) at the trader's WS. When the available credit for a counterparty falls below a percentage that is defined via the TFA. An out of credit

notification is issued when the credit utilisation is greater than the defined percentage.

A credit utilisation notification is included which message is also displayed at the trader's WS when credit is exhausted for a particular counterparty. Prices from that counterparty, for all tenors, will no longer be displayed. A credit utilisation report may be initiated, on demand, via the TFA for both screen and hard copy output.

Parameters used in the System

Banks initially define, and modify online, the following parameters which are stored at the local MAN for their local trading floor via the TFA facility;

a) credit limit currency - Market Access Node
b) separate credit limit currency conversions rate is a parameter for each currency traded on the system, from

c) a parameter related to the nature of at least one displayed financial instrument in the form of a currency

on devolatility the TFA utilisation factor for each output currency traded on the system. The currency volatility factor is indicative of the risk

Parameters associated with each financial instrument assessed by the TFA initially define, and modify online, the

d) low time to settlement credit utilisation factors for the their currencies traded on the local TFA floor. The TTS factor

a) is preferably non-linear and also not specific to any financial instrument traded currency conversions rate is a parameter for each currency traded on the system, from

e) Each credit group preferably comprises a plurality of trading floors. Any one credit granting entity (which itself could be a trading floor) may trade with a trading

f) floor of a group defined by the TFA if sufficient credit is availability factor is indicative of the risk

g) Banks also define the following for each counterparty (credit group) that they trade which are also stored at

h) the local MAN: settlement credit utilisation factors for the (a) available credit on the local TFA floor. The TTS factor

ab) low credit warning percentage. is not specific to any financial instrument traded currency conversions rate is a parameter for each currency traded on the system, from

c) Each credit group preferably comprises a plurality of

credit groups that they trade which are also stored at the central register. Banks also have the following options for resetting credit utilisation to zero:

- a) Automatically at the end of the trading day, as is currently done for spot. The time of the end of the trading day from FRAs is preferably definable separately from that for FX spot.
- b) On demand via the TFA
 - 1) for an individual credit group
 - 2) for all credit groups.

The TFA also has the ability to disallow particular floors within a credit group. If a floor is disallowed, it does not take part in the credit of that group. To be compatible, each of the two parties must make sufficient credit available to the other party to complete a trade for at least the predetermined minimum size dealt in any available currency (i.e. available credit at least equal to the minimum credit threshold established by the respective credit granting entity).

The calculation is thus: credit group
 Minimum credit threshold =
 Maximum of {(minimum 3 month equivalent amount) x
 (credit utilisation factor) x (# of months in
 floors gap) x (Interest rate volatility factor) x
 (conversion rate)} for each currency group. To be compatible, each of the two parties must make

Derivation of the Pre-Authorisation Matrix
 The exemplary Pre-Authorisation Matrix shown in Fig 20 is for any \$20 billion currency (i.e. available credit threshold is derived from the various parameters defined by the Trading Floor Administrator (TFA). In the example shown, each group comprises one trading floor.

Certain prices are said to be dealable, which means that they are pre-screened for credit availability. This means that sufficient bilateral credit is available with the counterparty making the price to execute at least one trade for each currency group. To be compatible, each of the two parties must make
Derivation of the Pre-Authorisation Matrix by day complete

that they are determined for credit and deal bid/grossed minimum size trade in the tenor that utilises the most credit.

The concept of dealable prices for FRAs is based on credit compatibility for all tenors. Therefore two trading floors are said to be credit compatible if they have bilaterally allocated enough credit to each other to execute one minimum size trade in the tenor that utilises the most credit available on the system.

For each FRA currency a 3 month minimum notional amount is set as a system parameter. The formula to calculate the minimum size for any tenor is;

$$\text{minimum size} = (\text{3 month minimum notional amount}) / \text{minimum}(\# \text{ months time gap} / 3) \text{ the tenor that utilises the most credit}$$

Example: The concept of dealable prices for FRAs is based on credit compatibility for all tenors. Therefore two

trading floors has defined the 3-month minimum notional amount to be USD 50 mill allocated enough credit to each other to execute one minimum size trade in the tenor that utilises

The minimum size for a USD June 98 = $(50 \text{ mill}) / (3/3) = \text{USD } 50 \text{ mill}$. Each floor has defined the 3-month minimum size for a USD in Sept 98 = $(50 \text{ mill}) / (6/3) = \text{USD } 25 \text{ mill}$ system parameter.

The formula to calculate the minimum size for any tenor is;

$$\text{minimum size} = (\text{3 month minimum notional amount}) / \text{minimum}(\text{Time between trade date and settlement date (TTS)}, \text{Time between settlement and maturity (gap)})$$

Example: The volatility of interest rates in the currency of the FRA then for two floors to be credit compatible

they must have sufficient credit available to execute a trade for a minimum size in the tenor with the highest calculated utilisation. This should mean

that, subject to USD credit changing during deal completion, the two parties will be able to complete

a deal in any currency at least of minimum size. To calculate via trading floor control, to an extent, the

minimum credit threshold necessary for to display dealable prices by modifying time to settlement

Time between settlement and maturity (gap)

Example: The volatility of interest rates in the currency of

completion, the two parties will be able to complete
 trading with any order of minimum size.
 factors with times to settlement that utilise the
 most credit. For example, a floor can specify time
 to settlement factors which do not increase for those
 factors beyond where they want to trade. Also, a
 floor can set the currency conversion to zero for
 particular currencies thus electing not to trade in
 volatile currencies offered, thus reducing the credit
 availability necessary to see prices in less volatile
 currencies.

Example:

The system of the present embodiment allows
 trading with time ranging from 0x1 to 12x27 in
 USD, GBP and JPY. The minimum trade size defined is
 set as USD 50 million (3 month equivalent notional
 value) beyond where they want to trade. Also, a
 floor can set the currency conversion to zero for
 particular currencies. For example, a floor can set
 the currency conversion to zero for USD. To see
 desirable prices from floor B, they must allocate
 sufficient credit to execute one trade in USD for a
 minimum notional size 50 million.

Trading floor A uses USD as their credit limit
 currency.

Trading floor A is only trading USD TRAs. allows
 trading and floor B has assigned a volatility
 factor to USD of 0.5%. Trade size defined is
 set as USD 50 million (3 month equivalent notional
 value) beyond where they want to trade. Also, a
 floor can set the currency conversion to zero for
 particular currencies. For example, a floor can set
 the currency conversion to zero for USD. To see
 desirable prices from floor B, they must allocate
 sufficient credit to execute one trade in USD for a
 minimum notional size 50 million. The minimum credit is calculated as follows
 (the LITS factor is assumed to be the square root of
 the LITS): $\sqrt{0.5\%} \times (50,000,000) = \$1,122,225$.

Trading floor A uses USD as their credit limit
 currency. Having calculated the minimum credit threshold, the
 Market Access Node then calculates for each potential
 counterparty whether it at least meets the minimum order size
 volatility factor to USD of 0.5%. Trade size defined is
 set as USD 50 million (3 month equivalent notional
 value) beyond where they want to trade. Also, a floor can set
 the currency conversion to zero for USD. To see
 desirable prices from floor B, they must allocate
 sufficient credit to execute one trade in USD for a
 minimum notional size 50 million.

could be dealt by checking against the credit limit available for the Credit Group associated with that counterparty, and transmits a CreditUpdate message to the affected Arbitrator(s) and Market Distributor(s) containing a simple binary indication of whether credit is currently available or not available to each designated potential counterparty in an amount at least equal to the calculated minimum credit threshold established by the credit granting entity associated with that Market Access Node. Provided that the relevant threshold has been met, the Arbitrator(s) and Market Distributor(s) receiving the CreditUpdate message place a "1" in the associated cell of their Pre-Authorisation Matrix against the relevant counterparty. Conversely, if the CreditUpdate message indicates that the available credit is below the relevant threshold, the Arbitrator(s) and Market Distributor(s) receiving the CreditUpdate message place a "0" in the associated cell of whether credit is currently available. The Pre-Authorisation Matrix is then used in a known fashion to pre-screen distributed buy/sell orders so that only dealable prices are shown to traders. The foregoing discussion excluded, for simplicity, the handling of credit as between the broker's workstation and other institutions. Market Distributor(s) receiving the CreditUpdate will be as clear from the previous discussion, the voice broker can submit to the trading system the identity of a client institution. The system then displays at the broker's workstation credit-screened prices and a credit-screened view of the book, based on the credit matrix for the selected counterparty. Thus, the broker's workstation provides a plurality of trading parties and the broker can select a market view for a given trading party so that only the broker's workstation can display dealable prices and the best price on the system (which may be from a counterparty with whom there is no credit) for each instrument traded on the system. These prices are displayed in the same way as with the regular trader workstations of the institution ID entered by the broker or a client institution. The system then displays at the broker's workstation credit-screened prices and a credit-

counterparty. When a credit is available, the credit is shown on the matrix system. The broker workstation also shows available quotes in the market for each instrument traded on the system. These quotes are sorted in price/time order and indicate the originating bank ID. These quotes are colour coded according to the credit matrix with black indicating that credit is available and red that no credit is available.

The broker workstation can also display a complete view of the book with no credit screening. This enables the broker to see a complete view of the market across its depth when he is not acting on behalf of a particular trader. The broker workstation shows all deals in which the broker has been involved but unlike trader workstations both parties are disclosed and the deals information can be filtered by voice trader or institution netting bank ID. These are shown in Figure 4 of the broker workstation are connected to a market access node, or these may be a number of market access nodes each with one or more broker workstations attached. The market access node for the broker workstation performs a number of functions as follows:

1. Submission of broker quotes to the arbitrator or trader.
2. Cancellation of broker quotes.
3. Reception of whole book for a specific tenor broker and transmission to a broker workstation.
4. Reception of the credit matrix and update for a specific floor from the market distributor.
5. Reception of the system market view for each connected trader and whose behalf the voice broker can market access nodes each with one or more broker workstations.
6. Submission of hits from the voice broker to the arbitrator against a specific quote.
7. Rejection or confirmation of deals.
8. Logging of deals in a trade database.
9. Printing and reprinting of deal tickets.
10. Reception of whole book for a specific tenor broker and transmission to a broker workstation.
11. Reception of the credit matrix and update for a

Subject of confirmation of deals

10. Hand off to the voice broker and customer's back office systems for order entry.

Our earlier application WO00/16224 describes the message flow around the network of the type described in Figure 4. For reasons of brevity, that will not be repeated reference is directed to that publication. The inclusion of the broker workstation(s) and associated one or more market access nodes gives rise to a number of additional broker related messages as follows.

A **Broker Quote** message is used to submit a hit entered by the broker. The message also contains the quote targeted by the hit and is sent by the broker's market access node to the arbitrator.

A **Broker Hit Notify** message is sent by the arbitrator to the maker market access node (that is the node from which the quote that been hit originated) to notify that node about the broker deal. It also causes the market access node to display a message of the maker trader workstations that a manual credit check is required for one or more **Broker deal status (Maker/Taker)** is a pair of messages which informs the components involved in a deal (maker and taker) about the broker deal. To submit a hit entered

A **Broker Hit Processed** message informs various components about the deals done by the voice broker manually. It is by means of this message that deals

conducted outside the system are entered into the system. This is an important aspect of the embodiment described as it enables the electronic trading system to have a more complete view of the market and so offer traders a more transparent environment within which to operate.

It will be appreciated that the embodiment of the invention described is only one of many embodiments of the invention. The description has been given with specific

reference to FRAs but it will be appreciated that the invention is applicable not only to other financial instruments such as F/Xa spot etc. but also to other manually processed by means of this message that deals conducted outside the system are entered into the system.

10 fungible products such as metals, pork bellies and other
15 commodities. The manner in which credit limits are
determined will vary depending on the nature of the
instrument or commodity being traded but the principle of
5 automated credit checking for wholly anonymous deals with
manual checking for voice broker assisted deals remains
unchanged.

10 The network described has a lot of distributed
functionality. Other network configurations are possible.
15 For example, a centralised network with a trader and
broker terminals connected to a host computer would be
possible. In such an arrangement, matching, credit
checking and the assembling of market views would all take
place at the host. The manner in which credit limits are
15 determined will vary depending on the nature of the
instrument or commodity being traded but the principle of
5 automated credit checking for wholly anonymous deals with
manual checking for voice broker assisted deals remains
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15 determined will vary depending on the nature of the
instrument or commodity being traded but the principle of
5 automated credit checking for wholly anonymous deals with
manual checking for voice broker assisted deals remains
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15 For example, a centralised network with a trader and
broker terminals connected to a host computer would be
possible. In such an arrangement, matching, credit
checking and the assembling of market views would all take
place at the host. The manner in which credit limits are
15 determined will vary depending on the nature of the

What is claimed is:

1. A computerised trading system for trading instruments between trading parties, comprising:

5 a communications network for transmitting electronic messages;

a plurality of trader order input devices connected to the communications network, each for generating electronic orders including bid and/or offer orders and for communication to traders of order information received from other input devices over the network;

at least one broker order input device connected to the communications networks for generating electronic orders including bid and/or offer orders on behalf of a selected one of a plurality of client traders and for communication to a broker of order information received from other input devices over the network;

at least one matching engine connected to the network for matching bid and offer orders input into the system from the order input devices and for executing deals where prices are matched; and
 10 for or a market distributor connected to the network for distributing order price messages to the order input devices, the market distributor being responsible to the

order messages and the matching engine generating electronic orders including bid and/or offer orders on behalf of a

2. A system according to claim 1, comprising a credit store for storing an indication of credit available for trades between each trading party trading via one of the
 30 a plurality of trader order input devices, whereby deals are executed automatically by the matching engine if sufficient credit for the deal exists between the counterparties, the credit limit further including an indication of whether the credit is available for trades
 35 between a trading party trading via the broker order input device and a counterparty, the system further comprising a messages generator for sending a message to the broker order input device and the order input device of a
 40 a system according to claim 1, comprising a credit store for storing an indication of credit available for

counterparty to a proposed deal, the deal confirmation message identifying the counterparty to the proposed deal and requesting confirmation from each counterparty that they wish to proceed with the deal.

3. A system according to claim 2, wherein the system further comprises a credit filter arranged to filter the order information to each order input device to distinguish information relating to orders with which the party represented by the order input device has sufficient credit to trade at least a portion of the order amount, and wherein the at least one broker order input device can select a given one of the plurality of the client traders whereby the order information displayed at the broker order input device is filtered to distinguish dealable order information for the party of the selected client trader.

3. A system according to claim 2, wherein the system further comprises a system according to claim 3, wherein the broker order input device is configurable to display order information relating to all orders submitted to the system represented by the order input device has sufficient credit to trade at least a portion of the order amount,

5. A system according to claim 3, wherein the device can select a given one of the plurality of the client traders whereby the order information displayed at the broker order input device is filtered to distinguish dealable order information for the party of the selected client trader.

6. A system according to claim 3, wherein the broker order input device is connected to a network node, the network node being arranged to submit order information from the broker order input device to the matching engine and to receive order information from other order input devices for communication to the broker order input device.

7. A system according to claim 3, wherein the broker order input device is connected to a network node, the network node being arranged to submit order information from the broker order input device to the matching engine and to receive order information from other order input devices for communication to the broker order input device.

8. A system according to claim 3, wherein the broker order input device is connected to a network node, the network node being arranged to submit order information from the broker order input device to the matching engine and to receive order information from other order input devices for communication to the broker order input device.

9. A system according to claim 3, wherein the broker order input device is connected to a network node, the network node being arranged to submit order information from the broker order input device to the matching engine and to receive order information from other order input devices for communication to the broker order input device.

7. A system according to claim 1, wherein the trader order input devices include means for disclosing the identity of a party to a trade to the broker order input device before a trade is agreed upon.
8. A system according to claim 1, wherein the trading system is an anonymous trading system.
9. A system according to claim 1, wherein the instruments traded are financial instruments.
10. A system according to claim 7, wherein the financial instruments are Forward Rate Agreements (FRAs), the trader order input devices include means for disclosing the identity of a party to a trade to the broker order input device before a trade is agreed upon.
11. A system according to claim 1, wherein the order input information conveyed to traders includes an indication of the amount of the market that has been entered by the broker order input device.
12. A computerised trading system for trading instruments between parties comprising: claim 1, wherein the instruments are financial instruments, the order input devices for entering order information into the system, the order input devices including a plurality of trader order input devices for inputting order information from traders, and at least one broker order input device for trading on behalf of a plurality of clients; system according to claim 1, wherein the order input devices include at least one matching engine connected to the network for matching bid and offer orders input into the system and for executing deals where orders are matched; and trading a market distributor for distributing order price messages to the order input devices, the market distributor being responsible to the order messages and the matching engine, wherein trades are conducted between a trader order input device and a broker order input device, the completion of a trade, and trades in which the broker order input device is a party require disclosure of order input device for trading on behalf of a plurality of clients; system according to claim 1, wherein the order input

of the parties to the trade prior to completion of the trade.

13. A computerised trading system for trading instruments between parties including a plurality of order input devices for inputting bid and offer orders on behalf of traders, a matching engine for matching bids and offers input by traders and, where matches are made, for executing deals, and a market distributor for distributing details of at least a portion of the bids and offers in the market to traders, wherein at least one of the order input devices comprises a broker terminal for entering bids and offers into the system on behalf of traders operating outside the system.

14. A screen display on a trader terminal of an electronic trading system in which electronic orders are input by traders via the trader terminals and by brokers on behalf of third parties via broker terminals, the screen display in communicating to the trader the order information received from other traders and brokers via a network, the screen further including an indication of the proportion of a given market that has been entered into the system by one or more brokers, comprises a broker terminal for entering bids and offers into the system on behalf of traders operating outside the system.

14. A screen display on a trader terminal of an electronic trading system in which electronic orders are input by traders via the trader terminals and by brokers on behalf of third parties via broker terminals, the screen display in communicating to the trader the order information received from other traders and brokers via a network, the screen further including an indication of the proportion of a given market that has been entered into the system by one or more brokers, comprises a broker terminal for entering bids and offers into the system on behalf of traders operating outside the system.

1/20.

FIG. 1

EBS		ABNL-FRA		CITL		BUY, BID, OFFER, SEEL		SELECT ALL		CLEAR ALL		OFF ALL	
USD-SEP98		LIBOR		5		14 16 09:18 5.8550		30		09:37 5.8550		G	
014-SEP-98		09:50		09:50		09:50		09:50		09:50		G	
015-SEP-98		09:50		09:50		09:50		09:50		09:50		G	
015-DEC-98		09:50		09:50		09:50		09:50		09:50		P	
USD-IMM		JUPY-IMM		GBP-IMM		UNDER DEALS		EBS & JUPY		DEM IMM			
28		5		5		TRADER DEALS		XEU IMM					
JUN98		407825		18225		90		5		TRADER DEALS			
SEP98		708550		8900		10		5		TRADER DEALS			
JUN99		12200		5		10		5		TRADER DEALS			
DEC98		10975		0075		70		5		TRADER DEALS			
MAR99		909775		0075		50		5		TRADER DEALS			
JUN99		1400025		1		10		5		TRADER DEALS			
SEP99		200400		0825		70		5		TRADER DEALS			
DEC99		1301450		1825		80		5		TRADER DEALS			
MAR00		800725		1075		60		5		TRADER DEALS			
JUN00		100000		1000		10		5		TRADER DEALS			
SEP00		100000		1000		10		5		TRADER DEALS			
DEC00		100000		1000		10		5		TRADER DEALS			
MAR01		100000		1000		10		5		TRADER DEALS			
JUN01		100000		1000		10		5		TRADER DEALS			
SEP01		100000		1000		10		5		TRADER DEALS			
DEC01		100000		1000		10		5		TRADER DEALS			
MAR02		100000		1000		10		5		TRADER DEALS			
JUN02		100000		1000		10		5		TRADER DEALS			
SEP02		100000		1000		10		5		TRADER DEALS			
DEC02		100000		1000		10		5		TRADER DEALS			
MAR03		100000		1000		10		5		TRADER DEALS			
JUN03		100000		1000		10		5		TRADER DEALS			
SEP03		100000		1000		10		5		TRADER DEALS			
DEC03		100000		1000		10		5		TRADER DEALS			
MAR04		100000		1000		10		5		TRADER DEALS			
JUN04		100000		1000		10		5		TRADER DEALS			
SEP04		100000		1000		10		5		TRADER DEALS			
DEC04		100000		1000		10		5		TRADER DEALS			
MAR05		100000		1000		10		5		TRADER DEALS			
JUN05		100000		1000		10		5		TRADER DEALS			
SEP05		100000		1000		10		5		TRADER DEALS			
DEC05		100000		1000		10		5		TRADER DEALS			
MAR06		100000		1000		10		5		TRADER DEALS			
JUN06		100000		1000		10		5		TRADER DEALS			
SEP06		100000		1000		10		5		TRADER DEALS			
DEC06		100000		1000		10		5		TRADER DEALS			
MAR07		100000		1000		10		5		TRADER DEALS			
JUN07		100000		1000		10		5		TRADER DEALS			

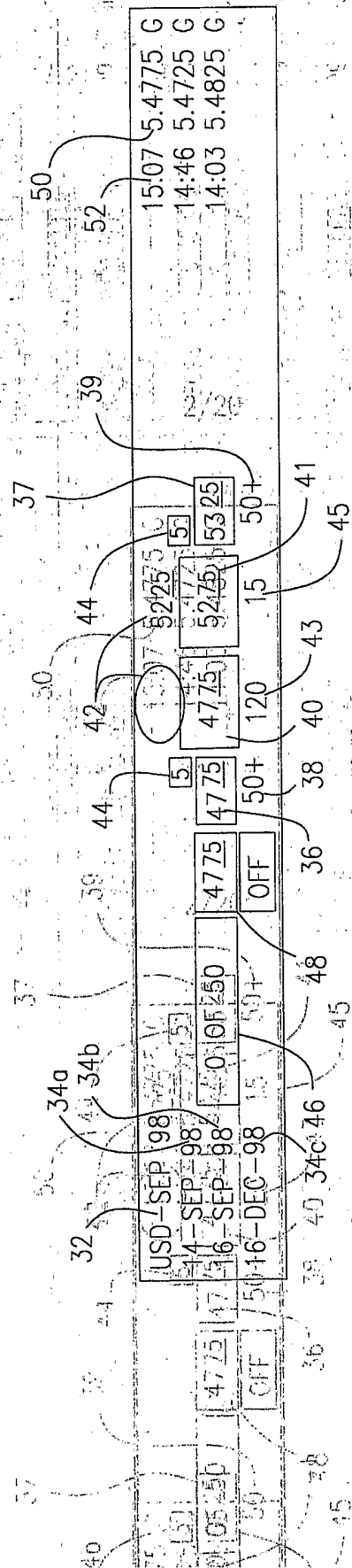


FIG. 2

FIG. 2

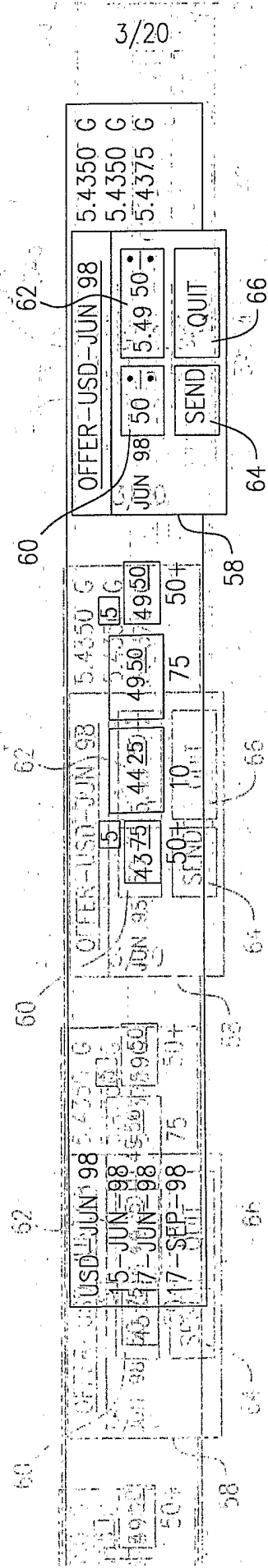


FIG. 3

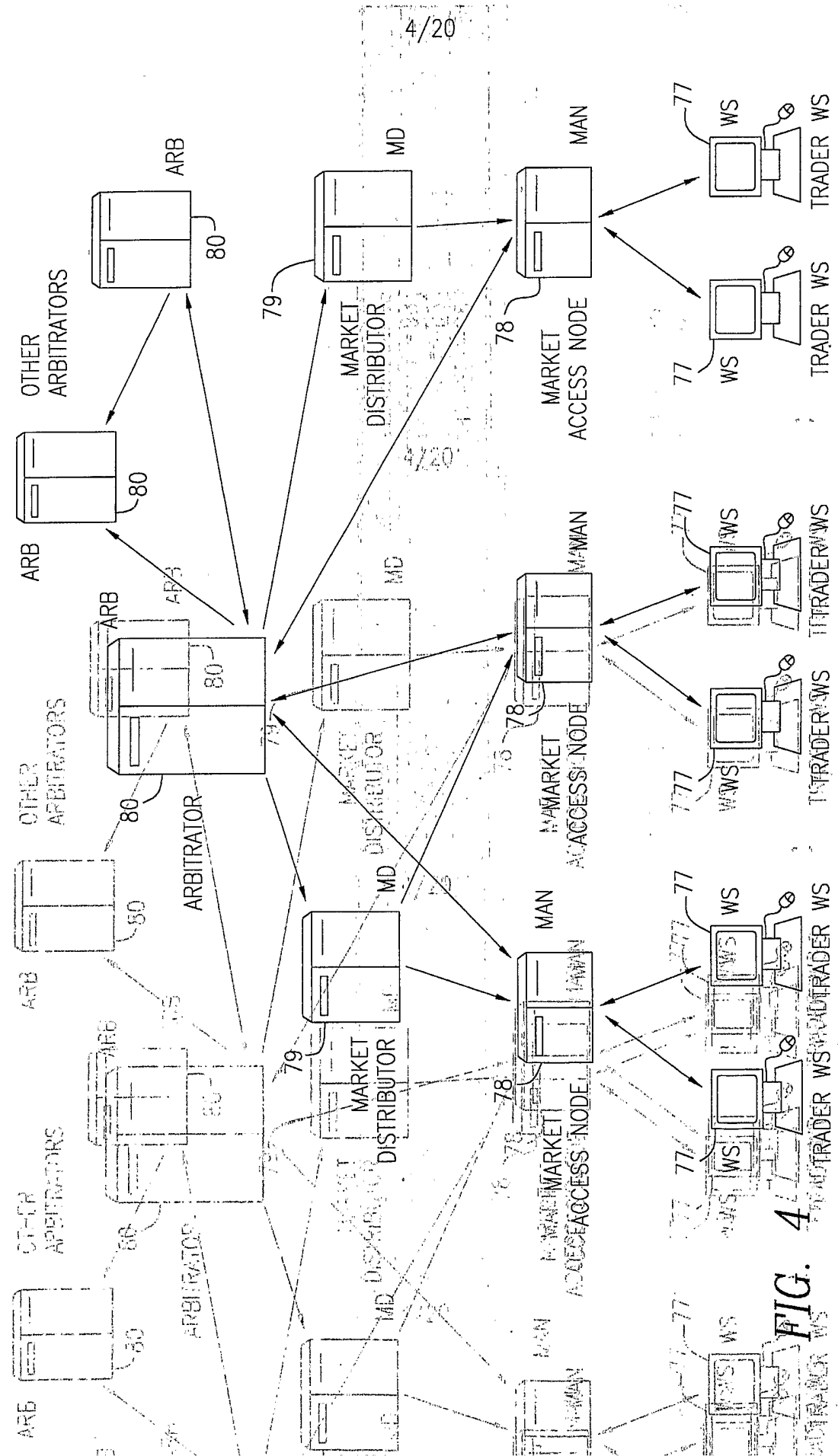
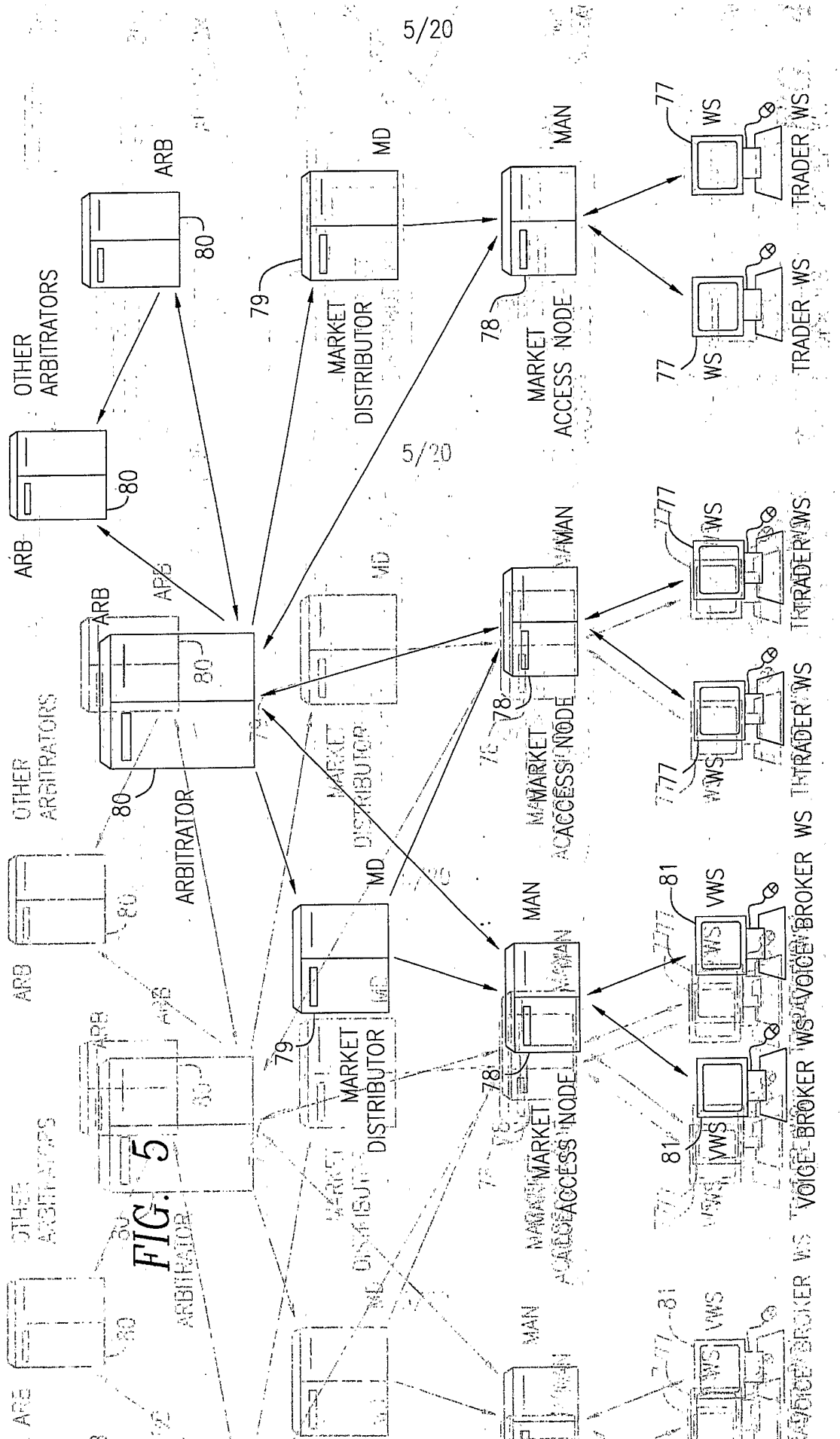


FIG. 4



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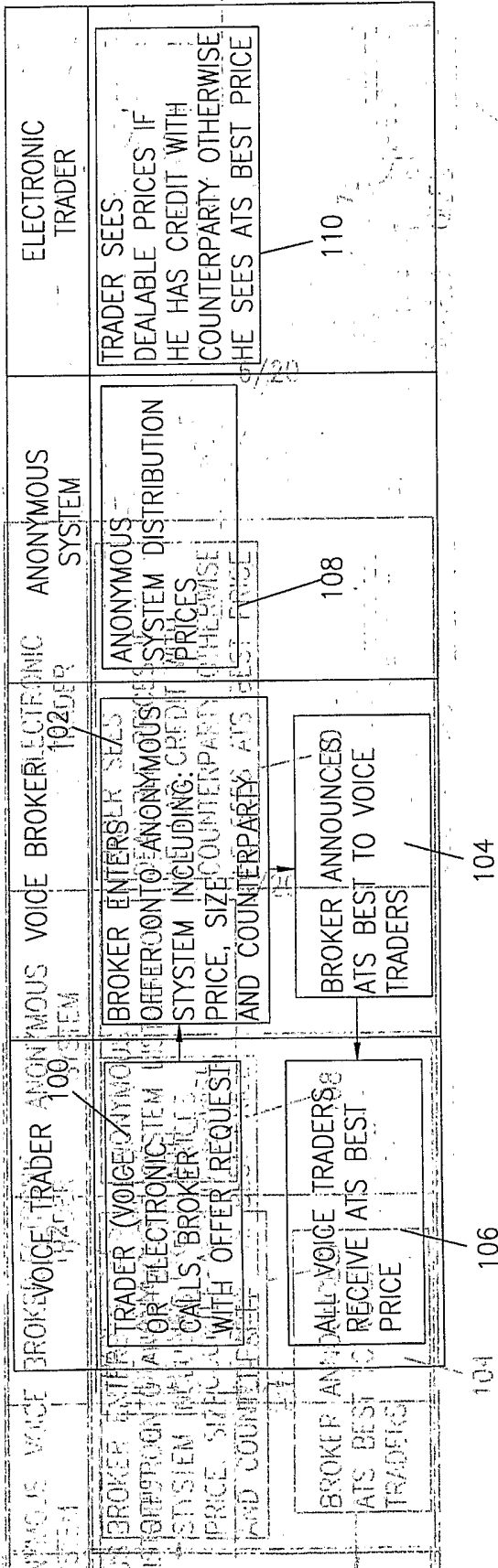


FIG. 6

FIG. 6

3- FILL IN QUOTE PANEL THEN CLICK 'SEND'		120	
3- FILL IN QUOTE PANEL THEN CLICK 'SEND'		120	
118		114	
116		112	
114		110	
108		106	
104		102	
100		98	
96		94	
92		90	
88		86	
84		82	
80		78	
76		74	
72		70	
68		66	
64		62	
60		58	
56		54	
52		50	
48		46	
44		42	
40		38	
36		34	
32		30	
28		26	
24		22	
20		18	
16		14	
12		10	
8		6	
4		2	
0		-2	
-4		-6	
-8		-10	
-12		-14	
-16		-18	
-20		-22	
-24		-26	
-28		-30	
-32		-34	
-36		-38	
-40		-42	
-44		-46	
-48		-50	
-52		-54	
-56		-58	
-60		-62	
-64		-66	
-68		-70	
-72		-74	
-76		-78	
-80		-82	
-84		-86	
-88		-90	
-92		-94	
-96		-98	
-100		-102	
-104		-106	
-108		-110	
-112		-114	
-116		-118	
-120		-122	
-124		-126	
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-144		-146	
-148		-150	
-152		-154	
-156		-158	
-160		-162	
-164		-166	
-168		-170	
-172		-174	
-176		-178	
-180		-182	
-184		-186	
-188		-190	
-192		-194	
-196		-198	
-200		-202	
-204		-206	
-208		-210	
-212		-214	
-216		-218	
-220		-222	
-224		-226	
-228		-230	
-232		-234	
-236		-238	
-240		-242	
-244		-246	
-248		-250	
-252		-254	
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-260		-262	
-264		-266	
-268		-270	
-272		-274	
-276			

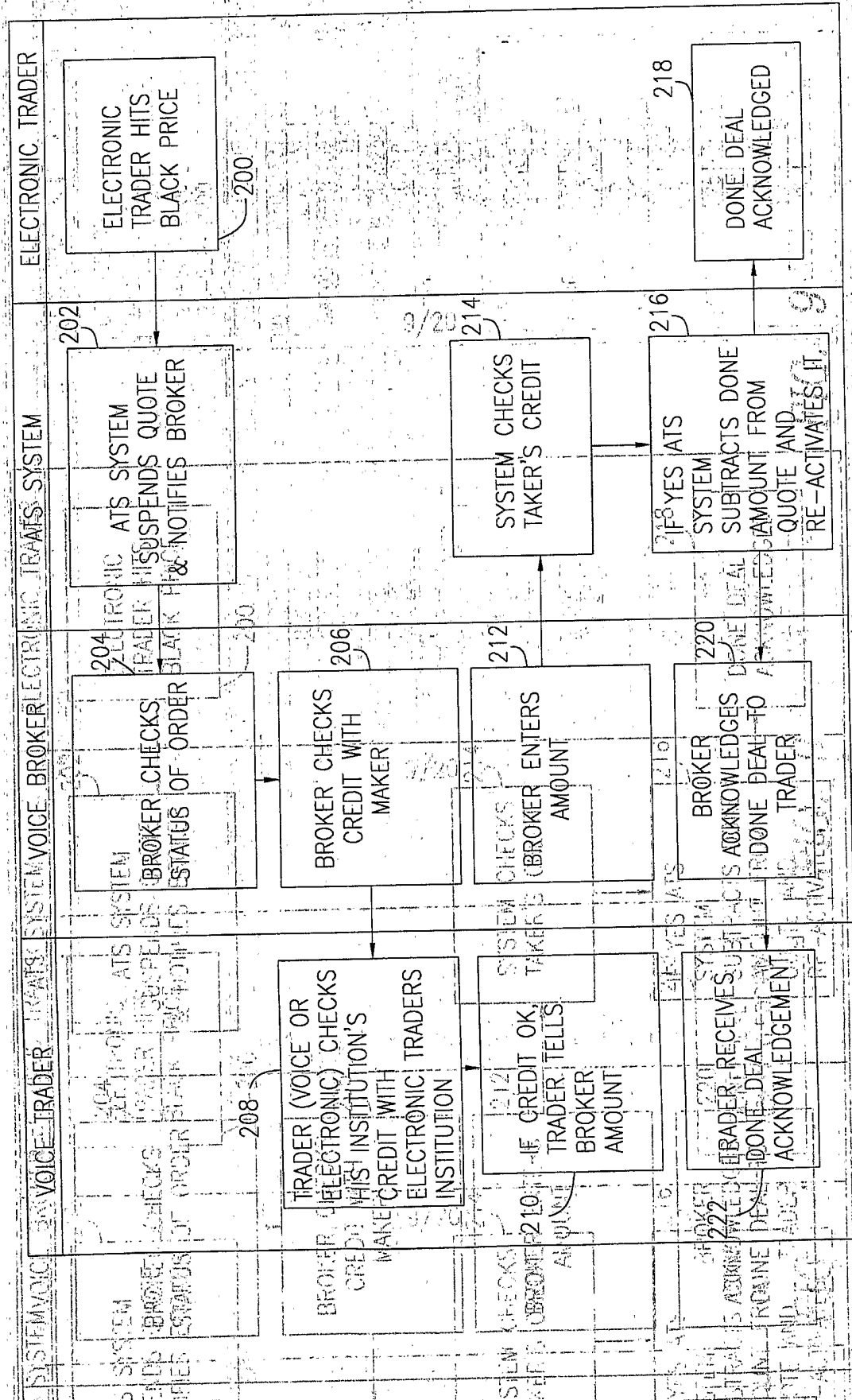
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FIG. 8

124		EBS PERM - 32		CITL		BUY		LBD		OFFER		SELL		DONE		SELECT ALL		CLEAR ALL		OFF ALL	
USD - SEP00		JPY - Z		GBP - L		OVERVIEW		BROKER DEALS		EUR - E		EBS DEALS		MARKET		CHF - L					
DEC99 5. 7800 8350 51		MAR00 5. 8550 9025 51		JUN00 5. 9750 10250 51		SEP00 5. 9750 10250 51		DEC01 6. 0025 0550 61		MAR01 6. 0450 0950 61		JUN01 6. 1450 1950 61		SEP01 6. 0725 1250 61		USD - LIBOR					
7800 8350		8550 9050		9750 10250		9700 10250		0025 0575		0450 0950		1450 1950		0700 1250		200 175					
25 300 300		25 300 300		25 300 300		25 300 300		75 375		225 75		225 250		225 250		USD - LIBOR					
124		124		124		124		124		124		124		124		124					
0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300					
0225		0225		0225		0225		0225		0225		0225		0225		0225					
300		300		300		300		300		300		300		300		300					
0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300					
0225		0225		0225		0225		0225		0225		0225		0225		0225					
300		300		300		300		300		300		300		300		300					
0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300					
0225		0225		0225		0225		0225		0225		0225		0225		0225					
300		300		300		300		300		300		300		300		300					
0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300					
0225		0225		0225		0225		0225		0225		0225		0225		0225					
300		300		300		300		300		300		300		300		300					
0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300		0 OF 300					
0225		0225		0225		0225															

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FIG. 9



EBS EPMI 321		CITL		ELEC BUY		BID OFFER SELL		DONE		SELECT ALL		CLEAR ALL		OFF ALL	
USD-SEP00		MGTL FOR 150?		YES		NO		232		MGTL FOR 150?		YES		NO	
LIBOR 225		0 OF 300		OFF		OFF		234		0 OF 300		OFF		OFF	
18-SEP-2000		0225		9650		9700		0225		0225		0225		0225	
20-SEP-2000		0225		100		100		0225		0225		0225		0225	
20-SEP-2000		0225		100		100		0225		0225		0225		0225	
USD-1		JPY-Z		GBP-L		OVERVIEW		BROKER DEALS		EUR-E		EBS DEALS		MARKET	
DEC99 5 7800 8350 5		7800 8350		5 8550 9025 5		5 8550 9050 5		5 9750 0250 5		5 9750 0250 6		5 9750 0250 6		5 9750 0250 6	
MAR00 5 8550 9025 5		8550 9050 5		5 9750 0250 5		5 9750 0250 5		5 9750 0250 5		5 9750 0250 5		5 9750 0250 5		5 9750 0250 5	
JUN00 5 9750 0250 5		9700 0250 5		5 9750 0250 5		5 9750 0250 5		5 9750 0250 5		5 9750 0250 5		5 9750 0250 5		5 9750 0250 5	
SEP00 5 9750 0250 6		9700 0250 6		5 9750 0250 6		5 9750 0250 6		5 9750 0250 6		5 9750 0250 6		5 9750 0250 6		5 9750 0250 6	
DEC01 6 0025 0550 6		0025 0575		6 0025 0550 6		6 0025 0550 6		6 0025 0550 6		6 0025 0550 6		6 0025 0550 6		6 0025 0550 6	
MAR01 6 0450 0950 6		0450 0950		6 0450 0950 6		6 0450 0950 6		6 0450 0950 6		6 0450 0950 6		6 0450 0950 6		6 0450 0950 6	
JUN01 6 1450 1950 6		1450 1950		6 1450 1950 6		6 1450 1950 6		6 1450 1950 6		6 1450 1950 6		6 1450 1950 6		6 1450 1950 6	
SEP01 6 0725 1250 6		0700 1250		6 0725 1250 6		6 0725 1250 6		6 0725 1250 6		6 0725 1250 6		6 0725 1250 6		6 0725 1250 6	
LIBOR		USD + LIBOR		200 175		200 175		200 175		200 175		200 175		200 175	
300		300		300		300		300		300		300		300	

FIG. 10

MAIL TELETYPE UNIT		EBS-SEPML-321		CITL	TELETYPE UNIT	BUY	BID	OFFER	SELL	1	DONE	SELECT ALL		CLEAR ALL	OFF ALL
OFFER		LIBOR	USD	240	OFFER		LIBOR	USD	240						
MGTL FOR		150	1	SEND	MGTL FOR		150	1	SEND						
300 @		6	0225	QUIT	300 @		6	0225	QUIT						
				07:24 5.9700 G					07:24 5.9700 P						
GBP-L		GBP-Z	GBP-L	GBP-Z	GBP-L		GBP-Z	GBP-L	GBP-Z						
USD-L		USD-Z	USD-L	USD-Z	USD-L		USD-Z	USD-L	USD-Z						
DEC99		15	7800	18350	5	DEC99		15	7800	18350	5				
MAR00		15	8550	19025	5	MAR00		15	8550	19025	5				
JUN00		15	9750	10250	5	JUN00		15	9750	10250	5				
SEP00		15	9750	10250	6	SEP00		15	9750	10250	6				
DEC01		15	0025	10550	6	DEC01		15	0025	10550	6				
MAR01		15	0450	10950	6	MAR01		15	0450	10950	6				
JUN01		15	1450	1950	6	JUN01		15	1450	1950	6				
SEP01		15	0725	1250	6	SEP01		15	0725	1250	6				
USD-L		USD-Z	USD-L	USD-Z	USD-L		USD-Z	USD-L	USD-Z						
300		11	300	11	300		11	300	11						

QUOTE OVERVIEW OFFERS		QUOTE OVERVIEW OFFERS		QUOTE OVERVIEW OFFERS	
LLOY	800/900	5.8325	USD-L	S00	USD-L
ABNL	0/100	6.0700	USD-L	S00	USD-L
ABNL	150/300	5.7825	USD-L	D99	USD-L
ABNL	75/350	0.6675	JPY-Z	M00	JPY-Z
ABNL	0/300	6.0225	USD-L	S00	USD-L
ABNL	300	5	9650		
ABNL	300	5	9650		
DFDFADS					

EBS DEALS		EBS DEALS		EBS DEALS	
LLOY	500	5	9750		
LLOY	25	6	97		
LLOY	500	5	9650		
ABNL	300	5	9650		

OFFERS		OFFERS		OFFERS	
CITL	300	6	0225		

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FIG. 11

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FIG. 12

EBS EPM 321		CITL LIT ECT		BUY		BID OFFER		USLN		DONE		SELECT ALL		CLEAR ALL		OFF ALL	
USD-SEP00		230		MGTL FOR 150?		YES		NO		234							
LIBOR 2.5		6		0 OF 300		9750		0225		6							
C18-SEP25-2000		5		0225		9700		0225		0225							
C20-SEP-2000		5		0225		9700		0225		0225							
C20-SEP-2000		5		0225		9700		0225		0225							
USD-L		JPY-Z		GBP-L		EUR-E		EUR-E		EUR-E		EUR-E		EUR-E		EUR-E	
DEC09		5		7800		8350		5		5		5		5		5	
MAR00		5		8550		9025		5		5		5		5		5	
JUN00		5		9750		10250		5		5		5		5		5	
SEP00		5		9750		10250		5		5		5		5		5	
DEC01		6		0025		0550		6		6		6		6		6	
MAR01		6		0450		0950		6		6		6		6		6	
JUN01		6		1450		1950		6		6		6		6		6	
SEP01		6		0725		1250		6		6		6		6		6	
USD-LIBOR		300		H		B		300		H		H		H		H	

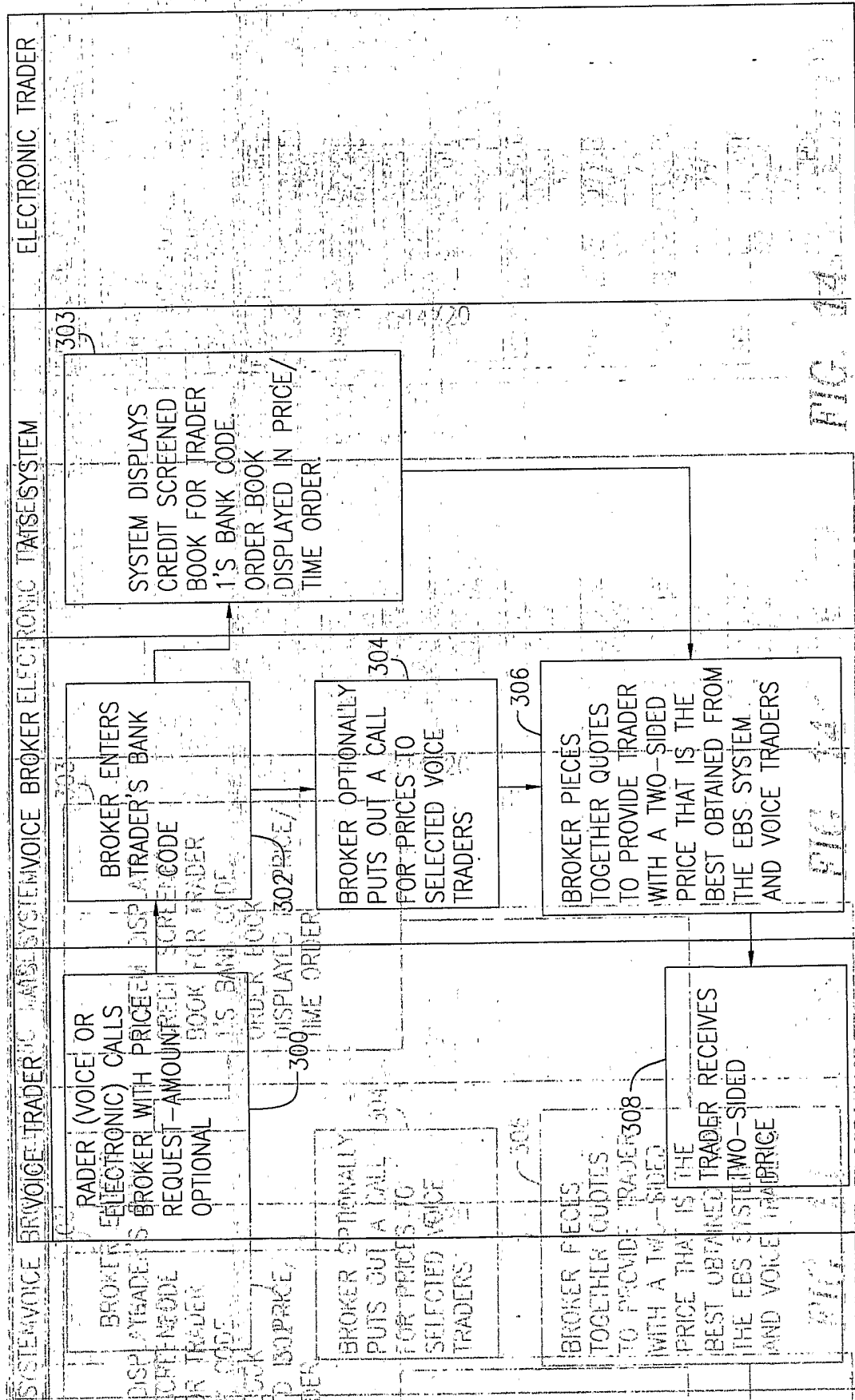
QUOTE OVERVIEW		OFFERS		BIDS		OFFERS	
LLOY	07:44	800	900	5	8325	USD-L	S00
ABNL	07:46	0	100	6	0700	USD-L	S00
ABNL	07:47	150	300	5	7825	USD-L	D99
ABNL	07:48	75	350	6	06675	JPY-Z	M00
ABNL	07:50	0	300	6	0225	USD-L	S00
ABNL	07:50	500	5	9650			
ABNL	07:50	300	5	9650			

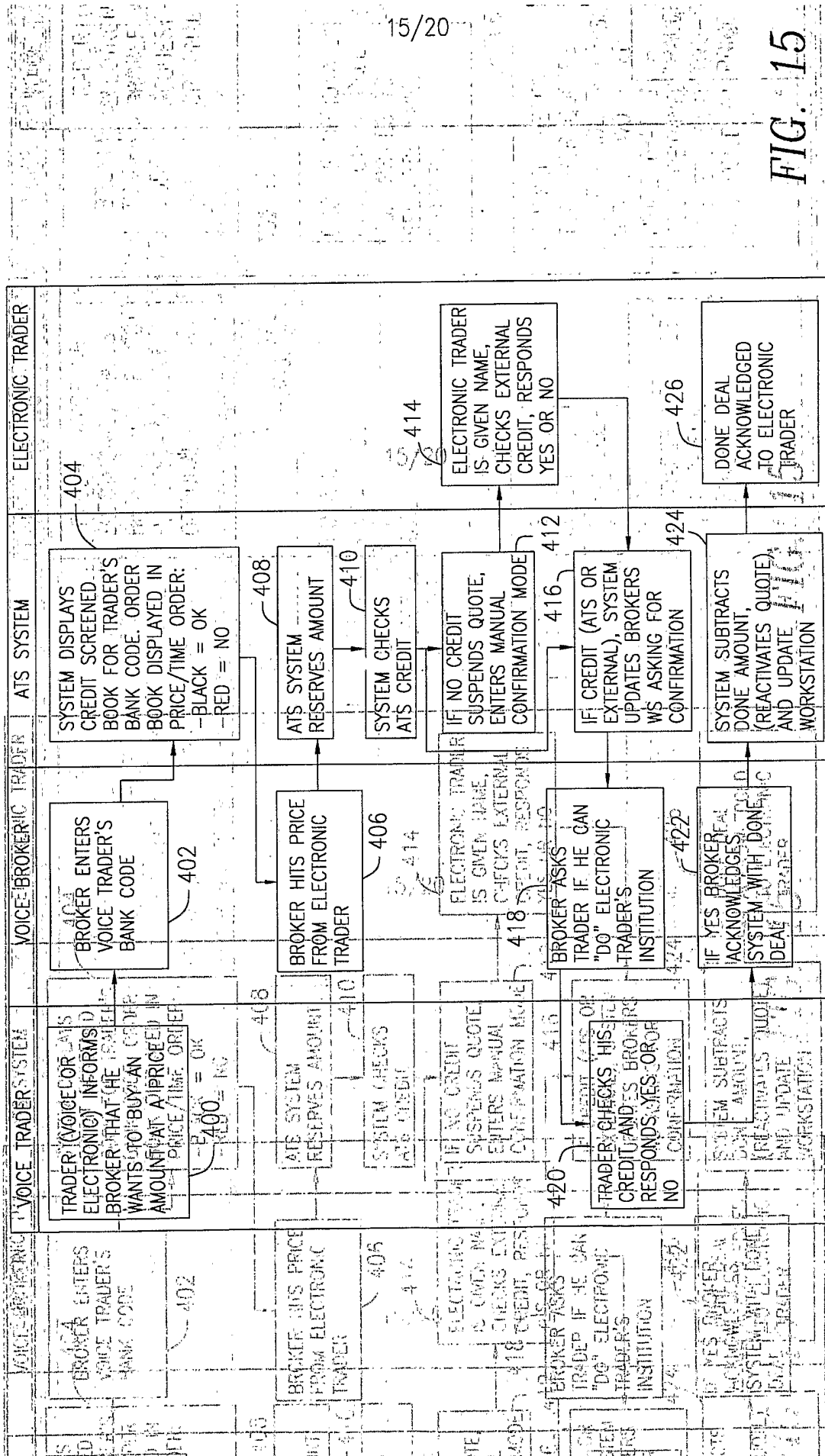
EBS REPML=321		CITL		BUY		BID		OFFER		SELL		DONE		SELECT ALL		CLEAR ALL		OFF ALL	
USD-SEP00		150 OF 300		OFF		5		9750		0225		6		150 OF 300		OFF		07:24 5:9700 G	
LIBOR02		0225		9650		9700		0225		0225				0225		OFF ALL		07:24 5:9700 P	
3738-SEP-200025		150		1000		AL25		07:24 5:9700		07:24 5:9700				150		CLEAR ALL		07:55 6:0225 P	
20-SEP-200074																			
20-SEP-2000																			
USD-L		JPY-Z		GBP-L		OVERVIEW		BROKER DEALS		EUR-E		EBS DEALS		MARKET		CHF-L			
DEC99		5		7800		8350		5		QUOTE OVERVIEW		OFFERS		CITL		150		6	
MAR00		5		8550		9025		5		LLOY		USD-L S00		LLOY		500		5	
JUN00		5		9750		0250		5		07:44 B MWSN		USD-L S00		LLOY		25		6	
SEP00		5		9750		0250		6		07:46 O UBSN		USD-L S00		LLOY		500		5	
DEC01		6		0025		0550		6		07:47 B MWSN		USD-L D99		LLOY		300		5	
MAR01		6		0450		0950		6		07:48 B UBSN		JPY-Z M00		LLOY		500		5	
JUN01		6		1450		1950		6		07:50 O CITL		USD-L S00		LLOY		500		5	
SEP01		6		0725		1250		6		07:50 O CITL				ABNL		300		5	
				200		175				500				5		9650			
				USD-L		LIBOR													
		300		4		300													

FIG. 13

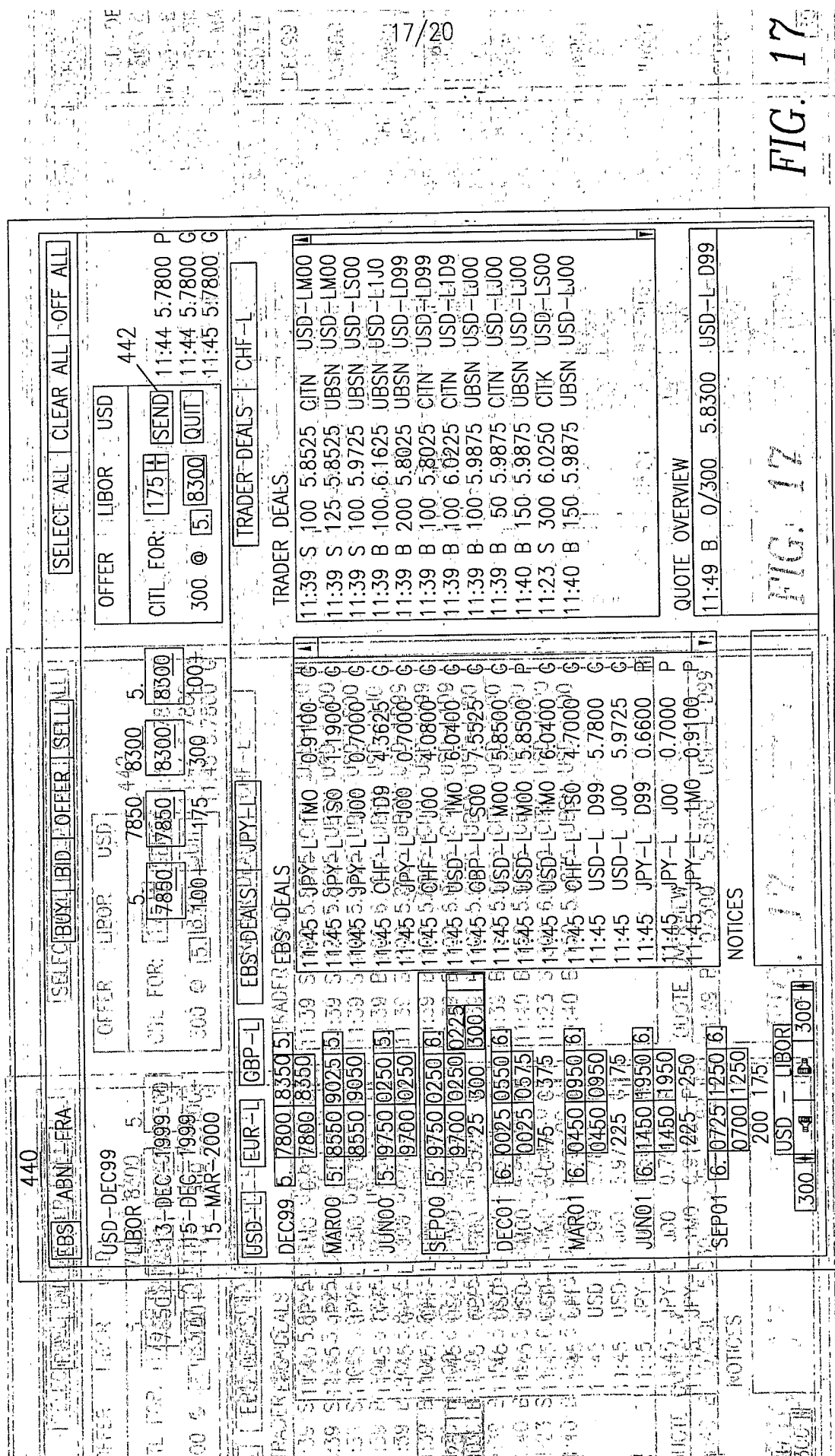
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FIG. 14





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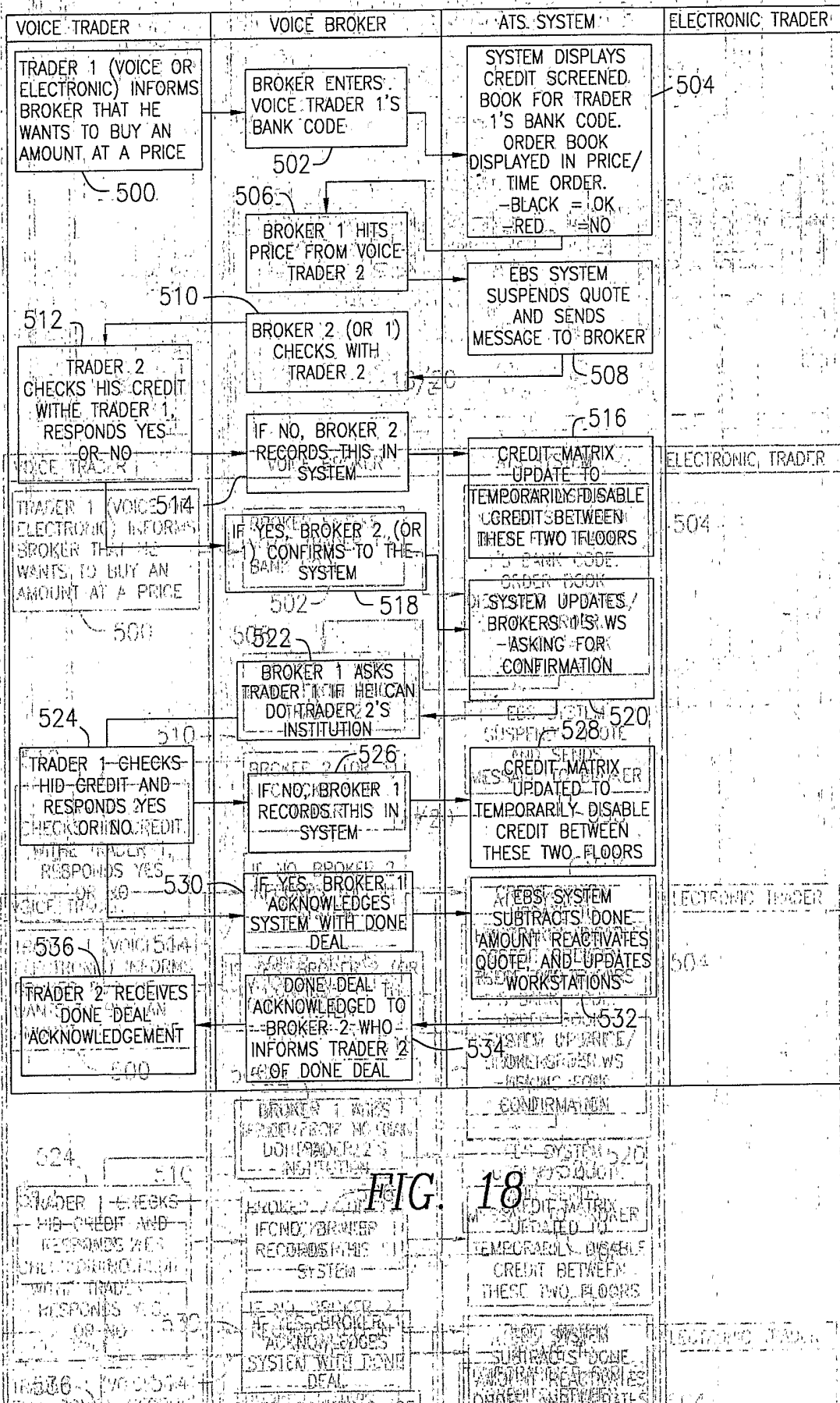
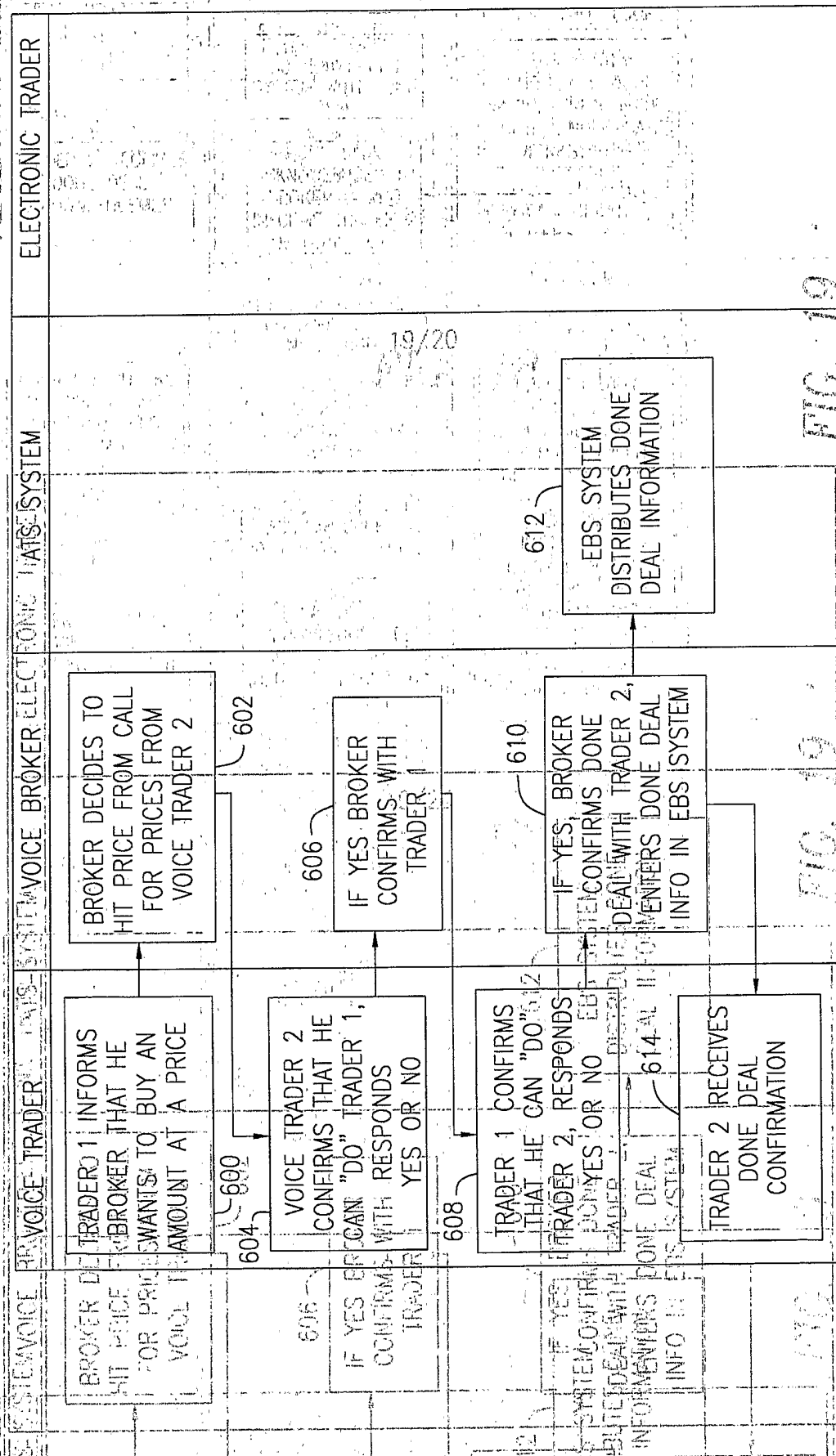


FIG. 18



USD		LIBOR		DEC01		MAR02		JUN02		OFF		BUY		BID		OFFER		SELL		DONE		SELECT ALL		CLEAR ALL		OFF ALL	
-----	--	-------	--	-------	--	-------	--	-------	--	-----	--	-----	--	-----	--	-------	--	------	--	------	--	------------	--	-----------	--	---------	--

USD		JPY		LIBOR		DEC00		5		7800		18125		5		DEC01		7800		18125		5		D00		300		725		125		1		D01							
MAR01		5		8675		8900		5		M02		200		6		8675		8900		100		25		275		JUN01		6		9700		10075		625		25					
SEP01		6		9975		9950		6		9975		9950		275		125		DEC01		6		10000		10425		6		10000		10000		10425		300		750		425			
MAR02		6		0400		0875		6		0400		0875		250		550		175		JUN02		6		1625		1700		6		1500		1625		1700		200		875		75	
SEP02		6		10900		1025		6		10900		1025		150		475		25		USD		LIBOR		300		H		B		300		H		B		300		H			

QUOTE OVERVIEW		BIDS		OFFERS	
13:04 B INDL 300/300 5.7800 USD-L D00		20/20			
13:06 B INDL 0/300 6.0000 USD-L D01					
13:06 B INDL 0/250 6.0400 USD-L M02					
13:06 B INDL 0/200 6.1500 USD-L J00					
13:06 B INDL 0/150 6.0900 USD-L S00					