

HEWLETT-PACKARD GENERAL SYSTEMS USERS GROUP

FEBRUARY, 1980 MEETING

FINANCIAL APPLICATIONS SERIES

SEVERAL FINANCIAL ANALYSIS SYSTEMS

PAUL GRAZIANO

PHILLIP BROTHERS

INTRODUCTION =====

THIS PAPER DESCRIBES THREE SYSTEMS THAT HAVE BEEN DEVELOPED OR ARE PRESENTLY UNDER DEVELOPMENT AT PHILIPP BROTHERS. BEFORE DISCUSSING THESE SYSTEMS, LET ME BRIEFLY DESCRIBE PHILIPP BROTHERS, ITS BUSINESS, AND ITS DATA PROCESSING RESOURCES.

PHILIPP BROTHERS IS A WORLDWIDE COMMODITIES TRADING ORGANIZATION DEALING ACTIVELY IN OVER 150 COMMODITIES. AS WITH MOST COMMODITY TRADING FIRMS THEY DETERMINE THE NEED THAT EXISTS IN THE MARKETPLACE FOR GOODS AND SERVICES, AND, IN TURN, THEY ATTEMPT TO FILL THIS NEED. AS A RESULT THE MOST IMPORTANT DATA REQUIRED FOR THE CONDUCT OF SUCH BUSINESS IS THAT RELATING TO SUPPLIER, I.E., AVAILABLE GOODS, PRICE, AND INVENTORY LOCATION, AS WELL AS DATA RELATING TO CUSTOMER, I.E., GOODS NEEDED, PRICE, AND DELIVERY PLACE. IN ADDITION TO THE TRADING ACTIVITY PHILIPP BROTHERS IS INVOLVED IN CORPORATE ACQUISITIONS. THE TWO SYSTEMS THAT WILL BE DISCUSSED WERE DEVELOPED TO SUPPORT THESE TWO MAJOR FACETS OF PHILIPP BROTHERS' BUSINESS.

PRIOR TO FEBRUARY, 1978 DATA PROCESSING AT PHILIPP BROTHERS WAS LIMITED TO BATCH MODE ACCOUNTING SYSTEMS RUNNING ON AN IBM S360/50. AT THAT TIME IT WAS DETERMINED THAT SYSTEMS SHOULD BE DEVELOPED TO SUPPORT THE TRADING AND TRAFFIC ACTIVITIES OF THE COMPANY. IT WAS ALSO DECIDED THAT THESE APPLICATIONS SHOULD OPERATE IN AN ON-LINE, REAL TIME MODE IN ORDER TO PROVIDE THE TRADING AND TRAFFIC AREAS WITH UP TO DATE TRADE-RELATED INFORMATION. THE HEWLETT-PACKARD 3000 WAS SELECTED AS THE MOST SUITABLE INSTRUMENT UPON WHICH TO IMPLEMENT THESE SYSTEMS BECAUSE IT OFFERED RELIABLE HARDWARE AND SOPHISTICATED SOFTWARE WHICH SUPPORTED THE TIMELY DEVELOPMENT OF USER APPLICATIONS.

APPLICATION 1: CASH FLOW ANALYSIS/BALANCE SHEET REPORTING

=====

BOTH THE CASH FLOW ANALYSIS AND BALANCE SHEET REPORTING FUNCTIONS WHICH OPERATE IN AN ON-LINE, REAL TIME INTERACTIVE MODE, WERE DEVELOPED USING BASIC AND THE IMAGE DATA BASE MANAGEMENT SYSTEM. THE CASH FLOW ANALYSIS APPLICATION WILL BE DESCRIBED FIRST SINCE IT WAS THE FIRST TO BE DEVELOPED AND BECAUSE IT FORMS THE BASIS FOR THE PRODUCTION OF THE BALANCE SHEET.

PRIOR TO INITIATING THE INTERACTIVE FINANCIAL SESSION, THE USER IS PROMPTED FOR INFORMATION CONCERNING PASSWORD, REPORT TITLE, ANALYSIS PERIOD IN YEARS, DOLLAR FACTOR (THOUSANDS OR MILLIONS), AND ADDITIONAL REMARKS. THE FORMAT OF THE INPUT FOR THESE PRELIMINARY ITEMS IS MORE OR LESS FREE-FORM.

NORMALLY THE CASH FLOW ANALYSIS PROGRAM ACCEPTS DATA FOR VARIOUS CATEGORIES OF FINANCIAL INPUT, AND CALCULATES FROM THEM OTHER CATEGORIES UPON WHICH THEY ARE FUNCTIONALLY DEPENDENT. IN ADDITION THE SYSTEM HANDLES THREE TYPES OF DATA; THAT WHICH MUST BE ENTERED BY THE USER; THAT WHICH IS EITHER CALCULATED FROM THE PREVIOUS INPUT OR ENTERED DIRECTLY; AND THAT WHICH IS CALCULATED ONLY. THE FORMAT OF THE INPUT DEPENDS UPON THE TYPE OF DATA BEING ENTERED, BUT, IN GENERAL, IT FOLLOWS THE FORMAT - \$ VALUE, START YEAR, END YEAR. CONSEQUENTLY BY ENTERING ONLY THREE PARAMETERS THE COMPLETE REPORT ANALYSIS MATRIX CAN BE DESCRIBED.

FURTHER THE SYSTEM WILL REQUEST MORE DETAILED DATA FOR SPECIFIC CATEGORIES SUCH AS INTEREST RATES, DEPRECIATION PERIOD, DEPRECIATION BASIS EITHER STRAIGHT LINE, DOUBLE DECLINING, OR SUM OF THE YEARS DIGITS, LOAN REPAYMENT CRITERION, TAX TIMING DIFFERENCE METHOD, AND THE LIKE.

EXAMPLES OF INFORMATION THAT MUST BE ENTERED ARE THE FOLLOWING: 1. NET PLANT - EXISTING, 2. NET PLANT - NEW, 3. ROUTINE ADDITIONS, 4. WORKING CAPITAL - INVENTORY, 5. WORKING CAPITAL - RECEIVABLES/PAYABLES, 6. GROSS FINANCING, 7. REPAYMENTS, FOR WHICH A STRAIGHT LINE OR COMPOUNDED INTEREST (MORTGAGE) SCHEDULE, WITH ANY RATE, PERIOD, AND STARTING YEAR, IS APPLICABLE, 8. NET LOAN, 9. REVENUES, INTO WHICH ANY INFLATION RATE CAN BE FACTORED FOR ANY PERIOD AND INTERVAL OF TIME, 10. MATERIAL COST, 11. OPERATING EXPENSES, FOR WHICH 5 ADDITIONAL ARE PERMITTED, 12. MISCELLANEOUS EXPENSES, AND 13. GENERAL AND ADMINISTRATIVE COSTS. ITEMS 10 THROUGH 13 CAN BE ENTERED AS FIXED AMOUNTS OR AS FIXED- RATE ESCALATED AMOUNTS FOR ANY TIME INTERVAL.

EXAMPLES OF INFORMATION THAT CAN EITHER BE CALCULATED FROM PRIOR INPUT OR ENTERED DIRECTLY ARE: 1. TOTAL GROSS INVESTMENT, 2. TOTAL INVESTMENT, 3. DEPRECIATION, WHICH CAN BE CALCULATED FROM ANY ONE OF THESE BASES: STRAIGHT LINE, DOUBLE DECLINING, OR SUM OF THE YEARS DIGITS, AND CAN BE APPLIED FOR ANY TIME PERIOD, 4. INTEREST, FOR WHICH ANY RATE MAY BE ENTERED, 5. PRE-TAX EARNINGS, 6. TAX ON EARNINGS, FOR WHICH ANY RATE CAN BE INPUT, 7. INVESTMENT TAX CREDIT, FOR WHICH ANY RATE CAN BE ENTERED AND FOR WHICH AN ANNUAL TAX CREDIT CARRYOVER (DIFFERENTIAL) IS APPLIED, 8. TAX PROVISION, 9. NET EARNINGS, 10. NON-CASH CHARGES, 11. TAX TIMING DIFFERENCES, AND 12. CASH FROM OPERATIONS.

AS A RESULT OF THE DATA ENTRY, THE SYSTEM CALCULATES THE FOLLOWING ITEMS OF IMPORTANCE TO THE FINANCIAL ANALYST: 1. NET CASH - ANNUAL, 2. NET CASH - CUMULATIVE, 3. PAYBACK, 4. DISCOUNTED CASH FLOW, 5. CUMULATIVE INVESTMENT, 6. NET EARNINGS - ANNUAL, AND 7. PERCENT RETURN ON INVESTMENT. UPON COMPLETION OF THE INTERACTIVE SESSION, THE REPORT WILL BE STORED ON THE IMAGE DATA BASE FOR SUBSEQUENT RETRIEVAL AND MODIFICATION AS REQUESTED BY THE USER.

SOME OF THE MORE SIGNIFICANT ALGORITHMS THAT HAVE BEEN INCORPORATED INTO THIS SYSTEM ARE AS FOLLOWS:

1. REPAYMENT SCHEDULE (MORTGAGE) =====
 $R = S * (M / (1 - (1 + M)^{-N}))$ WHERE R IS THE PAYMENT (PRINCIPAL PLUS INTEREST), S IS THE AMOUNT OF THE LOAN, M IS THE INTEREST RATE, AND N IS THE NUMBER OF PAYMENT PERIODS (GENERALLY YEARS).

$YR = C(X, L) = R - (S * M)$ WHERE YR IS THE YEARLY REPAYMENT OF THE PRINCIPAL.

2. DEPRECIATION ===== CASE 1: STRAIGHT LINE $C(X,L) = \text{SUM}(C(M,L)/N) + C(X,L-1)$ WHERE $C(X,L)$ IS THE MATRIX VALUE FOR DEPRECIATION, X IS THE ROW NUMBER, L IS THE COLUMN NUMBER, N IS THE NUMBER OF YEARS FOR THE DEPRECIATION, AND $C(M,L)$ ARE THE MATRIX VALUES FOR DEPRECIATED INVESTMENTS.

CASE 2: SUM OF THE YEARS DIGITS $C(X,L) = (N-(L-1)/\text{SUM } I) * \text{TINV}$ WHERE TINV IS THE TOTAL INVESTMENT= SUM $C(M,L)$, AND $I = \text{SUM } N$.

CASE 3: DOUBLE DECLINING BALANCE $C(X,L) = (\text{TINV} - C(X,L-1)) * 2/N$

3. RETURN ON INVESTMENT (ROI) =====
 $\text{ROI} = -C(X,1) + \text{SUM}(C(X,L)/(1+D)^{(L-1)})$ WHERE $-C(X,1)$ IS THE FIRST YEAR'S CASH EXPENDITURE, L VARIES FROM 2 TO N, THE NUMBER OF YEARS, AND D IS THE DISCOUNTED CASH FLOW RATE.

4. DISCOUNTED CASH FLOW (DCF) ===== THE DCF IS CALCULATED EMPIRICALLY FROM THE ROI BY TESTING VALUES FOR THE DCF THAT MINIMIZE TO ZERO OR CLOSE TO ZERO THE ROI. AS EACH VALUE FOR THE DCF IS TRIED, THE ROI IS RECALCULATED AND COMPARED TO ZERO. DEPENDING UPON THE RESULTANT VALUE FOR THE ROI, A NEW VALUE, EITHER LARGER OR SMALLER THAN THE PREVIOUS ONE, IS ENTERED FOR THE DCF. THIS REITERATIVE PROCESS CONTINUES UNTIL THE ROI FALLS BETWEEN -5 AND +5. OBVIOUSLY ANY ARBITRARY BOUNDS COULD BE CHOSEN FOR THE ROI, BUT THE MORE STRINGENT THE LIMITS THE MORE CALCULATIONS THAT ARE PERFORMED. THE DCF IS CALCULATED TO THREE DECIMAL PLACES BUT IS DISPLAYED TO ONE DECIMAL PLACE.

5. INVESTMENT TAX CREDIT ===== THE INVESTMENT TAX CREDIT (ITC) IS CALCULATED BY APPLYING A SPECIFIED TAX CREDIT RATE TO THE TOTAL OF ANY NEW STARTUP COSTS ASSOCIATED WITH THE BUSINESS VENTURE, SUCH AS NEW PLANTS, NEW EQUIPMENT, AND ANY OTHER ROUTINE ADDITIONS. HOWEVER AN INVESTMENT TAX CARRYOVER MAY EXIST, DEPENDING UPON A COMPARISON OF THE INVESTMENT TAX CREDIT AS PREVIOUSLY DEFINED AND THE RESULTANT VALUE ARISING FROM TAKING 50% OF THE TAX ON EARNINGS WHICH WILL BE CALLED THE PRE-TAX CREDIT OR PTC.

IF PTC IS LESS THAN ITC THEN THE DIFFERENCE IS THE CARRYOVER TAX CREDIT WHICH IS APPLIED TO THE SUBSEQUENT YEAR'S TAX CALCULATION. THIS PROCESS HAS A CUMULATIVE EFFECT FOR THOSE YEARS PRIOR TO THE START OF OPERATIONS AND BECOMES APPLICABLE AT THIS STARTUP TIME. FOR EACH SUBSEQUENT YEAR OF OPERATION THE INVESTMENT TAX CREDIT (ITC) AND THE PRE-TAX CREDIT (PTC) CALCULATIONS AND COMPARISONS ARE MADE IN ORDER TO DETERMINE WHETHER ANY TAX CARRYOVER EXISTS FOR THE YEAR IN QUESTION. ALL CARRYOVERS CONTINUE TO BE APPLIED UNTIL SUCH TIME THAT THE PTC IS GREATER THAN OR EQUAL TO THE ITC AT WHICH TIME ONLY THE ITC IS TAKEN AS THE INVESTMENT TAX CREDIT.

6. TAX TIMING DIFFERENCES ===== TAX TIMING DIFFERENCE IS A CONCEPT THAT ARISES FROM THE FACT THAT COMPANIES ARE PERMITTED TO ACCELERATE DEPRECIATION PER TAX RETURN IN ORDER TO GAIN TAX CREDIT. THE NORMAL SCHEDULE UPON WHICH DEPRECIATION IS BASED IS STRAIGHT-LINE, HOWEVER ONE HAS THE OPTION OF SELECTING EITHER DOUBLE DECLINING BALANCE OR SUM-OF-THE-YEARS DIGITS AS THE DEPRECIATION CALCULATION METHOD. IN THE EVENT THAT ONE OF THESE OTHER METHODS IS CHOSEN, THEN THE DIFFERENCE BETWEEN THE DEPRECIATION AS CALCULATED USING THE STRAIGHT-LINE PER BOOKS VERSUS THE CHOSEN TAX OPTION BECOMES THE TAX TIMING DIFFERENCE AND RESULTS IN A CREDIT FOR THOSE YEARS WHERE A DIFFERENTIAL DOES EXIST. THE SYSTEM INCORPORATES THIS FEATURE INTO ITS FACILITIES.
7. PAYBACK ===== THE PAYBACK IS DEFINED AS THE TIME PERIOD REQUIRED FOR THE CUMULATIVE CASH FLOW TO EQUAL ZERO AND IS CALCULATED FROM THE FOLLOWING: $CCF(X,L) = CCF(X,L-1) + CF(X,L)$ WHERE CCF IS THE CUMULATIVE CASH FLOW THROUGH YEAR L, AND CF IS THE DIFFERENCE BETWEEN THE GROSS INVESTMENT AND THE CASH FROM OPERATIONS (CASH FLOW OR NET CASH-ANNUAL). THEREFORE BY SETTING $CCF(X,L) = 0$, L, THE PAYBACK, CAN BE FOUND.

THE BALANCE SHEET REPORTING PROGRAM OPERATES QUITE SIMILARLY TO CASH FLOW ANALYSIS WITH RESPECT TO THE TYPE OF DATA PROCESSED AND THE METHOD BY WHICH IT IS ENTERED. THE DIFFERENCES LIE IN THE CATEGORIES THAT ARE RELEVANT TO BALANCE SHEET REPORTING AS CONTRASTED FROM THOSE THAT ARE RELEVANT TO CASH FLOW ANALYSIS. THE BALANCE SHEET APPLICATION CAN BE RUN AS A STAND-ALONE PROGRAM, WHEREIN MOST OF THE PERTINENT INFORMATION IS ENTERED BY THE USER. ON THE OTHER HAND, IT CAN BE RUN IN CONJUNCTION WITH A PREVIOUSLY INPUT CASH FLOW ANALYSIS REPORT. IN THIS CIRCUMSTANCE IT FOLLOWS THAT MANY OF THE BALANCE SHEET ENTRIES, SUCH AS RECEIVABLES/PAYABLES, INVENTORIES, GROSS FINANCING, DEPRECIATION, AND THE LIKE, ARE DERIVED FROM THE APPROPRIATE CASH FLOW CATEGORIES. IN LIKE MANNER EACH BALANCE SHEET REPORT IS MAINTAINED ON THE IMAGE DATA BASE AND IS AVAILABLE FOR SUBSEQUENT RETRIEVAL AND MODIFICATION.

THE FINANCIAL CATEGORIES INCORPORATED INTO THE BALANCE SHEET REPORT ARE AS FOLLOWS: 1. CASH/MARKET SECURITIES, WHICH IS A CALCULATION BASED UPON CERTAIN ITEMS IN BOTH THE CASH FLOW AND BALANCE SHEET REPORTS, SUCH AS WORKING CAPITAL, ACCOUNTS RECEIVABLE, NOTES AND OTHER RECEIVABLES, INVENTORY, OTHER CURRENT, TOTAL CURRENT LIABILITIES, AND CASH FROM OPERATIONS, 2. RECEIVABLES- FRACTION OF THE REVENUES, 3. NOTES AND OTHER RECEIVABLES, 4. INVENTORIES- FRACTION OF THE MATERIAL COST PLUS A FRACTION OF THE OPERATING COST, 5. OTHER CURRENT, 6. TOTAL CURRENT ASSETS, 7. INVESTMENTS AND ADVANCES, 8. GROSS INVESTMENT IN PROPERTY, PLANT, AND EQUIPMENT- THE SUM OF THE NET PLANT PLUS ROUTINE ADDITIONS, 9. DEPRECIATION, WHICH MAY STEM FROM THE CASH FLOW REPORT, 10. NET PROPERTY, PLANT, AND EQUIPMENT, 11. OTHER ASSETS, 12. TOTAL ASSETS, 13. SHORT TERM BORROWING- PAYMENT ON THE DEBT, 14. ACCOUNTS PAYABLE- FRACTION OF THE MATERIAL COST, 15. ACCRUED LIABILITIES- FRACTION OF THE OPERATING COST, 16. ACCRUED TAXES/NET OF DEFERRAL, WHICH MAY BE THE TAX ACCRUAL FROM THE CASH FLOW REPORT, 17. TOTAL CURRENT LIABILITIES, 18. LONG TERM DEBT- GROSS FINANCING MINUS SHORT TERM BORROWINGS, 19. STOCKHOLDER'S EQUITY- COMMON STOCK, 20. PAID IN CAPITAL, 21. RETAINED EARNINGS- NET EARNINGS, 22. TOTAL EQUITY, AND 23. TOTAL LIABILITIES.

IN THOSE CATEGORIES WHERE AN EXPLANATION IS INCLUDED, THE EXPLANATORY ITEM STEMS FROM THE CASH FLOW ANALYSIS REPORT.

ALTHOUGH BOTH OF THESE APPLICATIONS HAVE BEEN IMPLEMENTED AND ARE IN OPERATION, FURTHER REFINEMENTS AND ENHANCEMENTS ARE BEING INCORPORATED AS REQUESTED BY THE USER.

APPLICATION 2: INTEGRATED TRADING, TRAFFIC, AND ACCOUNTING SYSTEM =====

THE SECOND SYSTEM THAT WILL BE DISCUSSED IS ONE THAT ENCOMPASSES ALL OF PHILIPP BROTHER'S FRONT AND BACK OFFICE ACTIVITIES AND INTEGRATES THE TRADING, TRAFFIC, AND ACCOUNTING FUNCTIONS OF THE ORGANIZATION. THIS APPLICATION IS CURRENTLY UNDER DEVELOPMENT ALTHOUGH SOME TRADING AND TRAFFIC COMPONENTS HAVE BEEN COMPLETED FOR A NUMBER OF COMMODITIES, NAMELY GOLD AND SILVER, OIL, GRAINS, COPPER METAL, MOLYBDENUM, AND NON-FERROUS SCRAP. THIS PROJECT IS BEING IMPLEMENTED USING COBOL, IMAGE, AND DATA ENTRY LANGUAGE (DEL) SINCE WE HAVE BEEN ABLE TO ACHIEVE SIGNIFICANT SUCCESS WITH THESE SUBSYSTEMS IN THE PAST.

THE CONFIGURATION OF THIS SYSTEM IS COMPOSED OF SEVERAL HP-3000'S THAT PERFORM TRADING AND TRAFFIC RELATED TASKS INTERFACED VIA DS-3000 TO ONE HP-3000 DEDICATED PRIMARILY TO PROCESSING ACCOUNTING INFORMATION AS WELL AS TRADING AND TRAFFIC DATA. THE HARDWARE IS CONFIGURED IN THIS WAY IN ORDER TO OFF-LOAD THE BULK OF TRADING AND TRAFFIC FUNCTIONS ONTO MACHINES DEDICATED TO SUCH PROCESSING.

IT WAS FELT THAT THE VOLUME OF BUSINESS FOR CERTAIN HEAVILY-TRADED COMMODITIES WOULD SIGNIFICANTLY DEGRADE OVERALL SYSTEM PERFORMANCE IF THE TOTAL IMPLEMENTATION OF THE SYSTEM WAS ACHIEVED ON A SINGLE PROCESSOR. FURTHER THERE IS A LOGICAL SEPARATION OF OPERATIONAL RESPONSIBILITY AND INFORMATION AMONG THE TRADING, TRAFFIC, AND ACCOUNTING DEPARTMENTS EVEN THOUGH SUBSTANTIAL OVERLAP DOES OCCUR. THE USERS' INTERFACE TO THE SYSTEM IS VIA 2645A VIDEO DISPLAY TERMINALS ATTACHED TO THE FRONT-END AND BACK-END PROCESSORS.

THE SYSTEM IS AN ON-LINE, REAL TIME MENU-DRIVEN SYSTEM THAT PROVIDES THE USER WITH A VARIETY OF DATA ENTRY, DATA RETRIEVAL, DATA MODIFICATION, AND FILE MAINTENANCE FUNCTIONS. CONSEQUENTLY THE SYSTEM IS COMPLETELY SELF-CONTAINED AND CAN BE MAINTAINED BY THE USER WITH MINIMAL INTERVENTION BY THE DATA PROCESSING STAFF. ALL INPUT IS VALIDATED AT EDIT-CHECKED AT THE TIME OF ENTRY IN ORDER TO ELIMINATE THE OCCURRENCE OF SUSPENSE (UNRESOLVED) ITEMS.

ALL INFORMATION ENTERED INTO THE SYSTEM MUST FIRST BE APPROVED BY A PREDESIGNATED AUTHORITY PRIOR TO THE UPDATE OF AFFECTED FILES. ONCE THE APPROVAL CYCLE IS COMPLETED, ALL FILE UPDATES ARE PERFORMED IN REAL TIME, SO THAT THOSE REPORTS WHICH FLOW FROM THIS DATA WILL REFLECT THE CURRENT TRADING SITUATION. UP-TO-DATE INFORMATION IS OF PARAMOUNT IMPORTANCE TO THE TRADER AND HIS SUPPORT STAFF.

THE FRONT-END SYSTEMS WILL CAPTURE PERTINENT TRADING INFORMATION FOR THE PURPOSE OF ASSISTING BOTH TRADERS AND TRAFFIC PERSONNEL IN MAINTAINING TRADING POSITION, TRADING COMMITMENT, AND INVENTORY QUANTITY/INVENTORY LOCATION FOR A SPECIFIC COMMODITY OR GROUP OF COMMODITIES. THIS DATA CONSISTS OF THE FOLLOWING: 1. CONTRACTS, BOTH SPOT AND FORWARD, 2. INVOICES, 3. TERMINAL MARKET TRANSACTIONS (FUTURES), 4. TERMINAL MARKET PRICES, 5. CONTRACT PRICINGS, 6. CONTRACT APPLICATIONS, 7. CUSTOMER/SUPPLIER, AND 8. SPECIAL TERMS/REMARKS.

THE BACK-END ACCOUNTING SYSTEM PROCESSES THE FOLLOWING TYPES OF DATA: 1. CONTRACTS, BOTH SPOT AND FORWARD, 2. INVOICES, 3. ACCOUNTS PAYABLE, 4. ACCOUNTS RECEIVABLE, 5. GENERAL LEDGER, 6. TRADING ANALYSIS, 7. CUSTOMER, AND 8. TREASURY TRANSACTIONS. AS WITH THE FRONT-END PROCESSORS THE UPDATE OF THE INFORMATION MAINTAINED BY THE BACK-END IS ACCOMPLISHED IN REAL TIME MODE.

SEVERAL OF THE MORE IMPORTANT DOCUMENTS AND REPORTS PRODUCED BY THE SYSTEM ARE: 1. CONTRACTS, 2. INVOICES, 3. TRADING, SUCH AS PHYSICAL POSITION BY COMMODITY AND LOCATION, 4. TERMINAL MARKET, SUCH AS THE COMMODITY FUTURES TRADING COMMISSION (CFTC) REPORTS, 5. GENERAL LEDGER, 6. CONSOLIDATED ACCOUNTING, 7. TRAFFIC, 8. TREASURY, 9. CHECKS, 10. BANK RECONCILIATION, 11. MANGEMENT CONTROL, 12. CUSTOMER RISK POSITION, 13. UNREALIZED PROFIT AND LOSS, 14. REALIZED PROFIT AND LOSS, AND 15. PHYSICAL/QUOTATIONAL POSITION. AS MENTIONED PREVIOUSLY THESE ARE BUT A SAMPLING OF THE REPORTS THAT ARE PRODUCED BY THE SYSTEM.

APPLICATION 3: COMMODITY PRICE TRENDING AND SIMULATION

=====

THE THIRD SYSTEM THAT WILL BE DISCUSSED IS ONE THAT RESULTS FROM APPLICATION 2, WHEREIN COMMODITY PRICE AND TRADING ACTIVITY DATA MAINTAINED IN THAT SYSTEM (APPLICATION 2) IS USED TO FORMULATE THE FOLLOWING: 1. "BEST FIT" RELATIONSHIPS - TRENDS, 2. MULTIVARIATE LINEAR REGRESSION ANALYSIS, 3. POINT AND FIGURE CHARTS, AND 4. MOVING AVERAGE COMPARISONS. THE REASON FOR THIS SYSTEM IS TO SUPPORT THE ACTIVITIES OF THE TECHNICAL TRADERS WHO BASE MANY OF THEIR DECISIONS ON HISTORICAL MOVEMENTS OF VARIOUS TRADING FACTORS, SUCH AS PRICE, VOLUME, ETC.

CONCERNING ITEM 1 THE TWO VARIABLE PROBLEM HAS BEEN ANALYZED USING SOLUTIONS TO THE LINEAR, CURVILINEAR, EXPONENTIAL, AND LOGARITHMIC FUNCTIONS AND DETERMINING THE "BEST FIT" SOLUTION.

THE LINEAR, CURVILINEAR, EXPONENTIAL, AND LOGARITHMIC FUNCTIONS ARE RESPECTIVELY:

$$Y = A + BX$$

$$Y = A + BX + C(X \cdot X)$$

$$Y = A \cdot \exp(B \cdot X)$$

$$\ln(Y) = \ln(A) + B \cdot \ln(X)$$

WHERE A, B, AND C ARE COEFFICIENTS CALCULATED USING THE LEAST SQUARES METHOD. THE DETERMINATION IS BASED ON THE WEIGHTED MEAN-SQUARE ERROR BETWEEN RESULTS OBTAINED FROM THE FUNCTIONAL RELATIONSHIPS AGAINST THOSE ACTUALLY OCCURRING.

THE TIME PERIOD OVER WHICH THE ANALYSIS IS PERFORMED IS VARIABLE. ONCE THE CURVE REPRESENTING PAST ACTIVITY HAS BEEN DETERMINED, THEN IT IS POSSIBLE TO EXTEND THE ANALYSIS AND PREDICT FUTURE PRICE AND TRADING MOVEMENTS. IT MUST BE REMEMBERED THAT THE BEST FIT CURVE MAY BE TIME-DEPENDENT WHEREIN, FOR CERTAIN PERIODS, A DIFFERENT SOLUTION MAY BE BEST. IN ADDITION, SINCE THE ANALYSIS CAN BE PERFORMED OVER ANY TIME RANGES, DIFFERING INTERVALS MAY GIVE RISE TO DIFFERING SOLUTIONS.

ITEM 2 REPRESENTS A MORE AMBITIOUS ANALYSIS THAT HAS BEEN UNDERTAKEN BASED UPON SOLUTIONS TO THE MULTIVARIATE PROBLEM, USING GENERALIZED LINEAR REGRESSION TECHNIQUES. THIS EFFORT HAS RESULTED IN THE ESTABLISHMENT OF A GENERALIZED RELATIONAL MODEL WHEREIN ANY VARIABLE CAN BE ANALYZED WITH RESPECT TO ANY COMBINATION OF OTHER VARIABLES, SO LONG AS HISTORICAL INFORMATION CONCERNING THESE VARIABLES IS AVAILABLE. EXAMPLES OF SIGNIFICANT PARAMETERS ARE: 1. INFLATION RATE, 2. GROSS NATIONAL PRODUCT, 3. AVAILABLE COMMODITY RESERVES, 4. COMMODITY PRICES, 5. COMMODITY SHIPMENTS, 6. CURRENCY FLUCTUATIONS, 7. UNEMPLOYMENT STATISTICS, 8. RETAIL SALES FIGURES, 9. STOCK MARKET INDICATORS, 10. CONSUMER CREDIT, 11. COMMERCIAL CREDIT, AND 12. FINANCIAL INSTRUMENTS STATISTICS. THE CHOICE OF VARIABLES IS LEFT TO THE DISCRETION OF THE USER SINCE THE SYSTEM PLACES NO CONSTRAINTS UPON THE DATA THAT CAN BE ANALYZED.

THE THIRD ITEM OF INTEREST TO THE TECHNICAL TRADER IS POINT AND FIGURE CHARTING OF PRICE FLUCTUATIONS OCCURRING IN COMMODITIES, FOR SUCH CHARTS ARE USED TO INTERPRET PRICE TRENDS AND SIGNAL PRICE MOVEMENTS, EITHER UPWARD OR DOWNWARD. WITH RESPECT TO POINT AND FIGURE CHARTING THERE ARE TWO OPPOSING FACTORS THAT MUST BE CONSIDERED, SENSITIVITY AND RISK. SENSITIVITY DETERMINES BOTH THE NUMBER AND IMMEDIACY OF BUY/SELL SIGNALS. THE RISK IS THE RESULT OF ACTION BASED UPON THE BUY/SELL SIGNALS INDICATED BY THE POINT AND FIGURE CHART. IN GENERAL, THE HIGHER THE SENSITIVITY, THE GREATER THE NUMBER OF BUY/SELL SIGNALS FOR THE DATA CONSIDERED, AND CONSEQUENTLY THE GREATER THE RISK OF ACTING UPON FALSE SIGNALS. THE SYSTEM ALLOWS THE USER TO VARY THE SENSITIVITY IN ORDER TO OPTIMIZE THE PREDICTIVE CAPABILITY OF THE RESULTANT CHART.

THE FINAL ITEM CONCERNS THE PLOTTING AND COMPARISON OF VARIOUS MOVING AVERAGES OF COMMODITY PRICES. THIS TECHNIQUE IS ALSO USED TO INDICATE BUY/SELL SIGNALS, BUT UNLIKE POINT AND FIGURE CHARTING, IT FORMS A BASIS FOR TRADING PHILOSOPHY RATHER THAN BEING ANOTHER INPUT IN THE DECISION-MAKING PROCESS. TRADING ON A MOVING AVERAGE REQUIRES THE DEVELOPMENT OF A "FEEL" FOR ITS RESULTS. FAST MOVING AVERAGES INDICATE VOLATILE PRICE FLUCTUATIONS; SLOWER MOVING AVERAGES IDENTIFY LONGER TRENDS. NO MATTER WHAT SPEED OR HOW WELL TIMED, A MOVING AVERAGE CAN NEVER BE PRECISE; CONSEQUENTLY, THUS WATCHING COMMODITY PRICES WITH RESPECT TO THE MOVING AVERAGE WILL BE AGGRAVATING. THE MOVING AVERAGE WILL RARELY ENTER OR CLOSE

OUT A POSITION AT JUST THE RIGHT PLACE. IT IS INTENDED TO EXTRACT PROFITS FROM THE MIDDLE OF THE TREND AND HOLD LOSSES TO A MINIMUM. AS A RESULT, PROFESSIONAL TRADERS LEAN TOWARDS THE FASTER MOVING AVERAGES AND PORTFOLIO MANAGERS LEAN TOWARDS THE SLOWER. THE SYSTEM ALLOWS THE USER TO GENERATE AND COMPARE ANY MOVING AVERAGES THAT HE CHOOSES.

THE UTILIZATION OF THE VARIOUS TRADING TOOLS AND THE SUBSEQUENT FORMULATION OF A TRADING STRATEGY IS DEPENDENT UPON THE BIAS OF EACH INDIVIDUAL TRADER. THE SYSTEM IS FLEXIBLE ENOUGH TO ALLOW THE TRADER TO USE ITS RESOURCES AS HE SEES FIT AND THUS SERVES AS ANOTHER INGREDIENT TO THE ESTABLISHMENT OF A TRADING PHILOSOPHY.