



THE COMPANY



- ISS IS THE MOST EXPERIENCED DISK SUPPLIER

12/67

ISS FOUNDED

8/69

SHIPPED ISS 701 (7.25 MB)

- 2311 COMPATIBLE
- 30 MS AVG ACCESS (VS. 75 MS)
- VOICE COIL ACTUATOR (VS. HYDRAULIC)
- OPTICAL POSITIONING/CLOSED LOOP SERVO (VS. DETENT)
- 15 SECOND START-UP (VS. 60 SEC.)

4/70

SHIPPED ISS 714 (29 MB)

- 2314 COMPATIBLE

6/71

SHIPPED ISS 715 (58 MB)

- NO IBM EQUIVALENT
- MOST SUCCESSFUL DOUBLE DENSITY DRIVE



● **ISS IS THE MOST EXPERIENCED DISK SUPPLIER**

- 9/72** **SHIPPED ISS 7330 (100 MB)**
- 3330 COMPATIBLE
 - OVER 12,000 SHIPPED TO DATE
 - MOST SUCCESSFUL INDEPENDENT 100 MB DRIVE
- 2/75** **SHIPPED ISS 7330-11 (200 MB)**
- 3330-11 COMPATIBLE
 - SELECTED BY LARGEST PCM COMPANY
- 1976** **WILL SHIP THIS YEAR**
- ISS 7330-12 (317.5 MB)
 - 3350 COMPATIBLE



- **ISS HAS THE GREATEST TECHNICAL STRENGTH**
 - **TECHNOLOGY AND DESIGN SKILLS DEMONSTRATED IN LONG LIST OF INDUSTRY FIRSTS**
 - **SOPHISTICATED CONTROLLER CAPABILITY**

728	7830
730	7833
	5039
 - **EXTENSIVE PACK WRITING FACILITY**
 - **MOST EXTENSIVE FIELD FEEDBACK; OVER 28,000 DRIVES AND CONTROLLERS SHIPPED TO DATE**
 - **HIGH VOLUME PRODUCTION CAPABILITY**



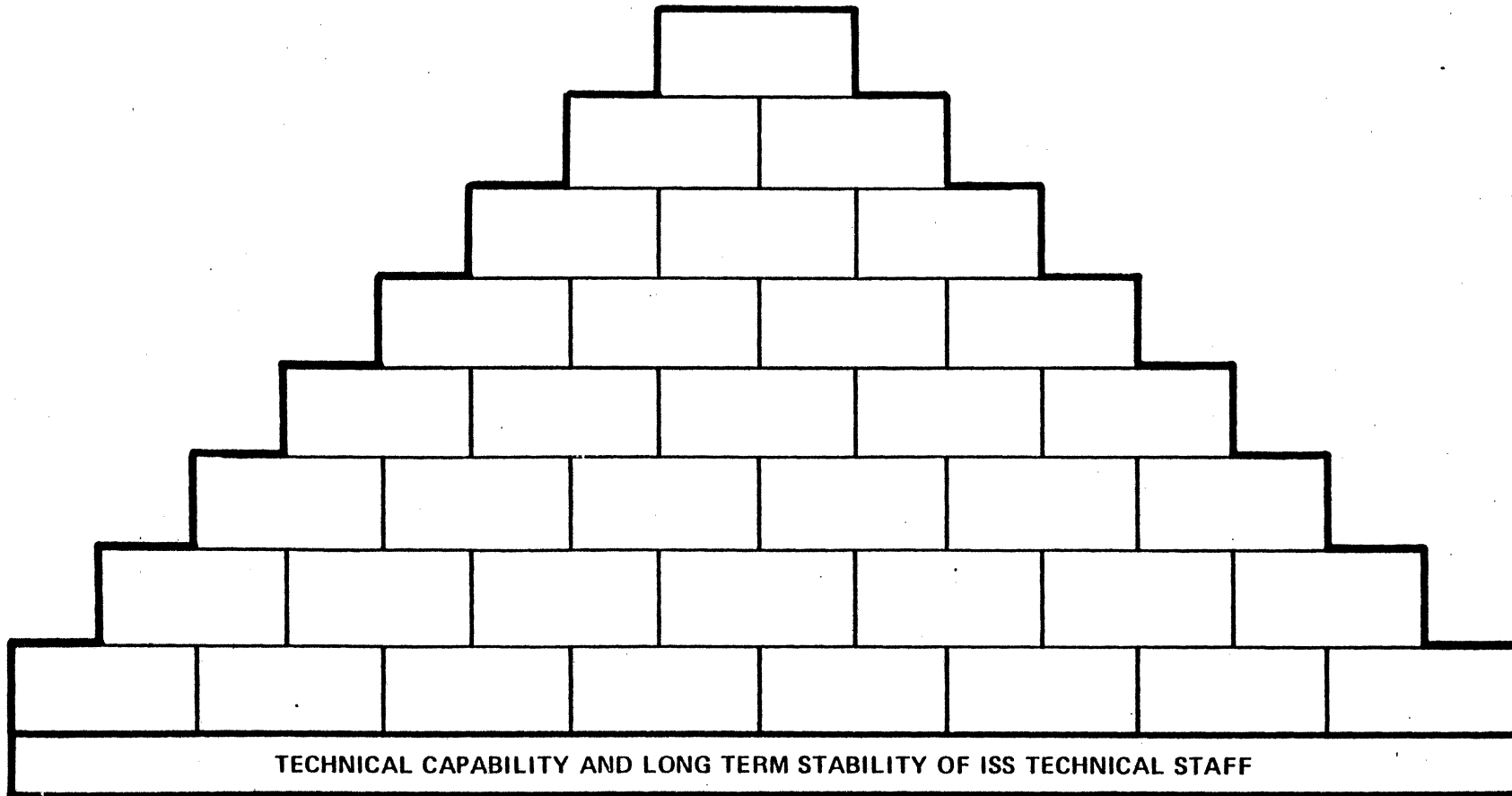
- **ISS IS FINANCIALLY STRONG**
 - **BACKED BY RESOURCES OF SPERRY RAND**
70TH LARGEST U. S. CORPORATION
\$3 BILLION REVENUE IN FISCAL 1975
 - **LARGEST INDEPENDENT DISK SUPPLIER**



TECHNOLOGY



THE ISS TECHNOLOGY PYRAMID





THE ISS TECHNOLOGY PYRAMID

<u>IBM MODEL</u>	<u>ISS MODEL</u>	<u>FEATURES</u>
2311	701	SHIPPED 8/69 7.25 x 10 ⁶ BYTES VOICE COIL ACTUATOR OPTICAL POSITIONING/100% CLOSED LOOP SERVO
7.25 x 10 ⁶ BYTES HYDRAULIC ACTUATOR DETENT MECHANISM	701, 714, 715	PATENT: FILED 1/69, ISSUED 8/71
75 MSEC ACCESS TIME	701, 714, 715 7330, 7330-11, 7330-12	30 MSEC ACCESS TIME. ISS SET NEW STANDARD. ELECTRONIC TACHOMETER PATENT: 1/69 - 3/71
60 SECOND START-UP	701, 714, 715	15 SECOND START-UP TEMPERATURE COMP PATENT: 9/68 - 9/70
	701, 714, 715	SINGLE ELECTRICAL ADJUSTMENT - LOW SERVICE COSTS
	701, 714, 715, 7330	PATENT: BALANCER 8/69 - 8/71
	701, 714, 715, 7330, 7330-11, 7330-12	PATENT: DISK DRIVE CONTROL 8/70 - 6/72
	701, 714, 715, 7330, 7330-11, 7330-12	PATENT: VELOCITY SAFETY 7/69 - 12/71
	701, 714, 715, 7330, 7330-11, 7330-12	PATENT: SAFETY UNLOAD 8/69 - 12/71
	701, 714, 715, 7330, 7330-11, 7330-12	PATENT: A.C. UNSAFE 6/70 - 12/71
	701, 714, 715, 7330, 7330-11, 7330-12	PATENT: SERVO STABILIZER 6/70 - 4/72
	701, 714, 715, 7330, 7330-11, 7330-12	PATENT: 100% PULSER POWER DRIVER 3/69 - 6/71
		OTHER: 701 PATENTS: HEAD LOAD CAMS 9/68 - 9/70 CARRIAGE MECH. 1/69 - 6/71 HEAD/ARM MOUNT 1/70 - 10/71



SPEERRY UNIVAC

THE ISS TECHNOLOGY PYRAMID

<u>IBM MODEL</u>	<u>ISS/MODEL</u>	<u>FEATURES</u>
2314	714	SHIPPED 4/70 29 x 10 ⁶ BYTES VOICE COIL ACTUATOR OPTICAL POSITIONING/100% CLOSED LOOP SERVO 32 MSEC ACCESS TIME 20 SECOND START-UP SINGLE ELECTRICAL ADJUSTMENT
IBM HAS NONE	715	DOUBLE DENSITY 714, SHIPPED 6/71 58 x 10 ⁶ BYTES 200 TPI NON-TRACK FOLLOWING VOICE COIL ACTUATOR OPTICAL POSITIONING/100% CLOSED LOOP SERVO
	714, 715	PATENT: ACTIVE TEMP. COMP. 8/71 - 8/73
	715	PATENT: SYNCH WIGGLER 8/71 - 4/73
	715	PATENT: DEFECT DETECTOR 8/71 - 9/73
	715	PATENT: ACCURATE HEAD ALIGNMENT 12/71 - 6/73
	715, 7330, 7330-11, 7330-12	PATENT: LINEAR POSITION APPARATUS 8/71 - 6/73
	715, 7330, 7330-11, 7330-12	29 MSEC ACCESS TIME PATENT: EARLY ARRIVAL 8/71 - 4/74 SINGLE ELECTRICAL ADJUSTMENT
	728 CONTROL UNIT -	VFO SYSTEM WITH ONLY TWO ELECTRICAL ADJUSTMENTS AND NO TAPPED DELAY LINE. PATENT: VFO OSCILLATOR 4/70 - 9/72 FOUR CHANNEL SWITCH SHIPPED 8/70



THE ISS TECHNOLOGY PYRAMID

<u>IBM MODEL</u>	<u>ISS MODEL</u>	<u>FEATURES</u>
3330	7330	SHIPPED 9/72 100 x 10 ⁶ BYTES VOICE COIL ACTUATOR 100% CLOSED LOOP SERVO TRACK FOLLOWING 30 MSEC ACCESS TIME PULSER POWER DRIVER* TWO MECHANICAL TACHOMETERS MECHANICAL FAIL SAFE RETRACTOR
INTEGRATION OF MOTOR CURRENT COMPENSATION	7330, 7330-11, 7330-12 7330, 7330-11, 7330-12 7330, 7330-11, 7330-12 7330, 7330-11, 7330-12 7330 7330	PATENT: ADVANCED FILE CAP. 7/72 - 4/74 PATENT: RUN-OUT COMPEN. 8/72 - 4/74 PATENT: BASEPLATE ASSY 8/71 - 10/73 PATENT: EMA CENTER DEV. 4/71 - 6/73 PATENT: ELECT. VELOC. SYST. 8/72 - 5/74 ONE OTHER PATENT PENDING
3330-11	7330-11	SHIPPED 2/75 200 x 10 ⁶ BYTES FORMAT WRITE (A.F.C.)
	7330, 7330-11, 7330-12 7330-11, 7330-12 7330-11, 7330-12	PATENT: ADVANCED FILE CAP 7/72 - 4/74(1) PATENT: ACT. FOR DISK DRIVE 2/74 PENDING PATENT: DELAY LINE COMP. 3/68 - 6/70
		FOUR OTHER PATENT APPLICATIONS IN PROCESS IN THE AREAS OF TACHOMETER SYSTEMS, FILTER TECHNIQUES, AND SELF ADAPTIVE SYSTEMS.

(1) FIRST SHIPPED 9/72



ISS TRACK FOLLOWING TECHNOLOGY DISK PACKWRITER

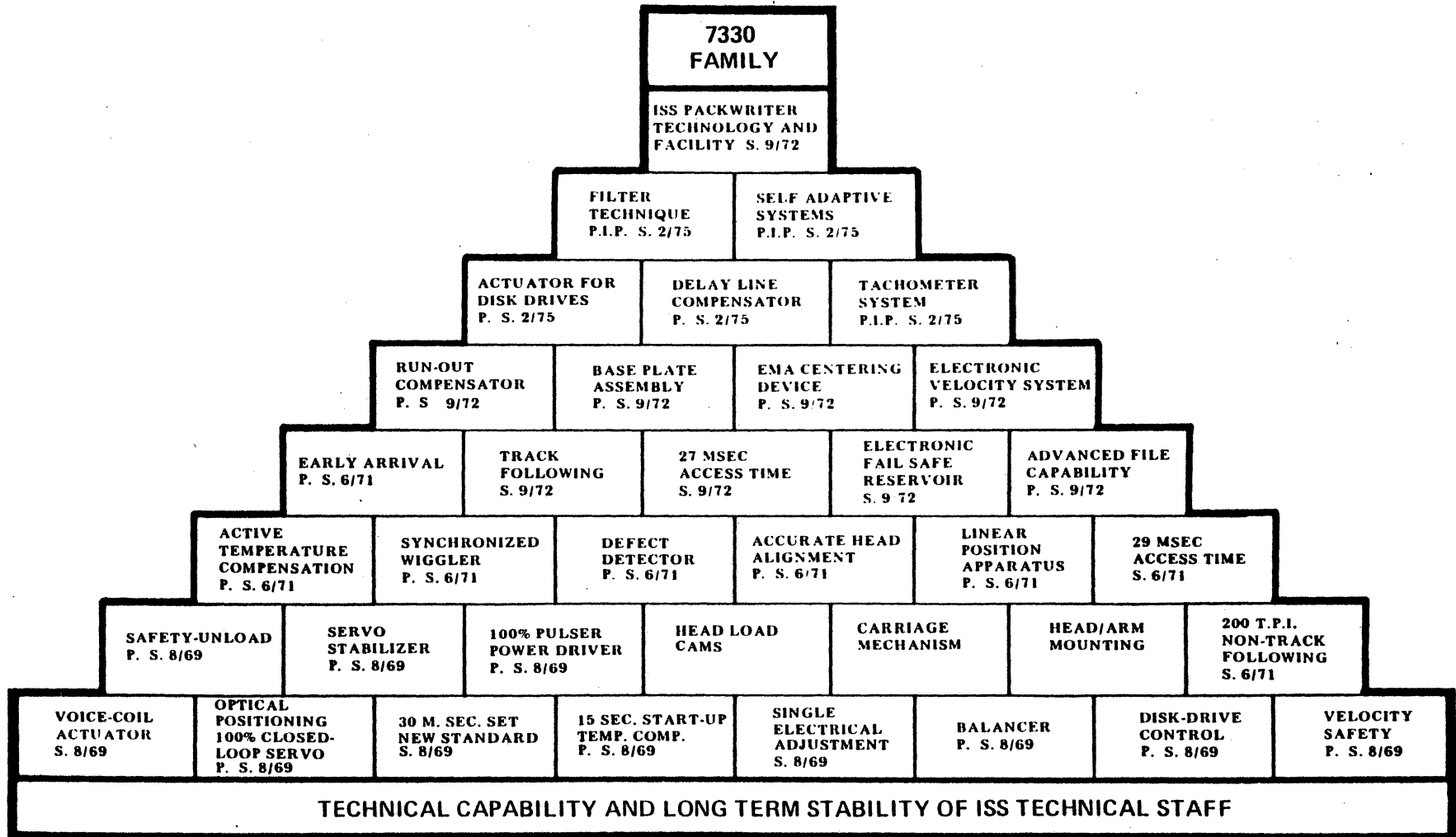
- 6/70 ISS STARTED TO DEVELOP TRACK FOLLOWING
- 12/71 ISS RECOGNIZED NON IBM C.E. PACK CRISIS
- 1/72 ISS DESIGNED AND CONSTRUCTED PACKWRITER FACILITY
- 9/72 ISS SHIPPED IBM 3336 COMPATIBLE C.E. PACK

TODAY, ISS WRITES SERVO SURFACE AND C.E. ALIGNMENT PACKS FOR UNIVAC, IBM COMPATIBLE, AND OTHER INDEPENDENT MANUFACTURERS.

ISS

SPERRY UNIVAC

THE ISS TECHNOLOGY PYRAMID



P = PATENT
S = SHIPPED



PRODUCTS

ISS / SPERRY  UNIVAC

THE 7833

DISK SUBSYSTEM



SPERRY UNIVAC

7833 DUAL PORT CONTROLLER

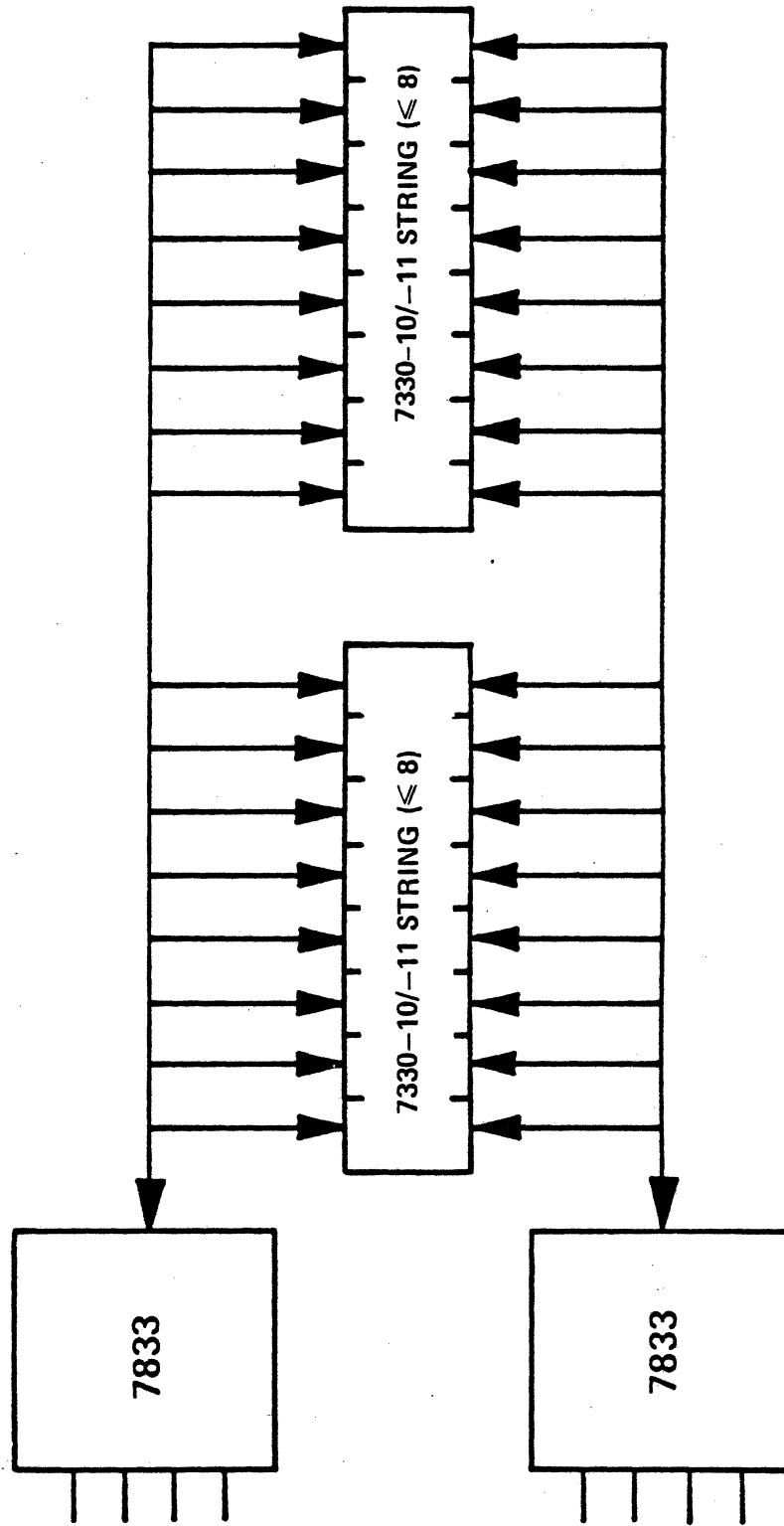
FEATURES:

- FOUR CHANNEL SWITCH CAPABILITY
- SIXTEEN DRIVE ADDRESSING
- DYNAMIC POWER SEQUENCING AND POWER DISTRIBUTION
- 7330 DOUBLE CAPACITY CAPABILITY
- ROM/PROM MEMORY
- MICRO PROGRAM PARTITIONING



SPERRY UNIVAC

7833 DISK SUBSYSTEM



ISS

SPERRY+UNIVAC

COMPARISON

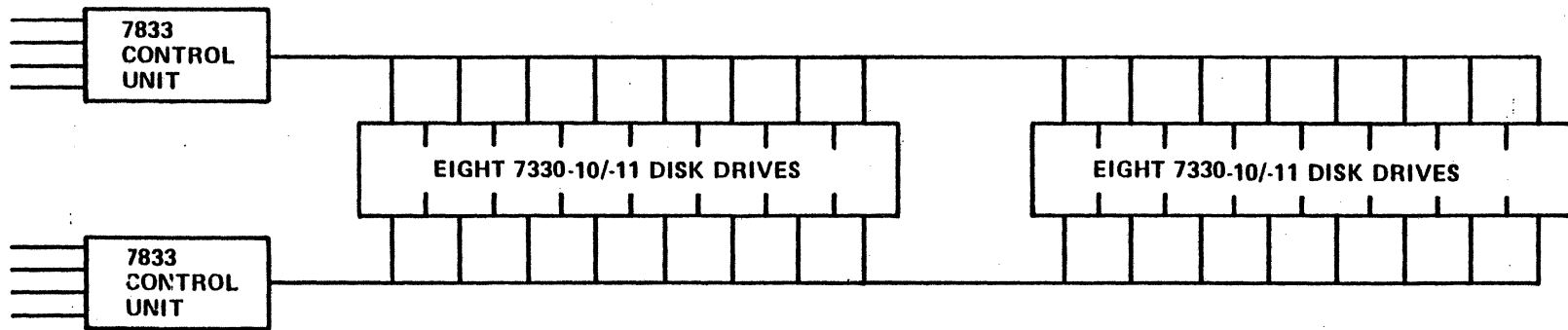
STRING SWITCHING DEPENDENCE VS. DEVICE SWITCHING INDEPENDENCE

- **I.B.M. 3830/3333 STRING SWITCHING**
- **POWER DISTRIBUTION**
- **MAINTENANCE**
- **SIMULTANEOUS OPERATION**
- **RELIABILITY**

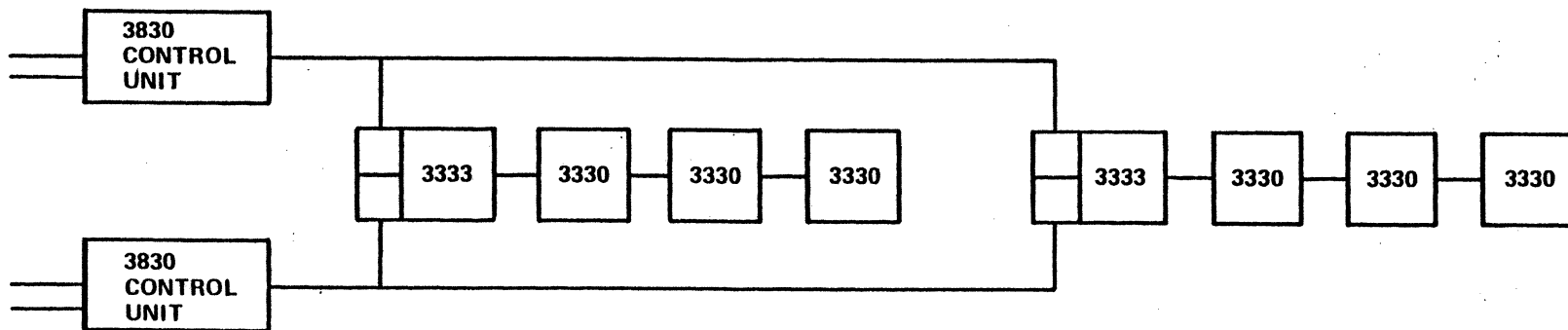
ISS

SPEERY+UNIVAC

COMPARISON



ISS DUAL PORT



IBM STRING SWITCH



SPELRY+UNIVAC

7330/7330-10/7330-11/7330-12 DUAL PORT DISK DRIVES

FEATURES:

- INDIVIDUAL POWER SUPPLY
- DUAL PORT SWITCH
- ONE SPINDLE PER UNIT



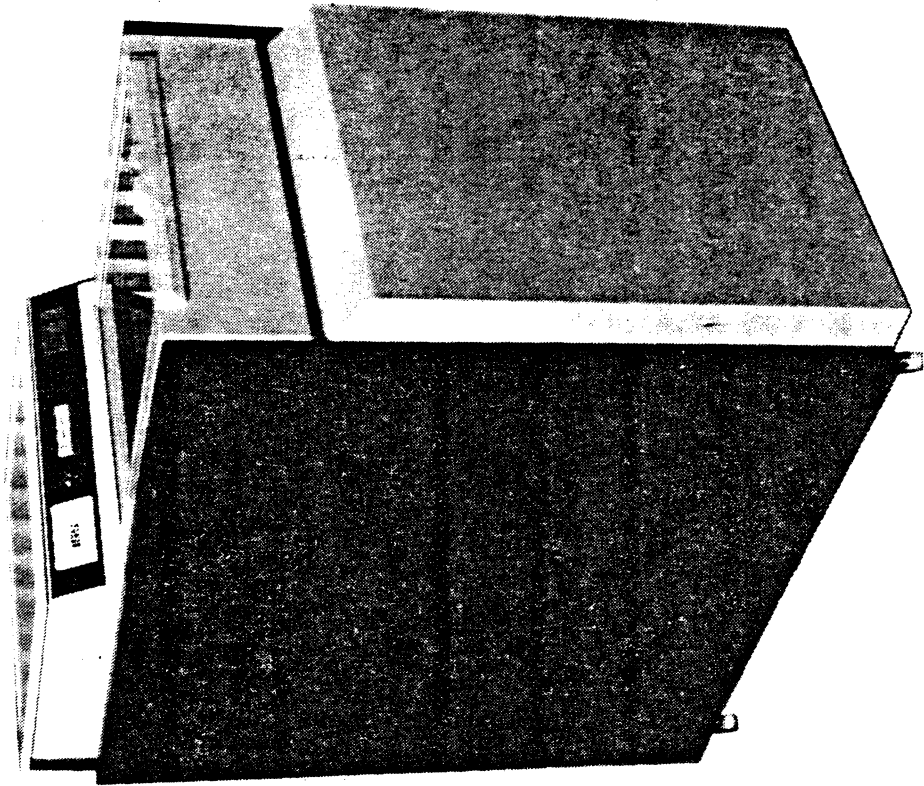
SPERRY UNIVAC

SUBSYSTEM DIAGNOSTIC /SERVICEABILITY

- 7833 C.E. PANEL
- 7833 OFFLINE DIAGNOSTICS
- D.E.D.U.
- INLINE DIAGNOSTICS
- SUBSYSTEM ONLINE DIAGNOSTICS
 - OS (OLTS)
 - STANDALONE (OLSEP)



ISS MODEL 7330-11 DISK STORAGE DRIVE





SPERRY UNIVAC

ISS DISK STORAGE DRIVES

CHARACTERISTICS:

	7330-10/8430	7330-11/8430	7330-12/8430
STORAGE CAPACITY	100 MILLION BYTES	200 MILLION BYTES	317.5 MILLION BYTES
BIT DENSITY	4040 BPI	4040 BPI	6060 BPI
TRACK DENSITY	192 TPI	370 TPI	400 TPI
DISK PACK	IBM 3336 OR EQUIVALENT	IBM 3336-11 OR EQUIVALENT	UNIVAC MOD II NOT INTERCHANGEABLE
CYLINDERS PER PACK	408 ADDRESSABLE	815 ADDRESSABLE	885 ADDRESSABLE
RECORDING SURFACES	19 DATA PLUS 1 SERVO SURFACE	19 DATA PLUS 1 SERVO SURFACE	19 DATA PLUS 1 SERVO SURFACE
ACCESS TIME (NOMINAL)	7 MILLISECONDS MINIMUM 27 MILLISECONDS AVERAGE 50 MILLISECONDS MAXIMUM	5 MILLISECONDS MINIMUM 27 MILLISECONDS AVERAGE 50 MILLISECONDS MAXIMUM	5 MILLISECONDS MINIMUM 30 MILLISECONDS AVERAGE 55 MILLISECONDS MAXIMUM
OPERATIONAL (NOMINAL)	15 SECONDS START/STOP	15 SECONDS START/STOP	15 SECONDS START/STOP
DISK ROTATIONAL SPEED	3600 RPM	3600 RPM	3600 RPM
NUMBER OF RECORDING HEADS	19 AIRBEARING HEADS	19 AIRBEARING HEADS	19 AIRBEARING HEADS
DATA TRANSFER RATE	806 KBS (8 BITS/BYTE)	806 KBS (8 BITS/BYTE)	1.2 MBS (8 BITS/BYTE)
POWER (SELF CONTAINED)	200/208/230 VAC 3 PHASE 60 HZ 6 AMPS RUNNING 200/220/230/240 VAC 3 PHASE 50 HZ 6 AMPS RUNNING	200/208/230 VAC 3 PHASE 60 HZ 6 AMPS RUNNING 200/220/230/240 VAC 3 PHASE 50 HZ 6 AMPS RUNNING	200/208/230 VAC 3 PHASE 60 HZ 6 AMPS RUNNING 200/220/230/240 VAC 3 PHASE 50 HZ 6 AMPS RUNNING
OPERATING ENVIRONMENT	TEMPERATURE 60°F – 90°F HUMIDITY 20% – 80% RH	TEMPERATURE 60°F – 90°F HUMIDITY 20% – 80% RH	TEMPERATURE 60°F – 94°F HUMIDITY 20% – 80% RH
PHYSICAL DIMENSIONS	SINGLE SPINDLE: PACK LOADING HEIGHT 36" HEIGHT 40" WIDTH 20" ** DEPTH 34" WEIGHT 500 LBS.	SINGLE SPINDLE: PACK LOADING HEIGHT 36" HEIGHT 40" WIDTH 20" ** DEPTH 34" WEIGHT 500 LBS.	SINGLE SPINDLE: PACK LOADING HEIGHT 36" HEIGHT 40" WIDTH 20" ** DEPTH 34" WEIGHT 500 LBS.



KEY 7330-11 ADVANTAGES

- EXTREMELY HIGH RELIABILITY HAS BEEN A FUNDAMENTAL DESIGN PRIORITY
- EASY ACCESS TO ALL SUBASSEMBLIES KEEPS SERVICE COSTS LOW
- EXTREMELY FAST AND PRECISE HEAD POSITIONING INCREASES SYSTEM PERFORMANCE
- ADVANCED AIR SYSTEM ACHIEVES EXCEPTIONALLY LOW PARTICLE COUNT, STABLE THERMAL CONDITIONS AND VERY QUIET OPERATION
- LOW FLYING HEIGHT ACHIEVES SUPERIOR TRACK RESOLUTION
- COMPACT DESIGN AND SINGLE-SPINDLE PACKAGING REQUIRE MINIMUM AMOUNT OF FLOOR SPACE



SPERRY * UNIVAC

7330-11 DESIGN STRENGTH

- 100 MB VERSION (7330-10) INTERCHANGES PACKS WITH 7330
- 7330-10 IS EASILY UPGRADED TO 7330-11 IN FIELD, REQUIRES LESS THAN 4 HOURS INCLUDING CHECKOUT
- FIELD KIT INCLUDES
 - 19 DATA HEAD ASSEMBLIES
 - 1 SERVO HEAD ASSEMBLY
 - 12 PCB UPDATES
 - 1 UPPER SPINDLE LOCKING SHAFT
 - 1 CAM
 - 1 MODULE SELECT PLUG



7330-11 DESIGN STRENGTHS

- **READ/WRITE**
 - DATA ERROR RATE 2 TO 3 TIMES LOWER THAN IBM 3330-11 ON INDEPENDENT MEDIA
 - DATA ERROR RATE 6 TIMES LOWER THAN 7330
 - HEAD OUTPUT INCREASED 30% VIA:
 - DOMAIN ORIENTED MEDIA
 - BIFILAR WOUND HEAD
 - 35 MICROINCH FLYING HEIGHT
 - SIGNAL TO NOISE RATIO INCREASED THROUGH CIRCUITRY CHANGES AND HARDWARE IMPROVEMENTS



7330-11 DESIGN STRENGTHS

- **HEAD ALIGNMENT**

- **ACCURACY HAS BEEN IMPROVED**
- **MECHANICAL DESIGN PROVIDES BETTER ACCESS TO HEADS**
- **RUGGED, LOW-COST PLUG-IN UNIT SUPERSEDES DEDU FOR HEAD ALIGNMENT**
- **MECHANICAL TOOLS REDUCED FROM TWO TO ONE**

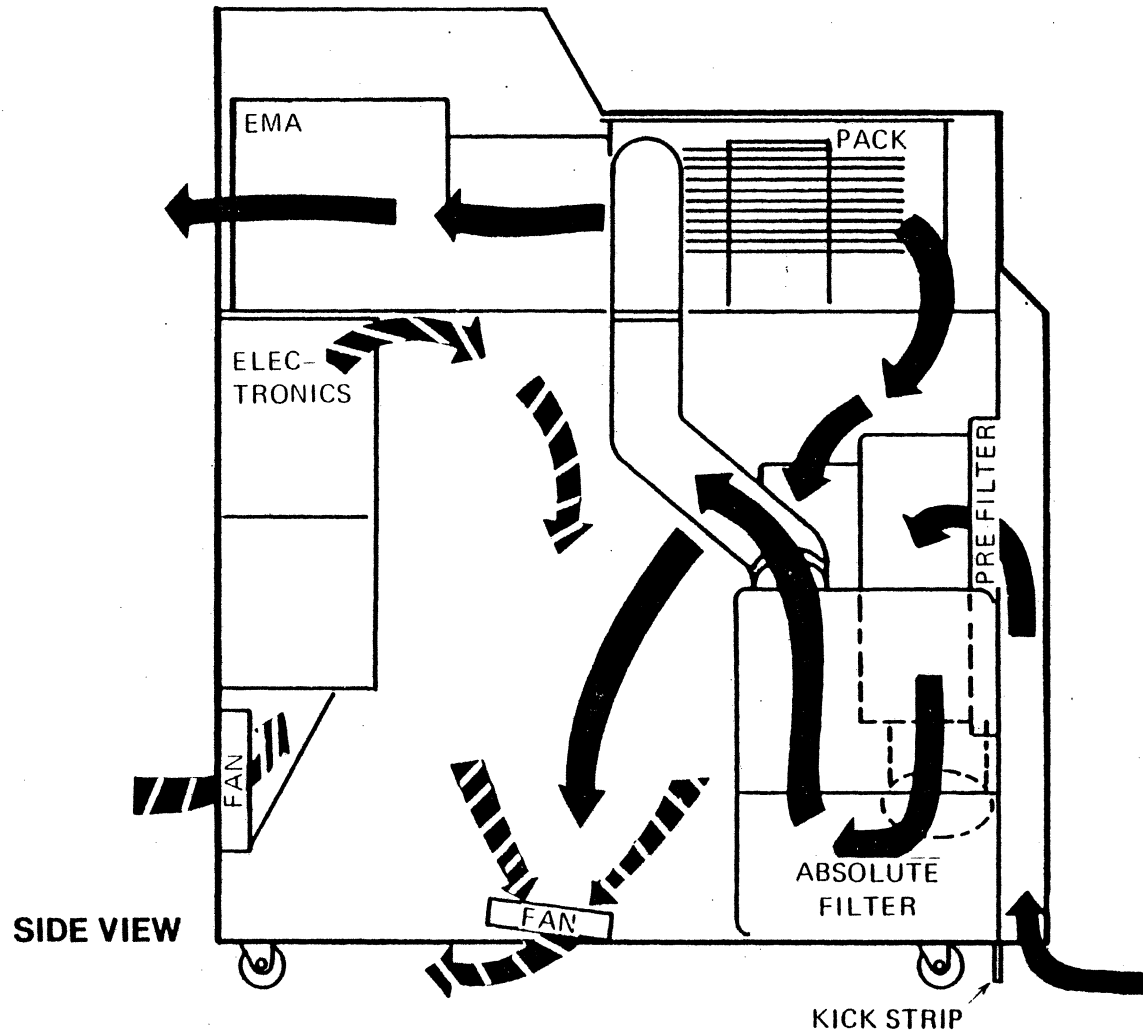


7330-11 DESIGN STRENGTHS

- **AIR SYSTEM**

- 7330 HAS LOWEST PARTICLE COUNT AMONG INDEPENDENTS
- 7330-11 LEADS THE INDUSTRY BY FURTHER REDUCING PARTICLE COUNT BY AN ORDER OF MAGNITUDE
- THIS BREAKTHROUGH IN PARTICLE COUNT PERMITS DECREASE OF FLYING HEIGHT FROM 45 MICRO INCH TO 35 MICRO INCH WHILE DECREASING PROBABILITY OF HEAD-TO-DISK INTERFERENCE (HDI)
- LOW FLYING HEIGHT ACHIEVES STRONGER SIGNAL, REDUCED FRINGING AND GREATER STABILITY
- THESE ACHIEVEMENTS RESULT IN REDUCED ERROR RATE AND LESS FREQUENT READ OFFSET
- ACOUSTIC NOISE HAS BEEN GREATLY REDUCED TO BELOW NC-60 CURVE
- THERMAL CHARACTERISTICS ARE CONTROLLED AT LEAST AS WELL AS IBM 3330-11

7330-11 DRIVE AIR SYSTEM





7330-11 DESIGN STRENGTHS

- **SERVO SYSTEM**
 - **POSITIONING PRECISION HAS BEEN DOUBLED WITHOUT INCREASING ACCESS TIME**
 - **ELECTRONIC TACH ADJUSTMENTS HAVE BEEN ELIMINATED WHILE IMPROVING ACCURACY**
 - **MANUFACTURING REPEATABILITY HAS BEEN ACHIEVED ON NEWLY DESIGNED COIL ASSEMBLY**
 - **CONTINUING SUPERIOR PERFORMANCE IS ASSURED BY FORMAL WORST CASE ANALYSIS**



7330-11 DESIGN STRENGTHS

- **SERVICEABILITY**

- ACCESS TO SERVICEABLE SUBASSEMBLIES HAS BEEN DRAMATICALLY IMPROVED
- POWER DRIVER CHANGED TO SINGLE PLUG-IN ASSEMBLY; POWER TRANSISTORS CAN BE CHANGED WITHOUT DAMAGING PRINTED CIRCUITRY
- HINGED SEQUENCER PANEL PROVIDES QUICK ACCESS TO POWER HANDLING COMPONENTS
- HEADS MUCH MORE ACCESSIBLE FOR ALIGNMENT OR REPLACEMENT
- FILTERS CAN BE CHANGED QUICKLY AND EASILY
- ONLY TWO ELECTRICAL ADJUSTMENTS
- PERIODIC MECHANICAL ADJUSTMENTS NOT REQUIRED



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7330-12 PROJECT OBJECTIVE

**PROJECT OBJECTIVE: TO PROVIDE THE COMPUTER INDUSTRY WITH A MACHINE
COMPARABLE TO THE 3350.**

ISS MARKETING HAS PROVIDED THE FOLLOWING GUIDELINES:

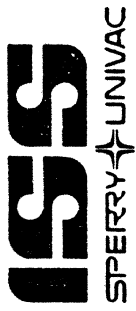
- **CAPACITY COMPETITIVE, APPROXIMATELY 320 MB, NATIVE**
- **TIME FRAME (6 TO 9 MONTHS DELIVERY AFTER 3350)
SEPTEMBER 1976 TO DECEMBER 1976**
- **FIELD UPGRADE OF TODAY'S 7330-11**
- **PACK INTERCHANGEABILITY NOT DEMANDED. PACK MUST BE MOVABLE
AND DATA RECOVERABLE. A DETERIORATED ERROR RATE IS TARGETED
AT 1 ERROR IN 10^8 BITS TRANSFERRED**
- **FIXED HEADS NOT MANDATORY**



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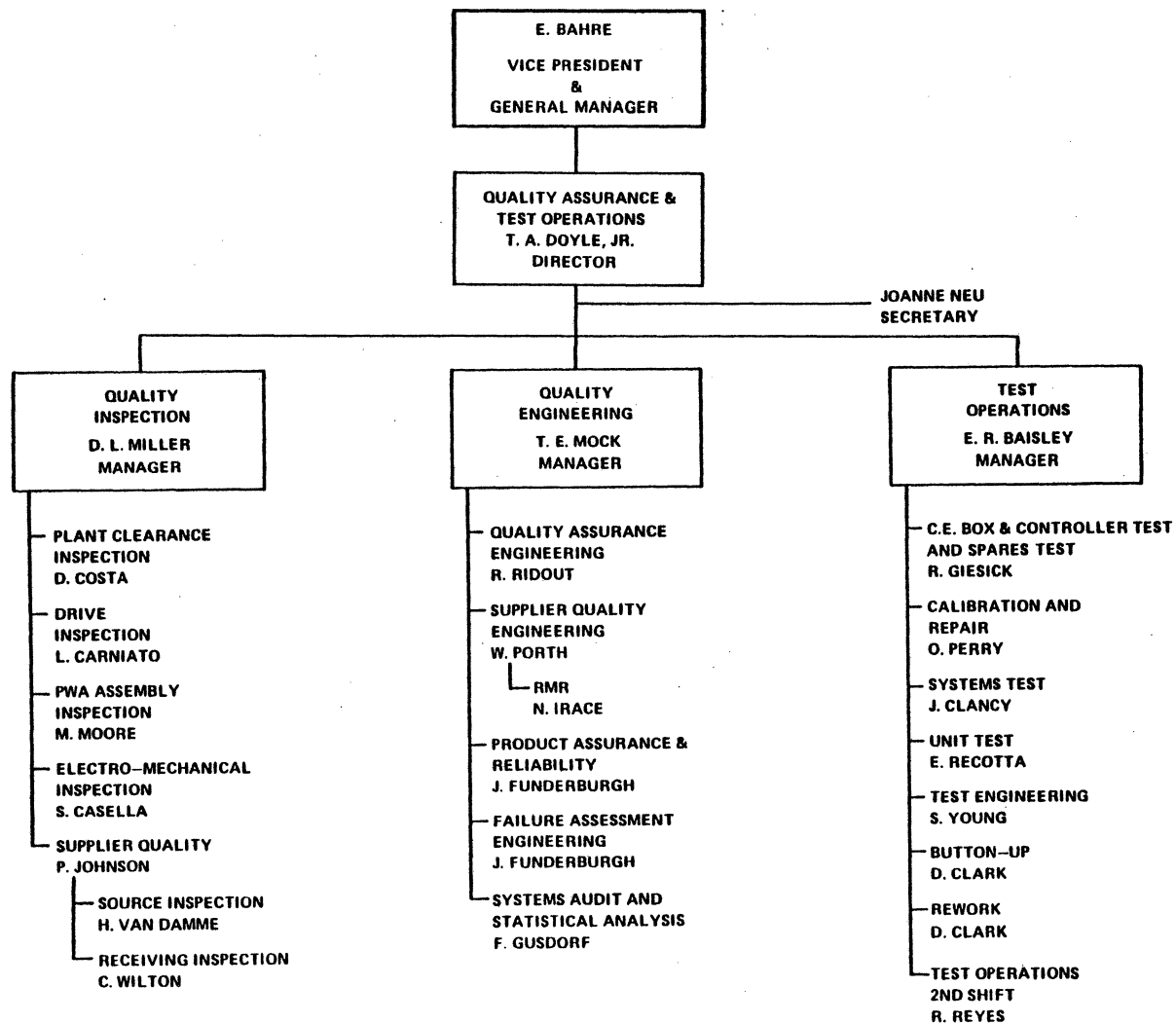
SUMMARY

- **PROVIDES SUPERIOR 100/200/ 317.5 MB PRODUCT**
 - **EXCEPTIONAL RELIABILITY ASSURES LOW SERVICE COST, INFREQUENT INTERRUPTIONS**
 - **ACCURATE HIGH SPEED POSITIONING BOOSTS SYSTEM PERFORMANCE**
 - **SINGLE SPINDLE PACKAGING AND SMALL FOOTPRINT REDUCE FLOOR-SPACE REQUIREMENTS**
 - **QUIET OPERATION WILL PLEASE OPERATIONS PERSONNEL**
 - **100 MB VERSION IS FIELD UPGRADABLE TO 200 MB AND 200 MB TO 317.5 MB**



SYSTEMS ASSURANCE

QUALITY ASSURANCE & TEST OPERATIONS





SUPERIOR PRODUCT RELIABILITY

- **ISS IS DEDICATED TO CONTINUING PRODUCT IMPROVEMENTS WITH PARTICULAR EMPHASIS ON RELIABILITY**
- **PERIODIC RELIABILITY FEEDBACK HAS SHOWN THAT A LARGE SAMPLE OF 7330'S PRODUCED IN 1974 HAVE REACHED A STABLE MTBF OF 6,000 HOURS IN SIX MONTHS, WELL BEYOND THE SPECIFICATION OF 3,000 HOURS**
- **THIS SAME ATTENTION TO RELIABILITY IS BEING APPLIED TO ALL NEW PRODUCTS**



SYSTEMS ASSURANCE

QUALITY FUNCTIONS

- IMPLEMENT QUALITY CHECKPOINTS THROUGHOUT PROCUREMENT, ASSEMBLY AND TEST PROCESS TO ASSURE COMPLIANCE WITH QUALITY REQUIREMENTS.
- PROVIDE TOP MANAGEMENT AN INDEPENDENT REAL-TIME SCOREBOARD ON QUALITY AND RELIABILITY PERFORMANCE.
- PROMOTE FULL COOPERATION AMONG ALL ISS DEPARTMENTS TO DISCOVER AND REMEDY THE CAUSES OF DEFECTS.
- MAINTAIN POSITIVE QUALITY ENVIRONMENT AT ISS BY ACTION AND AWARENESS PROGRAMS.
- RELIABILITY ENGINEERING FROM DESIGN CONCEPT THROUGH PRODUCT INTRODUCTION TO END-OF-PRODUCT-LIFE.



MAJOR QUALITY PROGRAMS

- **COMPONENTS**

- IMPROVED SEMICONDUCTOR QUALITY
- REPLACE PLASTIC TRANSISTORS WITH METAL CAN TYPES
- CONTROLS IN THE PREFORM AREA
- HANDLING AND TESTING OF COMPONENTS
- VENDOR CONTROLS
- COMPONENT APPLICATIONS

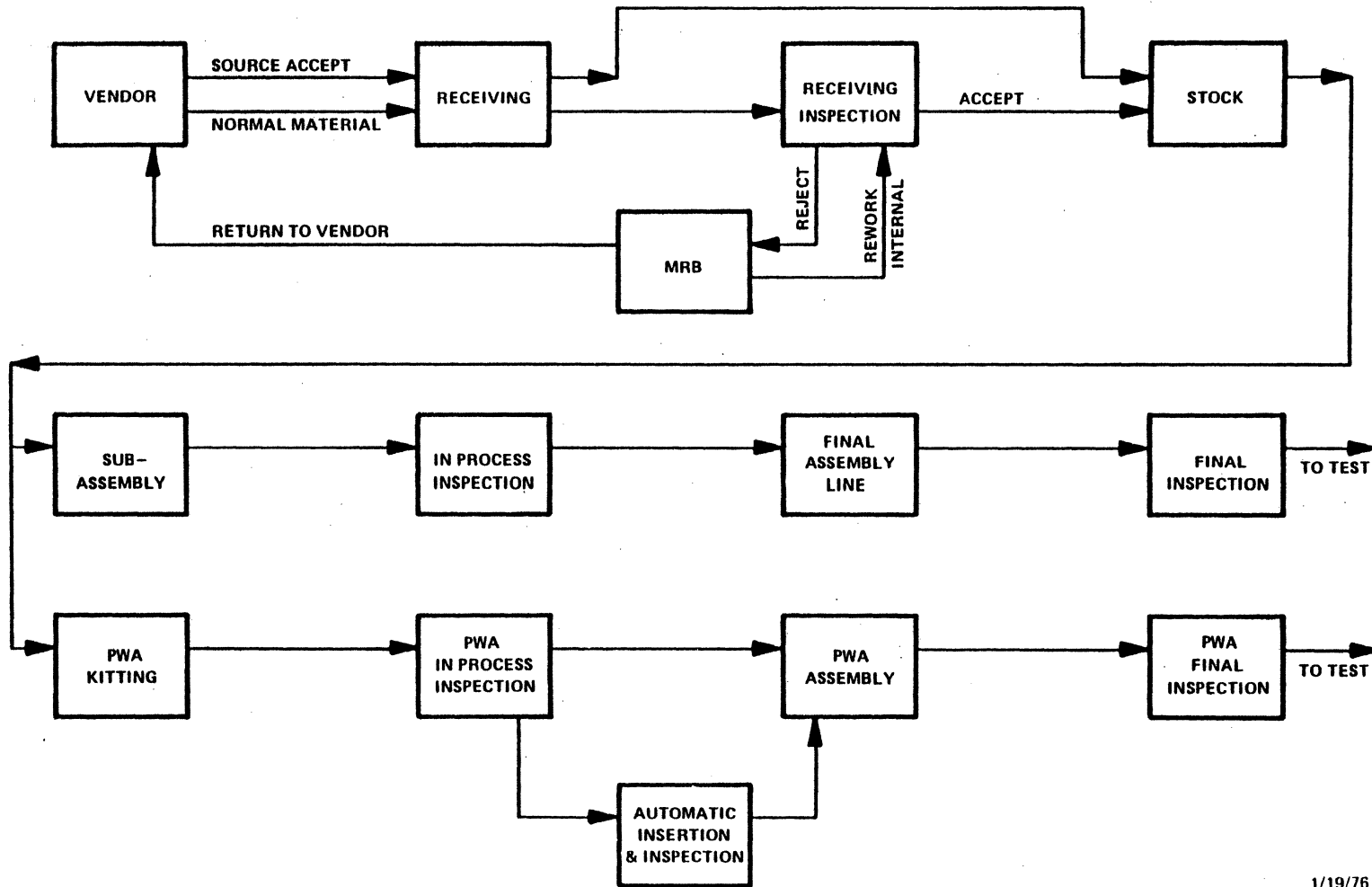
- **PCB**

- HANDLING AND WORKMANSHIP
- ESTABLISH MAXIMUM REWORK CRITERIA
- IMPROVED TESTING, USING THE FAULT FINDER AND GR TESTER
- NEW INLINE CLEANER
- CONTROL OF BARE BOARDS
- AUTOMATIC INSERTION



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ASSEMBLY & INSPECTION FLOW DIAGRAM





MAJOR QUALITY PROGRAMS

- **SYSTEMS TEST**

- TESTING AT ELEVATED TEMPERATURE
- INCREASED TEST TIME
- RETEST PROCEDURE
- VERIFICATION

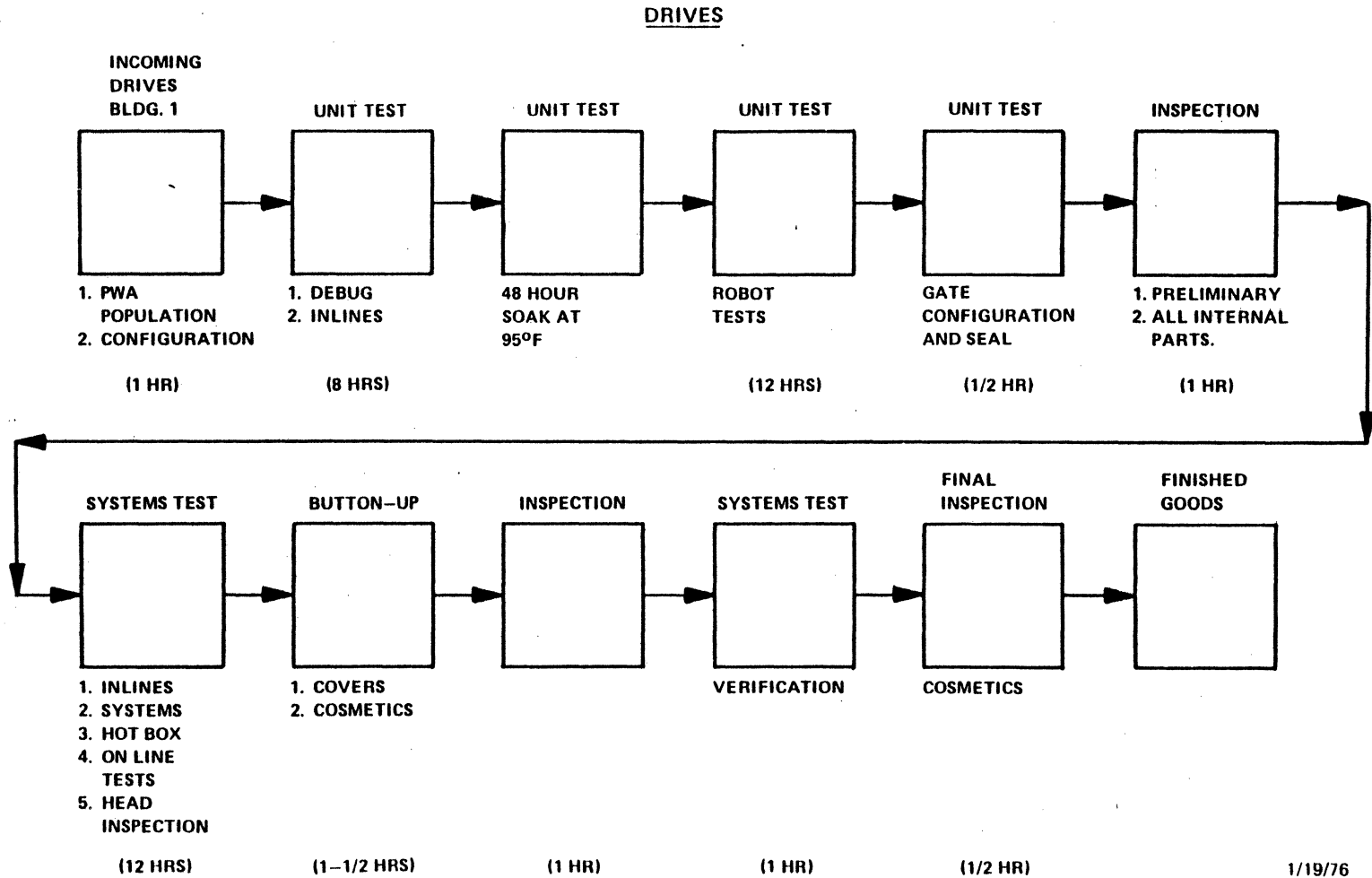
- **FAILURE ANALYSIS**

- EVALUATE IN-PROCESS FAILURES
- RESPONSE TO CUSTOMER REQUESTS FOR ANALYSIS



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FLOW CHART OF DRIVES THROUGH TEST

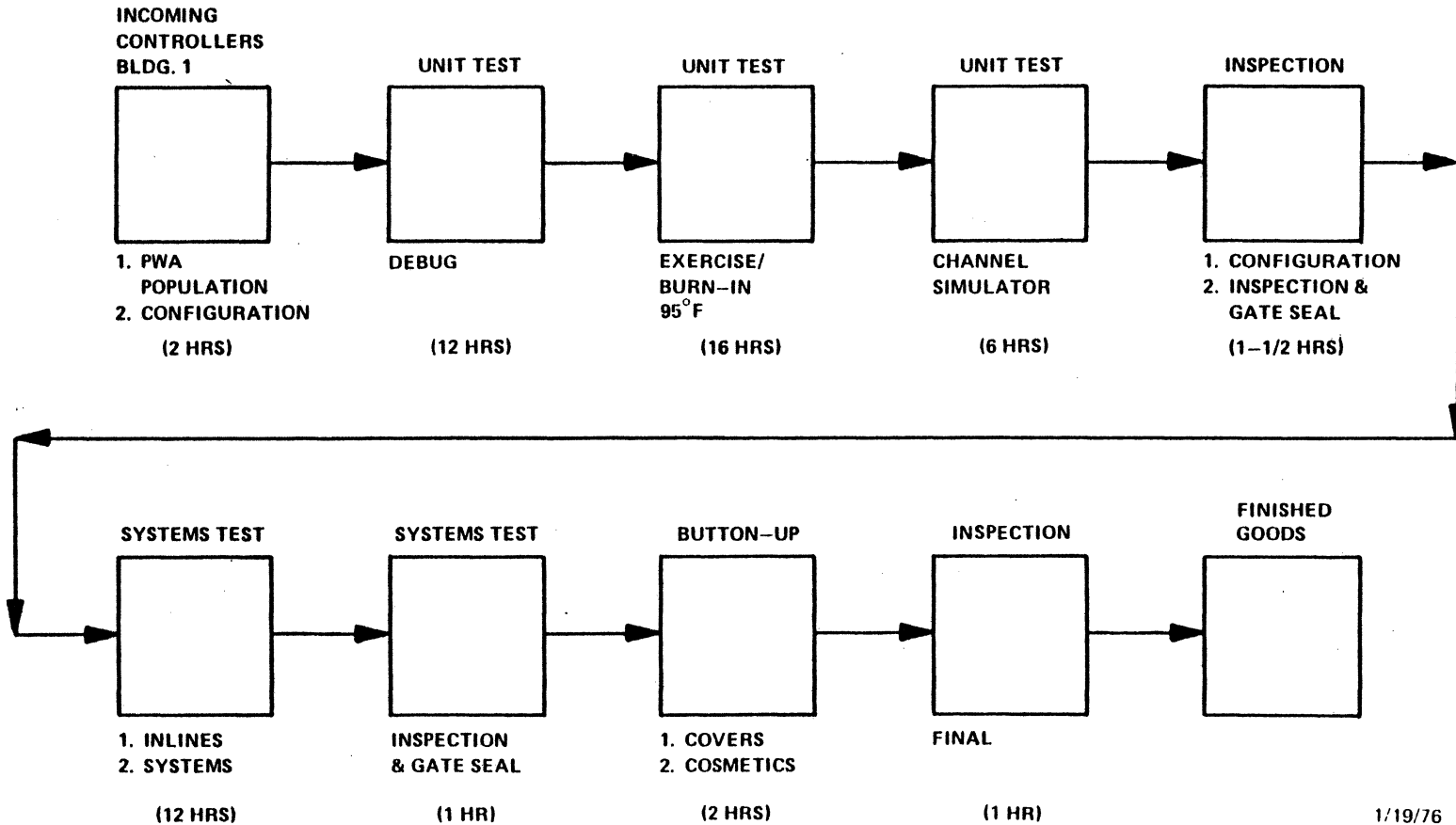




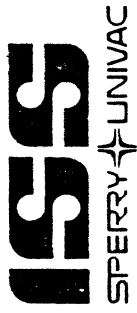
SPERRY UNIVAC

FLOW CHART OF CONTROLLERS THROUGH TEST

CONTROLLERS



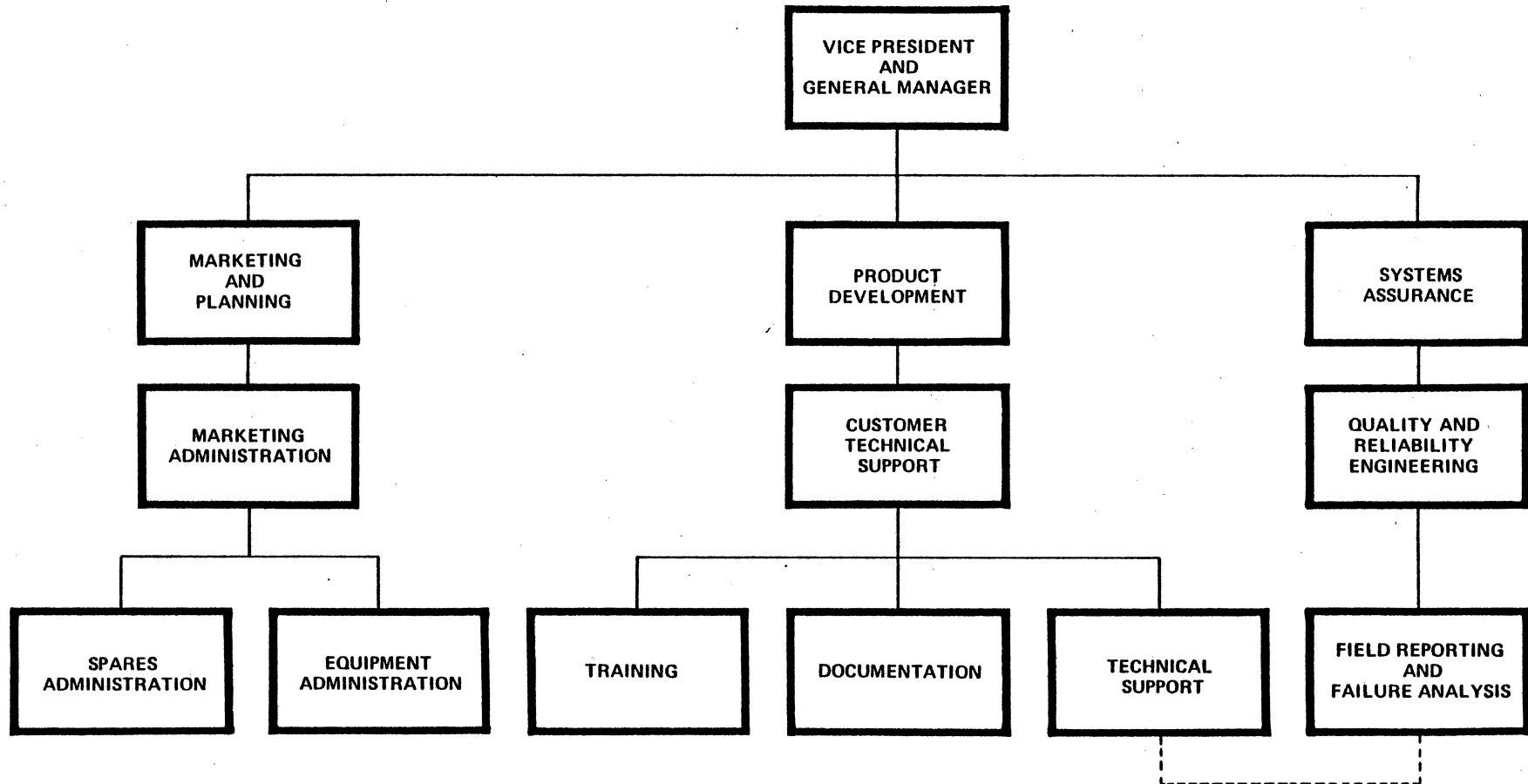
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CUSTOMER SERVICE AND SUPPORT



CUSTOMER SERVICE AND SUPPORT





SUMMARY



SUMMARY

- **GUARANTEES DEPENDABLE SOURCE OF SUPPLY**
 - **ISS HAS VERY STRONG FINANCIAL RESOURCES**
 - **TECHNICAL CAPABILITY IS SECOND TO NONE**
 - **HIGH-VOLUME PRODUCTION CAPABILITY IS IN PLACE**
 - **ISS IS THE MARKET LEADER**