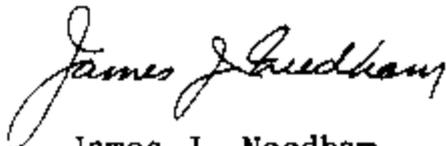


Is it presumptuous to suggest that a central market system for securities already exists? I don't think so.

Perhaps you will agree - or at least be stimulated - by this up-to-date report on the giant steps that have been taken in automating the Exchange market - a market that few would dispute is the best the world has ever known.



James J. Needham  
Chairman

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## A PROGRESS REPORT

# The Central Market System

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A PROGRESS REPORT

## The Central Market System: A Progress Report From The NYSE

Is the title of this report presumptuous?

At the NYSE, we don't think so.

Recent events, culminating in an Act of God on the morning of February 2, 1976, make it clear that a Central Market System already exists in this country—a system firmly anchored in the New York and American Stock Exchanges, with a satellite network of regional exchanges and over-the-counter dealers all trading the same relatively few listed stocks.

• Storm conditions in the New York area that morning forced the New York Stock Exchange to delay its opening from 10 a.m. to 11:15 a.m. During the 75 minutes when the NYSE pricing mechanism was not operating, a total of 55 transactions in listed stocks took place in all other markets combined. Fewer than 31,000 shares changed hands. Most of the other markets simply remained closed until the NYSE opened and the benefits of the central market pricing mechanism in New York became available to them.

Below is a complete facsimile of the consolidated tape for those 75 minutes.

A comparable facsimile of trades reported during the next 75 minutes would fill more than 200 pages of this booklet.

• During January and February 1976—the most active two-month period in the history of the U.S. stock market—the consolidated tape reported that 1.5 billion shares of NYSE listed stocks changed hands. Of that total, 1.3 billion shares—86.4 per cent—were traded in the central marketplace that is the New York Stock Exchange.

Why do most U.S. investors and their brokers specifically direct that business to the New York Stock Exchange trading floor instead of to other markets?

The answer is very simple:

*Because they know that the pricing mechanism of the NYSE's central marketplace offers them the fairest, most competitive prices, the most efficient service, and the highest standards of self-regulation available not only in this country but anywhere in the world.*

Although the auction market clearly provides the best means of pricing securities fairly, accurately and continuously, the Exchange

SEA&P	SCE&P	SN&P	F&P	ZE&P	IBM&P	KG&P	UCL&P	JPM&P	ABT&P	CMS&P	GP&P	CIL&T	IBM&P	
1000s27 $\frac{1}{8}$	6s21 $\frac{1}{4}$	43 $\frac{3}{8}$	49 $\frac{5}{8}$	1000s29 $\frac{1}{2}$	257	2s33 $\frac{3}{8}$	44 $\frac{3}{4}$	2s61 $\frac{1}{4}$	2s42 $\frac{1}{2}$	4s21	49 $\frac{1}{4}$	2000s42 $\frac{1}{2}$	4s257 257	
FN&P	MSEP	R&P	R&P	NSM&P	TA&P	TA&P	USL&P	SEA&P	CBC&P	PCG&P	PCG&P	CBC&P	LSI&P	MOB&P
4s20 $\frac{3}{4}$	5s24 $\frac{1}{2}$	1700s8 $\frac{3}{8}$	3s8 $\frac{3}{8}$	51 $\frac{1}{2}$	1000s10 $\frac{3}{4}$	1000s10 $\frac{3}{4}$	10 $\frac{3}{8}$	7s2 $\frac{3}{4}$	3s15 9s15	2000s22	2000s22	15	1000s8 $\frac{3}{8}$	2s54 $\frac{3}{8}$
PCG&P	MOB&P	BNF&P	GM&T	GRA&T	CL&T	IBM&P	CCC&T	EK&T	MSE&P	XON&T	GM&T	XON&T	EK&T	MTC&T
1000s22	54 $\frac{3}{8}$	2s10 $\frac{3}{4}$	1000s64 $\frac{1}{4}$	5s28	3s28 $\frac{1}{4}$	256 $\frac{3}{4}$	3s29 $\frac{3}{8}$	7s113 $\frac{3}{8}$	24 $\frac{1}{2}$	91 $\frac{1}{4}$	64 $\frac{3}{8}$	2s91 $\frac{1}{4}$	5s113 $\frac{3}{8}$	1000s92 $\frac{3}{8}$
GS&T	WLA&T	IBM&T	GRA&T	P&T	BN&T	HAL&T	IP&T	TI&P						
4s36 $\frac{1}{4}$	6s37 $\frac{3}{8}$	5s257	5s28	9s55 $\frac{3}{4}$	5s28 $\frac{3}{4}$	5s154 $\frac{3}{8}$	1000s70 $\frac{3}{4}$	9s12 $\frac{1}{2}$						

has not been content merely to sit back and gather in the business. We recognize that our status as the central marketplace for listed securities imposes tremendous responsibilities for giving investors the best service, their confidence—and our money—can buy. That realization has led the Exchange to make a very substantial commitment of time, effort and money to automate those elements of our market that do not depend upon factors of human judgment.

### **Trading Floor Automation**

An important part of the Exchange's automation effort has focused on trading floor improvements. During the four-year period through the end of the current year, the Exchange will have spent approximately \$36.6 million to develop six major new trading floor systems and numerous support systems and, of course, additional large sums to operate them. (A small portion of these development costs involve projects completed since the end of 1972 but begun earlier.)

The results of applying the most sophisticated automation techniques to established auction market principles speak for themselves:

- In late 1968, the task of handling some 15 million shares a day engulfed the NYSE member firm community in a flood of paperwork that came very close to overwhelming the securities industry.
- In early 1976, NYSE member organizations—aided by their own and the Exchange's advanced automation systems—have shown they can handle sustained volume of more than 30 million shares a day, speedily, efficiently, and without undue operational stress.

Beyond developing the highly specialized systems described in this booklet, the Exchange has continuously improved and updated other elements of what has become the most advanced securities handling, data-processing and communications complex in existence.

### **Clearance and Settlement**

Over the past four years, the Exchange has taken the lead in securities industry efforts to establish a national clearance and settlement system. Adoption of a new Consolidated Net Settlement System (CNS) in the fall of 1974 has vastly simplified securities processing and control, giving each participant the advantage of a single account with the clearing corporation for all its exchange transactions. The result has been substantial cost reductions and improved efficiency for all participants who share clearance and settlement costs on a mutualized basis.

Following integration and physical consolidation of all NYSE and Amex clearance and settlement services in early 1973, the NYSE spearheaded efforts to establish a national system. That goal is now close to realization, with the newly organized National Securities Clearing Corporation expected to take over the operations of the clearing corporations of both New York exchanges and the NASD in early summer. Present plans call for NSCC to pursue rapid expansion of clearing interfaces with other clearing corporations in major cities across the nation.

Preliminary NSCC estimates indicate that securities industry savings from the establishment of the central clearing facility in New York City could aggregate as much as \$12-\$17 million a year.

### **The Depository Network**

Another key element in the industry's vast automation complex is, of course, the Exchange-developed Depository Trust Company with participants throughout the nation. DTC has virtually eliminated one of the major causes of the paperwork logjam that plagued the industry and its customers in the late 1960s—an overwhelming flow of stock certificates. Securities ownership today is transferred increasingly by automated bookkeeping entries, without physical movement of certificates among brokers.

Pioneered by the New York Stock Exchange and initially established as a wholly owned Exchange subsidiary, DTC is now also owned in part by other exchanges, the National Association of Securities Dealers and major U.S. banks. Supported by transaction fees from users and operated under a user Board of Directors, DTC provides central market settlement services to all institutions wishing to use them. DTC has helped make post-trade processing cheaper and safer not only in the New York markets but also in satellite (regional) markets, through cooperative links maintained with clearing entities there.

DTC now holds more than \$75 billion in stocks and bonds and is a keystone of the developing national clearance and settlement system—another Exchange-sponsored contribution to modern post-trade processing in a nationwide central securities market system.

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Clearly, the Central Market System that everyone has been talking about bringing into existence is already alive and functioning very well at the New York Stock Exchange.

This Progress Report from the Exchange helps explain how this has happened—in full view of the American investing public—while nearly everyone else has been trying to figure out what to do.

## Exchange Automation: Focus On The Trading Floor

Over the four-year period covered by this report, the Exchange will have spent some \$36.6 million on development of automation systems to improve operations of the Exchange's auction market.

### A Bit of History

In early 1973, the Exchange initiated development studies for a comprehensive automation program called Centaur (Central Exchange Network Trading and Unified Reporting.) This ambitious plan was designed to link advanced computer and communications technology with the auction market trading process. Composed of a number of sophisticated sub-systems, this program was intended to provide:

- A communications network capable of linking exchanges, member firms and institutions.
- Trading services to accomplish order entry and to improve execution reporting.
- Market data services to broaden the availability of trade information.
- Post-trade services to facilitate clearing and settlement.

The Centaur plan was reviewed in early 1974 and deemed to be too expensive. Accordingly, Exchange management redirected all further efforts toward projects requiring lower development expenditures and offering more immediate utilization and cost benefits.

While the grand design of Centaur did not materialize, its concept has helped shape subsequent development of Exchange trading systems. Just as 1973 may be seen retrospectively as a time of critical evaluation of Exchange automation plans, 1976 will see the culmination of many Exchange efforts to meet the growing needs of a highly automated central market system.

### Six Major Systems

Consistent with the original Centaur objectives, the Floor systems development effort, since 1973, has produced six major systems.

1. Market Data System (MDS-II)
2. Common Message Switch (CMS)
3. Designated Order Turnaround System (DOT)
4. Floor Terminal System (FTS)
5. Consolidated Tape System (CTS)
6. Automated Bond System (ABS)

Together these systems contribute to the original objectives of:

- Reducing operating costs to member organizations and exchanges.
- Improving availability and timeliness of information for investors.
- Strengthening the auction market mechanism and Exchange self-regulatory capabilities.
- Firmly establishing the basis of the Exchange central market system.

### Market Data System II

Market Data System II, which went live in 1973, is the core system in the Exchange's worldwide network of trading reporting. The predecessor system—MDS-I—which had begun operating in 1965, was based on second-generation computer technology and was rapidly losing ground in its ability to cope with increased demands for service.

MDS-II was launched in the relatively heavy trading environment of 1973 and has proved to be a fully successful stock trade reporting system—more than 99% operational during trading hours in each of the past three years.

MDS-II captures trade data from the New York Stock Exchange Floor via cards that can be marked to be machine-read. The system validates, processes and puts into proper format the information for dissemination to members, subscribers and media via the Last-Sale Ticker, Volume Ticker, Bid-Asked Ticker and electronic devices at the trading posts. In addition, approved vendor services make this information available, worldwide, on more than 50,000 display devices.

More than 100 separate MDS-II computer programs have been developed to further strengthen Exchange regulation and surveillance, member performance measurement, listed company reporting and other key aspects of the auction market mechanism. Recent findings by a select committee of the Exchange's Board of Directors confirm the desirability of introducing additional programs to enhance the quality of markets maintained by specialists.

During the first two months of 1976, MDS-II handled unprecedented volume averaging more than 30 million shares a day without significant stress.

### Common Message Switch

Development of this critical component of the Exchange's automation program was initiated in 1973. The first application—improved odd-lot switching—was brought on-line in the fall of 1974.

The Common Message Switch is the foundation for numerous improvements in delivering orders to the NYSE and reporting trades back to member firms. The advanced technologies employed in the design of CMS will also facilitate high-speed communications between the exchanges and regional broker dealer firms.

The Exchange has already moved to exploit the message-handling capability of CMS to enhance specialist reporting with Improved Specialist Reporting (ISR), which was conceived late in 1974. In August 1975, a pilot program verified the fundamental soundness of the man-to-machine interactions of the ISR approach.

#### **Designated Order Turnaround System**

However, in October 1975, the Exchange suspended development of the ISR system in order to divert necessary resources to the more pressing need to complete the Designated Order Turnaround (DOT) capability, which is, in effect, the Exchange's response to competitive "automatic" trading systems. DOT was activated on a pilot basis with three member organizations on March 1, 1976.

In its initial stage, DOT establishes a link for transmitting 100-share market orders and reports between member firm offices and the trading posts on the Floor, through the Common Message Switch, at electronic speeds. The system combines maximum communications efficiency with the judgmental features of public-to-public pricing in the *primary auction market*.

DOT will have both immediate and long-term benefits to member firms and to Floor members in terms of maintaining the flow of orders to the Exchange Floor and reducing costs. DOT will also pave the way for further expansion to transmit other designated orders and reports and, possibly, to trigger post-trade operations.

DOT and ISR have many overlapping elements. As work proceeds on DOT, it is anticipated that the two projects will dovetail so that the ultimate benefits visualized for both systems will be smoothly integrated.

While addressing important questions of order flow, the Exchange also directed attention to strengthening the basic mechanisms of the auction market as the foundation for the central exchange market system.

#### **Floor Terminal System**

FTS serves as the specialists' vehicle for interrogating the Market Data System. Like the Common Message Switch, FTS had its origins in the Centaur concept. The viability of FTS was reaffirmed in late 1973, and development was authorized to continue. The system was implemented on the Floor of the Exchange in 1974.

The system met with mixed reactions on the Floor. While it did provide a new and worthwhile facility, it was viewed as limited in scope, subject to excessive failure and too costly.

Since that time, the system has stabilized, and performance has greatly improved. However, with information needs growing, the system is still considered by many members as requiring further modification to meet the current information processing requirements of the Floor.

Additional improvements are currently being explored, with a view to making FTS a more useful and integral part of the trading process. These include:

- Ability to enter quotes with size.
- An expanded facility, using Consolidated Tape System trade data, to inquire as to the depth and continuity of markets.
- Inventory displays to assist the specialist in carrying out possible new odd-lot responsibilities.
- Adaptation of FTS to improve trading post displays in connection with operation of the DOT system.

#### **Consolidated Tape System**

The consolidated tape was mandated by SEC Rule 17a-15, formally adopted by the Commission in late 1972. The system was designed to provide more complete disclosure of trading in NYSE securities that are listed on other exchanges or traded over the counter. CTS is currently operational for NYSE listed securities (Tape A) and for American Stock Exchange listed securities (Tape B). Trading data from participating regional exchanges, the National Association of Securities Dealers and Instinet—a system for trading directly between institutions—are all entered into the system and disseminated via the nationwide ticker network. A recently developed CTS High-Speed Line provides the most current data to vendor quote devices without regard to delays in the last-sale tape.

The costs of development and responsibility for implementing the tape fell primarily on the NYSE and, to a lesser extent, on the Amex.

#### **Automated Bond System**

Development of ABS, a fully computerized trading system in which all orders for non-convertible bonds will be entered into and reside within the computer, was initiated in 1971. The system will analyze these orders and print out suggested matches which the bond member will examine for concurrence. ABS terminals permit interrogation of the system for quotations, display of all orders, last

sale displays and entering of all buy and sell orders. At the end of the day, trade data will be transmitted to the clearing facilities. Thus, all elements of a fully automated trading system are included—remote electronic entry, a central data base, on-line quotation and order-matching.

Although it has taken longer to implement than anticipated, ABS—which is now expected to be fully operational in the third quarter of 1976—will be the first completely automated trading system in the Exchange's history and will greatly aid member firms in improving the flow of timely information to investors.

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It may be noted that virtually all the automated systems envisioned or demanded by the securities industry in the aftermath of the operational and financial crises of 1968-1970 will be serving the NYSE central auction marketplace and millions of investors by the end of the current year.

Obviously, the costs have been high and the efforts have been intense. But the result has been to establish, within the existing central market system, a firm foundation for the Central Market System of the future—a system that must and will be characterized by the most efficient possible blend of technological excellence and the proven superiority of auction market pricing and trading techniques.