FIELD SERVICE PRODUCT PLAN

(Preliminary and unpublished)
(Contains only Section 3)

RD31-A
******

(20 MB WINCHESTER DISK)

Prerelease 1.1
3-SEP-85

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3.0 SERVICE OPERATIONS PLAN

This section describes the technical service planning and agreements to support service on the RD31. First Customer Shipments of the RD31 will be with the PC100 and 300 systems. Delivery with and upgrades to other host systems are in the planning stages, as a result some plans, specific dates and order numbers are still To Be Determined (TBD) in FY86.

3.1 PRODUCT DESCRIPTION

The RD31 is a 5.25" low cost, random access winchester disk drive ultilizing non removable media.

The drive has a formatted capacity of 20 megabytes. It is designed to reside inside host system cabinetry, which results in a compact system package. The RD31 is purchased from a Vendor under contract with Digital.

The RD31 requires a host adaptor and cables to function with host systems. There are 2 categories of adaptors which will support the RD31, Storage Systems supplied and others. Storage Systems supplies the CTI bus to ST-412 bus adaptor called the RCD52, and the Winchester adaptor for the PC100 called PC1XX-DA. The other category of adaptor presently includes the PC AT to ST-412 adaptor for the PCXX, and others including VAXmate, Nautilus and Workstations (plans TBD).

The following Table will assist the Reader in understanding the relationship of the RD31 to other RD products and Host adaptors in the DESCRIPTIONs and DIFFERENCES sections of this plan.

SYSTEM	BUS	ADAPTOR	MAX # DRIVES	DRIVES SUPPORTED RD50	51	52	53	31
Micro	Q22	RQDX1	2		X	X		T
		RQDX2	2		X	X	X	B
		RQDX3	4		X	X	X	D
PRO3XX	CTI	RCD50	1	X	X			
		RCD52	1	X	X	X	X	X
PC100		PC1XX-DA	1	X	X			X
PCXX	PC-AT	TBD	TBD					X
VAXmate		TBD	TBD					X

This section includes plans and schedules for all hosts, planning to offer the RD31, as they are known today.

3.1.1 FUNCTIONAL DESCRIPTION - The RD31 meets the ST-412 Bus specification and the RD31 Engineering Purchase Specification, which defines the Electrical, Mechanical and Environmental requirements of the RD31. The RD31 requires DC Power, cooling and a bus adaptor provided by the Host System for operation. Digital includes an FCT (Factory Control Table) on the innermost track of each surface which defines all identifiable bad spots, which reduces the number of soft and hard error detected by a subsystem to near zero. This also eliminates the need to do extensive surface scanning of new and repaired drives during the format/initialize procedures when bringing up a system from scratch.

The RCD52 adaptor supports all ST-412 bus requirements of the RD50, RD51, RD52, RD53 and RD31 Drives. The Professional Operating System (POS) and RT11 are being updated to add RD31 software support. The adaptor provides the interface to the PRO CTI bus.

The RQDX3 supports all ST-412 requirements of the RD51, RD52, and RD53. The RD31 can be added thru release of adaptor configuration software. This adaptor interfaces to the Q-22 bus utilizing MSCP protocol.

The PC1XX-DA Supports all ST-412 requirements of all Digital RD products. PC100 currently supports only the RD50 and RD51 and is adding the RD31 to the Winchester Utility Package.

The PCXX Adaptor will support only the RD31 as used in the PCXX and meets all ST-412 bus requirements. The adaptor interfaces PC-AT bus to ST-412.

3.1.2 ARCHITECTURE - RD31 to Host Adaptor is ST-412. Host Adaptor to Pro (RCD52) is CTI. Host Adaptor to Q-22 (RQDX3) is Qbus MSCP. The Host adaptor to PC100 (PC1XX-DA) is _____. The Host Adaptor to PCXX is PC-AT(IBM).

3.1.3 PHYSICAL DESCRIPTION - The RD31 is a 5.25" fixed Winchester technology disk drive. It fits the standard 'half-high' 5.25" Floppy Disk footprint. Digital adds a mounting (slide) plate and ground clip which makes it user installable into the PC100, PC300 and Micro Family products. Installation into PCXX and VAXmate is (Currently) without the Slide Plate (non-user installable). The Drive has 3 interface connectors, 1 power, 1 Data and 1 control, which also meet the ST-412 spec.

RD31 Physical Specs (without Standoff and Mounting Plate):

Height	1.63 inches (41.4mm)
Width	5.75 inches (146.05mm)
Depth	8.00 inches (203.2mm)
Weight	2.8 lb (1.3 Kg)

RD31 Physical Specs (with Standoff and mounting plate):

Height	2.07 inches (52.6mm)

Width	5.75 inches (146.05mm)
Depth	8.00 inches (203.2mm)
Weight	3.00 lb (1.4Kg)

3.1.4 PHYSICAL DIFFERENCES -

The RD31 is physically similar to other RD products except in th height. The RD31 is a Half height (1.63 inches) drive and the rest of RD disk drives (RD50,51,52 & 53) are Full height (3.25 inches).

3.1.5 SERVICE FEATURES -

The RD31 requires no tools to install or remove after appropriate system covers and shielding are removed.

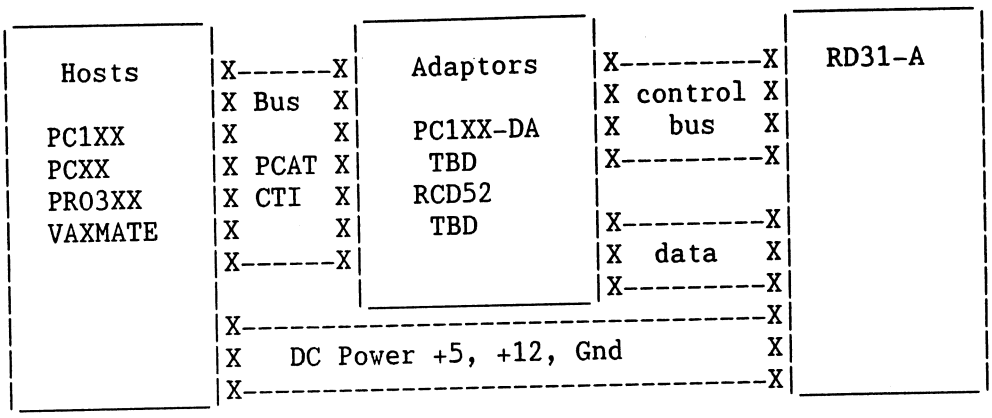
There is a dedicated shipping zone, located from cylinders 615 to 670,to preserve data integrity during shipping/transport. The heads can be parked in the shipping zone by issuing a seek t any cylinder between 615-670. All the shock and vibration tests on the drive are conducted with the heads parked on the data are

Upon power-up, the drive will recalibrate to track 0. If the heads are parked while power is still applied, any step will unpark the heads and recalibrate to track 0.

The RD31 utilizes an FCT (Factory Control Table - factory bad blocking) which reduces the time spent initializing a drive when building or rebuilding the system disk.

The RCD31-A subsystem is tested at system power on by the PRO380 host. This test, which includes data transfer is automatic. If a failure is detected, the system VR201 will display a picture of the system with the Winchester subsystem hi-lited accompanied by an error code which will point to the cause of the failure.
This feature and corrective action is the same as was performed for the RCD52-A which means no additional training is necessary for service personnel to identify and isolate subsystem failures.

3.1.6 CONFIGURATION DIAGRAM -



3.2 PRIMARY SERVICE PLAN

The initial service delivery will be to use field service terminal technicians to isolate system failures to the respective Controller-Disk subsystem and replace the failing FRU.

Self Maintenance customers will be able to run diagnostics and either return the failing device to Digital for exchange, or have field service replace the failing device on site at per call rates.

3.2.1 PRODUCT MAINTENANCE STRATEGIES - The Primary service strategy for the RD31 is to isolate the failing FRU by first replacing the Device PCB and then the option if necessary.

Field replacement of FRU's is necessary to maintain customer data on site if possible. The 2 FRU's are the Device PCB and the RD31. The RD31 will be replaced instead of a "HDA" FRU because the manufacturers build and repair processes are "drive" focused and they can provide a complete qualified Drive for the price of a qualified HDA.

Units being returned will be tested and verified at one or several PRC's (domestic and international). All non-HDA repair will take place at these sites.

Self maintenance customers will be able to replace the RD31 or the subsystem using Carry-in or Module mailer services on PRO and PC100 systems. Other host adaptors may not be fully customer serviceable due to limited physical access. Policies regarding customer maintenance of subsystems other than PC100 and PR0380 may be found in the Service Product Plans and Field Implementation Plans for each host.

3.2.2 REMOTE DIAGNOSIS - No Remote Diagnosis is being planned for the Host Systems.

3.2.3 MAINTENANCE GOALS -
MTBF - 20,000 power on hrs
MTTR - 1.0 hrs (lab). < 1.5 hours (field).
MTTI - 1.0 hrs
D.O.A.- The Dead-on-Arrival will not exceed 2.5%. This includes both shipment to Field Service logistics and Customers.
PCB's - All printed circuit boards (PCB)/FRU's are interchangeable and field replaceable.

Components of MTTR:

Activity	Time	# Times/Call	Time/Call
Customer Intro	15 min	1.0	15.0 min
Subsystem Diag	5 min	3.0	15.0 min
Format RD31	15 min	.25	3.75 min
R-R Host Adaptor	3 min	.4	1.2 min
R-R RD31 PCB	5 min	.5	2.5 min
R-R RD31	3 min	.15	.45 min
R-R Cables	3 min	.05	.15 min
Call Wrap-Up	15 min	1.0	15.0 min
			Total 53.05 min

The previous chart summarizes the individual activities required to maintain an RD31 subsystem. The time for each activity is shown as well as the number of times performed during an average repair. This results in an average time for each activity during a call. The average repair time is the sum of the average activity time. The actual repair flow is contained in the Miscellaneous Attachments to this Plan.

3.2.4 PM REQUIREMENTS - No Preventive Maintenance will be required on the RD31.

3.2.5 SITE PREPARATION - The RD31 is embedded in host systems and will perform under all conditions specified by DEC-STD-102 for Digital Class B systems. Refer to Attachment 6.2 for RD31 site requirements.

3.2.6 INSTALLATION AND ACCEPTANCE - User installability of the RD31 and RCD31-A is a requirement. User installability of the RD31 and RCD31 have already been demonstrated by identical form factor products RD50-A, RCD50-A, RD51-A, RCD51-A, RD52-A, and RCD52-A. User Installability is defined by DEC-STD-041. The installation of RD31 (including the RCD31-A) will be documented in Host installation manuals prior to the option FRS on each host.
Acceptance testing consists of formatting if necessary and running the Hard Disk diagnostic. Procedures for formatting and diagnostics are unique to each host and is documented in host installation, User Guides and PSG manuals.

3.2.7 DE-INSTALLATION - Since the RD31 is shock sensitive, extreme care must be exercised when removing and transporting the Drive to prevent shock. Always return the drive to its original shipping carton when transporting drive, do not drop or bang RD31 when handling.

Procedure for RD31 de-installation is host dependent and is described in host Installation manuals and PSG's.

The RD31-A installation and de-installation is identical to the RD50-A procedure, which may be followed on PRO and PC100 systems.

3.2.8 SERVICE ENGINEER PROFILE - Onsite Engineer will be able to load and run diagnostics, interprete results and replace Device PCB or RD31 based on diagnostic tests. Engineer will be familiar with Host system configurations, diagnostics and service aids.

3.2.9 TOOLS - No special tools will be required.

3.2.10 TEST EQUIPMENT/SERVICE AIDS - No test equipment is required. Service Aids include RD31 Technical Description and Print Set, and Host User manual, Pocket service Guide and Diagnostic Software.

3.2.11 DOCUMENTATION - The documentation plan is to provide a technical description manual, IPB (Illustrated Parts Breakdown), FS maintanance print set and RD31 Matrix management.

Description	Part #
RD31 Technical Manual	EK-RD31A-TD (NOV 85)
RD31 FS MPS	MP- (SEP 85)
RD31 IPB	EK-RD31A-IP (SEP 85)
RD31 Revision Management	Part of RD31 FSMPS
RD31 Tech Tips	
Rainbow 100 PSG Addendum	EK-PC100-PS-CN3 (SEP 85)
Rainbow 100 IPB	EK-SB100-IP-005 (NOV 85)
Rainbow Hard Disk installation Guide	AZ-GK75A-TV (SEP 85)
PRO Pocket Service Guide	EK-PC350-PS (Dec 85 Estimated)

[redacted]

* As the RD31 is very similar to other RD products, there will be no major impact on the field due to delayed PSG's.

3.2.12 DIAGNOSTICS - Diagnostics will be provided by the host system and verified by Storage CSSE prior to that host revenue shipping with or offering upgrades which include the RD31. The diagnostic offerings for RD31 will be very similar to that available for RD50 and RD51 disk drives. There will be two levels of diagnostics available for the RD31.

* Drive level diagnostics :

The drive level self test is run under power up. This self test will determine the ability of the drive to spin up, seek and re-position itself to track 0.

* System level diagnostics :

System level testing will be done at two levels.

1. When the operating system is booted, the RD31 will be check as a part of total system check.

2. The drive can be further checked using menu driven diagnost in the maintenance diskett.

These diagnostics will isolate failures to the RD31 with 95% or greater level of confidence. Drive testing is combined with host adaptor tests which isolate to 95% or greater level of confidence.

There is a plan to release a maintenance services diskett in FY86 for PRO380 system, which would provide formating capability under standalone condition.

The following will support diagnostic utilities for RD31.

PC100

Winchester Utility/Diag Disk

	Part #	
WUP V3.0	BL-GQ99A-MV	(Sep 85)

PR0350/380

PRO maintenance services diskette

V3.0	BL-	(JAN 86 Est)

PCXX

Diagnostic Diskette -- Details TBD.

VAXMATE

Diagnostic Diskette -- Details TBD.

3.2.13 SOFTWARE -

Operating systems which support the RD31 will be tested IAW DEC-STD-038 to verify that the RD31 subsystem operates correctly within the OS environment before that Operating system is released.

A System Verification test will be conducted on each host and operating system prior to Announcing for shipment. This is a test which fault inserts the RD31 and verifies correct operating system response. This test will be conducted by System Test Groups with Storage CSSE support.

The following Host operating systems will support the RD31:

PC100 Family	MS-DOS
	CP/M

These operating systems will eventually support RD31 but detailed plans have not been published.:

PRO350/380	POS	(Est Q3,FY86)
	RT11	(Est Q3,FY86)
PCXX	MS-DOS	(Est Q4FY86)
VAXMATE	MicroVMS	(Est Q4FY86)
	ULTRIX-32W	(Est Q4FY86)

Micro 11 (TBD)	RT11
	RSX 11M
	RSX 11M+
	RSTS/E
	DSM-11
	Ultrix-11

3.2.14 FEEDBACK - The primary support feedback on the RD31 will be via Host CSSE representatives, LARS, and the Repair Depots in Salem NH. Feedback reports will be generated from this and other data for the RD31 by the Storage CSSE Product Measurements group.

LARS information must identify the RD31 as RD31 and include the Drive serial number under option serial number. RCD31 and other host adaptors will be identified by their module number. Time spent identifying, repairing or replacing and verifying RD31 failures should be reported as corrective time. Time spent restoring customer data or other activities is not corrective time and should be reported by other means (such as 0 M on LARS).

A post partum will be conducted on the RD31 approximately 18 months from FCS to measure performance of the RD31-A to this plan.

3.3 SUPPORT SERVICE PLAN

3.3.1 SUPPORT STRATEGY - This product will be supported the same way as the host system. Primary field support will be via the Atlanta Hotline.

3.3.2 REVISION CONTROL/COMPATIBILITY - The RD31 will be under Revision control prior to FCS. The Revision Matrix will be included in the Field Service Maintenance Print Set (FSMPS). Hardware, Software, and Diagnostics which support the RD31 will also be compatible with RD50 and RD51.

3.3.3 TOOLS/SKILLS - No Tools required. Support level personnel (including the Atlanta Hotline) will be trained at the system level to run diagnostics, interprete operating system error messages and identify supportable configurations. This training will be accomplished by Host CSSE.

3.3.4 TEST EQUIPMENT/SERVICE AIDS - The service support aids are documentation and diagnostics.

3.3.5 DOCUMENTATION - Support documentation for the RD31 will be the same as for field engineers. In addition Purchase Specifications and Vendor Technical Literature will be distributed by CSSE as needed.

3.4 LOGISTICS PLAN

Logistics planning includes ordering and shipping spares, managing inventory, kitting and shipping C.D. kits, processing repairs, and monitoring spares quality.
The final Logistics Plan will be available July 30, 1985.

3.4.1 LOGISTICS STRATEGY - Logistics will support the RD31 at two (2) levels of Field and Repair Depots. The RD31-A (whole option) will be obtained thru Storage Systems Manufacturing (Shrewsbury). 29 class spares (FRU's) will be obtained directly from the vendor.

3.4.2 RSL/ARL -

RD31 RSL

Part No.	Description	Std. Cost	RSL	ARL	ARL Repair
RD31-A	20M Fixed Disk	$328.00	Y	Y	FSL/ Vendor
29-25527-00	Device PCB	$ 60.00	Y	N	
12-14314-00	Jumper	$ 0.18	Y	N	
90-00001-39	Stand off's	$ 0.16	Y	N	

3.4.3 KIT INFORMATION - The RD31 CD Kit will contain an RD31 and Device PCB. The Warranty Kit order number is A2-W1049-10 and the MSE Kit order number is A2-M1049-10. The Kit cost is 388.00 dollars.

3.4.4 FIELD ORDERING INFORMATION - The field should place orders for A2-W/M numbers to SR17 in Woburn. Orders should be placed at least one month prior to domestic installation of the RD31 and two months prior to a foreign installation.

The field should place replenishment orders for RSL items through the routine (cyco) order mode.

Both the RD31 and Device PCB must be returned in original type shipping container for credit of failed units. Spare Drive shipping containers are available from SR17 under part number 99-*****-**.

3.4.5 KIT/OPTION RATIO - The RD31 CD Kit will support 40 installed RD31's at a 98% LOS.

3.4.6 KIT AVAILABILITY - Warranty and MSE kits for the RD31 will be available 1 SEP 1985.

3.4.7 FRU REPAIR SOURCES AND COST - The initial repair source for the RD31 will be the Vendor. Digital will screen RD31 drives returned to SR126 to eliminate NPF. Salem NH will provide initial screening and repairs.

Part #	Repair source	Repair Cost
RD31-A	FSL/Vendor	$125

Note: Screen and non-HDA sub replacement will take place at Distributed Logistics Operations (DLO) sites. Actual HDA repair will take place at Vendor. Vendor repair charge is 120 dollars for HDA repairs. Estimated DLO repair cost is 53 dollars for non-HDA subassembly repair.

3.4.8 LOOSE PIECE ORDERING INFORMATION - Individual part orders should be placed on SR17 using the cyco order mode for routine orders. Refer to FIELD ORDERING INFORMATION for more details.

3.4.9 OPTION SWAP - One of the RD31 FRU's is the option, therefore no seperate option swap strategy is necessary.

3.4.10 CAPITAL EQUIPMENT - No capital equipment is required for the RD31. The RD31 will use Depot test equipment purchased for the RD52.

3.4.11 TEST EQUIPMENT - No additional test equipment is required for the RD31.

3.4.12 TOOLS - No special tools required.

3.4.13 LOOK-A-LIKE STRATEGY - All RD31 Drives will have a Digital label with RD31, Rev Level and Serial number affixed. Any unit without this label is likely not a DEC purchased RD31 and will not be serviced or credited under this plan.

Storage CSSE will cooperate with VES planning for service of Seagate ST225 drives to share RD31 resources and/or spares.

3.4.14 MATERIAL/FEEDBACK PLAN - The quality of spares reaching field locations will be monitored through the Defective Spares Analysis system by the Quality Management Orginization of FSL. The spares DOA rate will be generated from data captured by BIMS.

A monthly report, detailing repair activity and NPF rate at FSL screening locations will be produced for the first year after FCS. A quarterly report of returned drive repairs will be produced by the vendor during the life of this program. This information will allow Field Service to monitor drive performance and drive any necessary changes.

3.4.15 WARRANTY PLAN - RD31 drives under the Vendor Warranty which fail will be returned for repair at no cost to Digital and noted on Purchase Orders as such.

Date codes on PCB's and the date code within the RD31 serial number will be used to determine qualification for warranty repair. Purchase Orders placed for out of warranty repairs will include cost of out of warranty repairs.

3.4.16 LOGISTICS FLOW -

New material will flow from the New Build source or repair source thru SR17 and the LSC to the Branch and ultimately the Customer.

Defective material will return from the Branch to SR126 thru the LSC or from the Customer thru SR26. It will then be sent for screen in ZWO and either returned to the Vendor for repair, repaired by ZWO or returned to SR17 if NTF.

3.5 SERVICE TRAINING PLAN

3.5.1 TRAINING STRATEGY - Training on the RD31 will be generated by and integrated into host system level training. This will include disk sub-system FRU level training and hands on FRU replacement.

3.5.2 TARGET POPULATION - N/A

3.5.3 TRAINING PREREQUISITES - N/A

3.5.4 STUDENT VOLUMES - N/A

3.5.5 FIRST LEVEL TRAINING - N/A

3.5.6 SUPPORT TRAINING - Support training for the RD31 is also bundled into Host system support training. There will be a video tape made of a vendor technical presentation for the RD31. This tape may be viewed by support personnel as required and will be available during Q3 FY86.

3.5.7 TRAINING DOCUMENTATION - N/A

3.5.8 TRAINING IMPLEMENTATION - N/A

3.6 CUSTOMER TRAINING

There will be no customer training for the RD31.

3.7 CONTINUATION ENGINEERING

Storage Engineering will provide technical and material resources to assist CSSE in the ongoing support of this product. The Revision Matrix will be maintained to track RD31 changes or improvements.

3.7.1 FCO STRATEGY - There should be no FCO's on the RD31. If an FCO is necessary, it will be implemented by option swap. Required and improvement ECO's will be implemented as failing units are returned for repair and will not require an FCO.

4.0 SERVICE DELIVERY

4.1 SERVICE DELIVERY METHOD

Onsite contract and percall service for the RD31 will be delivered in the same manner as for the host system. Presently, service is provided by the Terminal Service Group in local branches for all Qbus and PC products. Customers requiring service place a call with the local branch, which dispatches a Terminal service person to the customer site.

Carry in service requires that a customer bring the failing system or option to a Carry-in Service Center, where the system/option is repaired by replacing the failing FRU.

4.2 PROBLEM MANAGEMENT SYSTEM

Problem Management of the account should remain with the Branch Manager.

The Branch may request CSSE support for outage situations thru CLD, and non-outage type problems thru PRISM.

4.3 PRE-CONTRACT INSPECTION

Prior to placing an RD31 or RD31 subsystem under contract, the branch must ensure that the option is complete, functional and up to minimum acceptable Revision levels.

Compare the RD31 Revision (on the RD31 Label) and the Host Adaptor Revision with the Revision Matrices for the RD31 and Host System. Visually inspect the subsystem for physical damage to components, cables and connectors. Run the host diagnostic exerciser one pass and observe that the customers data can be written and recovered by starting the operating system and verifying user directories.

4.4 OPTION LEVEL/SWAP STRATEGY

Option Swap is implemented in the level 1 maintenance strategy. No additional Option swap strategy is necessary.

4.5 ESCALATION PROCEDURES

Technical problems which cannot be repaired by replacing RD31 and host adaptor should be escalated using Host Support escallation process. For the Ultra low cost Machines (ULCM's) the problem is escalated to the CSC's. In the event CSC cannot resolve the problem, it will be escalated to CSSE. Ultimate technical problem resolution rests with CSSE.

Outage situations which require Corporate involvement should be logged thru CLD. Non-outage situations requiring Corporate involvement for resolution should be entered on PRISM.

4.6 REVISION MANAGEMENT

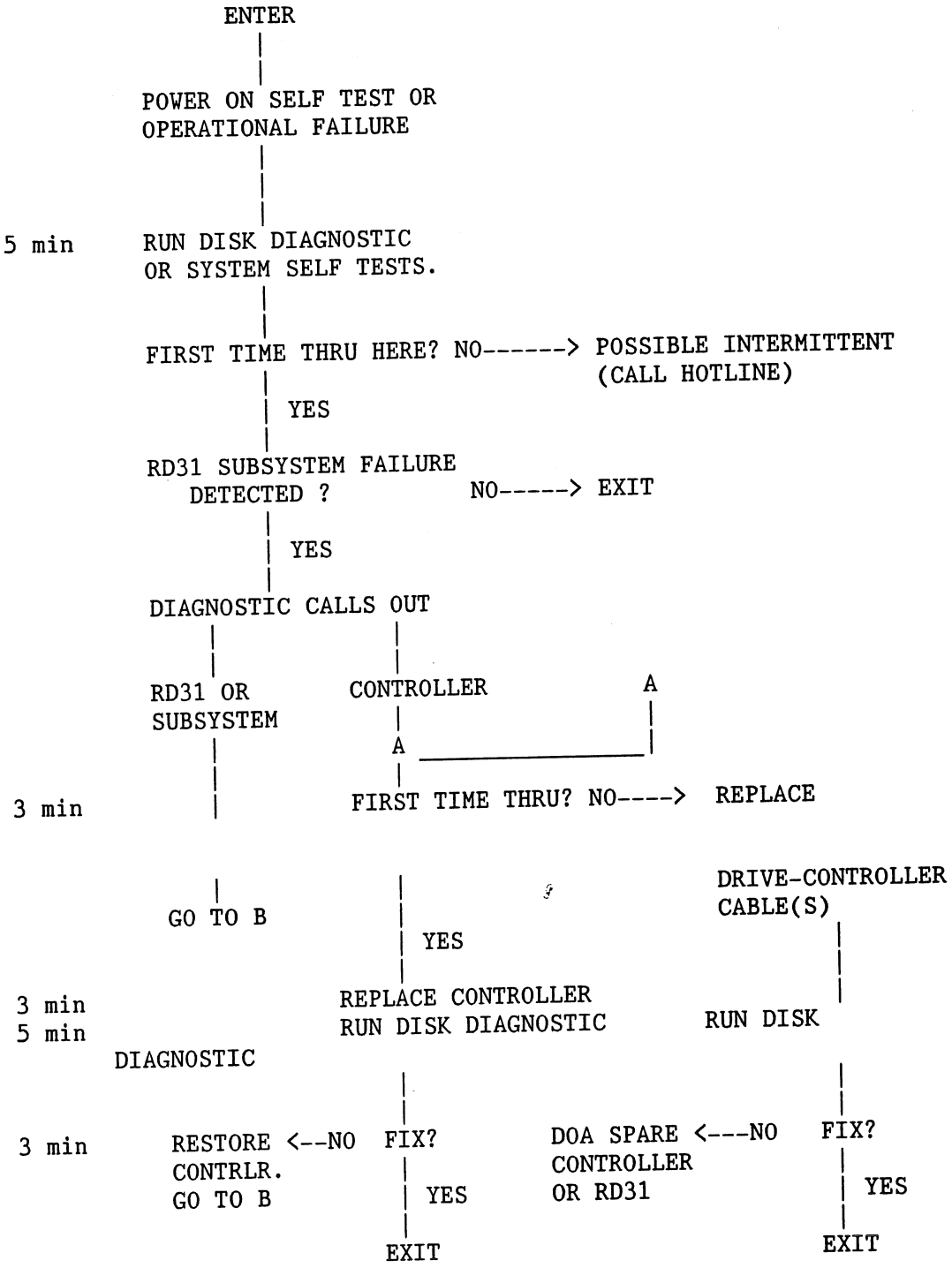
All changes to the RD31 will require Engineering, Manufacturing and Customer Services signoff. Any change which affects form fit or function of the RD31 or any FRU will be documented in the Revision Matrix.

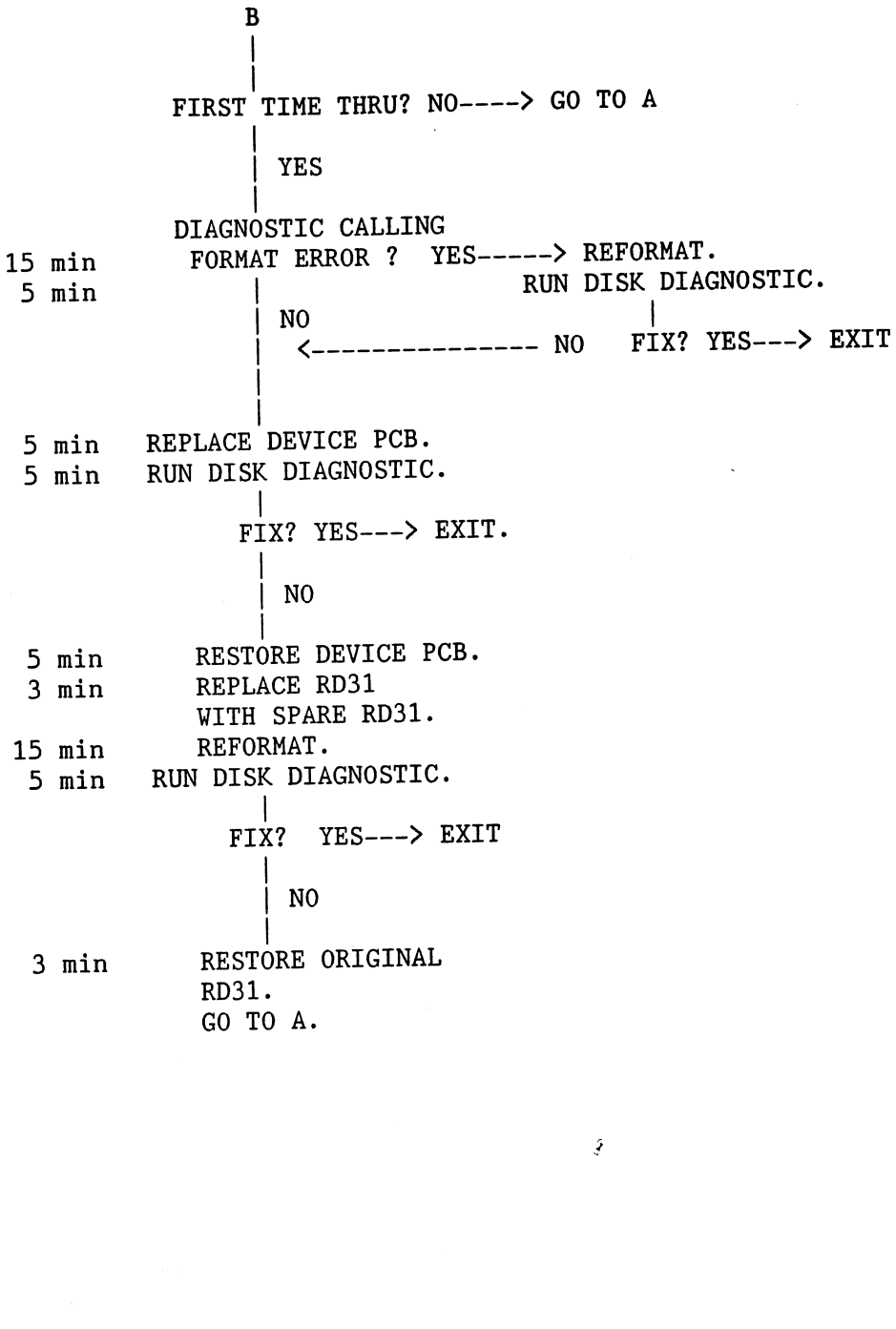
5.0 OPERATIONS AND ADMINISTRATION

RD31-A will utilize the same support structure as the Host System No changes in support strategy are requested by this plan

6.0 MISCELLANEOUS ATTACHMENTS

6.1 RD31 SUBSYSTEM REPAIR FLOW DIAGRAM




B
FIRST TIME THRU? NO----> GO TO A
YES
DIAGNOSTIC CALLING
15 min
FORMAT ERROR ? YES-----> REFORMAT.
5 min
RUN DISK DIAGNOSTIC.
NO
<---------- NO
FIX? YES---> EXIT
5 min
REPLACE DEVICE PCB.
5 min
RUN DISK DIAGNOSTIC.
FIX? YES---> EXIT.
NO
5 min
RESTORE DEVICE PCB.
3 min
REPLACE RD31
WITH SPARE RD31.
15 min
REFORMAT.
5 min
RUN DISK DIAGNOSTIC.
FIX? YES---> EXIT
NO
3 min
RESTORE ORIGINAL
RD31.
GO TO A.

6.2 RD31-A Site Preparation data sheet.

DESCRIPTION	OPTION DESIGNATOR
20 Megabytes 5 1/4" Half height fixed Winchester Disk Drive	RD31-A

MECHANICAL

MOUNTING CODE	WEIGHT LB	WEIGHT KG	HEIGHT IN	HEIGHT CM	WIDTH IN	WIDTH CM	DEPTH IN	DEPTH CM	CAB TYPE (IF USED)
MOD	2.8	1.3	1.63	4.14	5.75	14.6	8.0	20.3	N/A

POWER (AC)

AC VOLTAGE NOMINAL	AC VOLTAGE TOLERANCE	FREQUENCY & TOLERANCE	PHASES(S)	STEADY-STATE CURRENT (RMS)	POWER CONSUMPTION
N/A	N/A	N/A	N/A	N/A	N/A

POWER (AC)

PLUG TYPE (NEMA NO)	POWER CORD LENGTH	INTERRUPT TOLERANCE	APPARENT POWER (kVA)
N/A	N/A	N/A	N/A

POWER (AC)

INRUSH CURRENT	SURGE CURRENT	SURGE DURATION
N/A	N/A	N/A

POWER (DC)

+5V	-5V	+15V	-15V	+20V	-20V	+12V	-12V	DATA CABLE LENGTH (STD)
YES	NO	NO	NO	NO	NO	YES	NO	

ENVIRONMENT (DEVICE)

TEMPERATURE		RELATIVE HUMIDITY		RATE OF CHANGE		HEAT DISSIPATION	
OPERATING	STORAGE	OPERATING	STORAGE	TEMP	HUMIDITY	BTU/HR	
50-122 F 10-50 C	-40_140F -40_60 C	8% to 80%	5 to 90%	18 F/HR 10 C/HR	NonCond-ensing		

ENVIRONMENT (DEVICE)

ALTITUDE (MAX)		AIR VOLUME (AT INLET)		AIR QUALITY
OPERATING	STORAGE	FT3/MIN	M3/SEC	PARTICLE COUNT (MAX)
-1000 to 10000 FT 3.03 KM	-1000 to 30000 FT 9.1 KM	N/A	N/A	N/A

6.3 ADD-ON INSTALLATION COST FOR RD31-A

Persons Required for Installation:	1.00
Customer Introduction:	0.20
Verify System Operation:	0.15
Unpackaging and Inspection:	0.05
Reconfiguring (If Required):	0.00
Installation:	0.15
Option/System Diagnostics:	0.20
Software Checkout:	0.20
System Turnover:	0.05
Total Manhours Expended:	1.00
Dead-On-Arrival (D.O.A.) Percentage:	2.50

The following are the same values used in calculating the basic monthly charge:

Labor Plus Overhead Rate:	94.00
Support Ratio:	5.00
Travel Time:	0.70
Mean Time to Repair:	1.00
Material Expense per Repair:	125.00

Installation Cost	$ 94.00
Problem Repair Cost	27.10
Travel Cost	65.80 (1 Trip (s))
Total Cost	$ 186.90

****
* *
* SUGGESTED CHARGE $266.99 *
* *
****

FIELD IMPLEMENTATION PLAN

ADDENDUM

for the

RD31-ON-RAINBOW-100

REV 1

SEPT 3, 1985

Larry E. Griswold
Rainbow
LJ02/H11
DTN: 282
RAINBO::

FIELD IMPLEMENTATION PLAN, REV 1

RD31-ON-RAINBOW-100

INTRODUCTION

This document is a companion document to:

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+---------------------------------------+
!  Field Service Product Plan           !
!  for the RD31-A                       !
!                                       !
!  Prerelease 1.0                       !
!                                       !
!  by  Dick Frost and Raghu Minisandram !
+---------------------------------------+
```

This FIP will present the information necessary to understand the implementation of the RD31 disk drive on the Rainbow 100 series of computers. Both this document and the RD31-A Field Service Product Plan should be read to gain a full understanding of the RD31 storage product. This FIP will contain ONLY that information that is incremental, or differs from, the RD31-A Field Service Product Plan.

CUSTOMER SERVICES TEAM

```
!    RD31 ON RAINBOW CST DISTRIBUTION
!
RAINBO::BABINGTON       ! Jeff    Babington CSSE interest
RAINBO::TEBO  ! Gerry  Tebo                 CSSE interest
RAINBO::GRISWOLD        ! Larry  Griswold  H/W  CSSE
RAINBO::JOHNSON         ! Wes Johnson                H/W  CSSE
RAINBO::WHEELOCK        ! Karen Wheelock   S/W  CSSE
RAINBO::NEALAND         ! Greg    Nealand   Support CSSE
RAINBO::BONNEY! Arthur  Bonney    Support CSSE
RAINBO::FAIRCHILD       ! John Fairchild   Support CSSE
RAINBO::STAUPE! Dale    Staupe            Documentation - H/W
RAINBO::NILES  ! Kitty Niles              Documentation - H/W
PSGVAX::GURSKY! Dave    Gursky            Fld. Svc. Prod. Mgt.
AKOV01::HAYES  ! Art  Hayes               GIA
AKOV01::CARROLL         ! Trisha  Carroll  GIA
GVA01::ACCESS  ! Harry  Fleury     EUR
GVA04::MEIER   ! Hans-Juergen      Meier     EUR
PSGVAX::ROGERS! Dave    Rogers            Training
FSLENG::SARASIN         ! Carol  Sarasin   Logistics
GRAMPS::MINISANDRAM! Raghu Minisandram    Storage CSSE
PEACHS::BLAIR  ! Sam  Blair               CSC Atlanta
PEACHS::DRYE   ! Richard  Drye     CSC Atlanta
PEACHS::PHILLIPS        ! Debbie Phillips  CSC Atlanta
```

3.0 SERVICE OPERATIONS PLAN

3.1 PRODUCT DESCRIPTION

The RD31-on-Rainbow-100 (hereinafter called the RD31R, for convenience) is a 20 mb (half-height) plug-in replacement for the RD51 or RD50. The same slides, controller, and cables are used. The hard disk diagnostic, (known as the "Winchester Utility Program"), h been upgraded to a new version (version 3) and renamed to "RAINBOW HARD DISK UTILITY PROGRAM".

The option numbers for the drive and controller kits (such as RCD51-BB) have been changed to include the RD31 in the title (RCD31-BB). System designations (such as PC100+) have not changed. See appendix A for a complete description of the changeover philosophy and the order number matrix.

3.1.1 SCHEDULE

PAC approved:	27	August 1985
DMT complete:	16	September 1985
System Level Test complete:	16	September 1985
Announce:	27	September 1985
Price effective:	1	October 1985
FRS:	1	October 1985

3.1.2 VOLUMES

* Number of RD31s sold on Rainbow 100s is expected to be 3300.

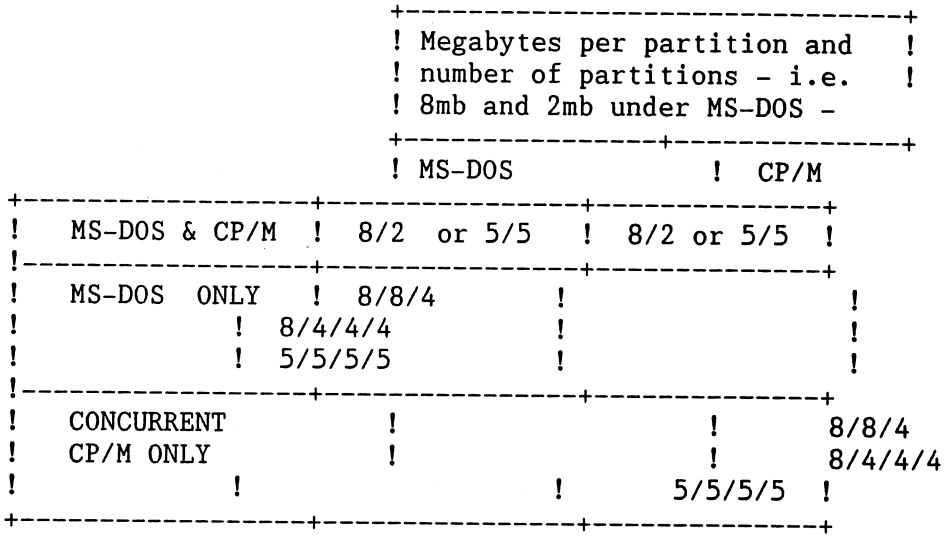
* This is for FY 1985 only. No Rainbows are forecast for FY 1986.

* No further splits of options vs. systems, or by geography are available at this time.

3.1.3 FUNCTIONAL DESCRIPTION

The RD31 has a capacity of 20mb (formatted) and a 22% faster access time. It is .3 Bels noisier than the RD51, is half-height, and has no bezel. (The filler plate MUST be installed in the Rainbow cover.) The RCD kits include (among other things) a controller (unchanged), a cable (unchanged), and a diagnostic/utility disk, entitled "Rainbow Hard disk Utility Program."

The Rainbow Hard Disk Utility automatically checks to see which drive it is running on, (the RD50, RD51, RD31), and adjusts the menus and initialization to suit. The new version of the Utility Program has been modified to provide a larger choice of partitions. Those choices are:



Note that there is no longer a "CP/M only" partition. This is because an inherent characteristic of CP/M will not allow it to address over 10 mb. Concurrent CP/M does not have this limitation.

The Rainbow Hard Disk Utility initializes the hard disk in MS-DOS format, as opposed to the previous CP/M. This is because it was discovered that most customers preferred MS-DOS and had to re-partition the drive after initialization. Now the drive is initialized the way that most people want it.

The Hard Disk Utility diskette also contains a patch program, used to patch the MS-DOS versions 2.11 or 2.11-1 operating systems. The patch corrects when an 8mb warning limit message appears. The message* is supposed to appear as the user nears 8mb of storage on the hard disk, but instead appears at random times. The message is not a problem with MS-DOS Ver 2.05.

To run the program, the user places the MS-DOS operating system diskette in drive A, the WUP in drive B, and types "RDCPM READ B:DOSMOD.COM A:". Correct installation is checked by typing "DOSMOD A:". The operating system will then read the Dosmod file, which checks itself and reports.

Any version of MS-DOS or CP/M 86/80 that supports the RD51 supports the RD31.

```
! *  The message reads:  "Warning: Only 8 megbytes of the hard disk !
!      is usable.  Refer to the MS-DOS installation instructions."      !
+-----------------------------------------------------------------------+
```

3.1.4 SERVICE FEATURES

The hard disk diagnostics run the same as before, with the same error messages.

The "device board" (read/write board) is removable so that faults on that board will not require a drive swap.

The hard disk diagnostic contains the MS-DOS patch mentioned above, for convenience.

The standoffs between the drive and the skid plate are threaded on both ends so that they do not fall off (and get lost) when the skid plate is removed.

3.2 MAINTENANCE PHILOSOPHY AND RAMP FEATURES

The Maintenance Philosophy of the RD31R is FRU replacement. The FRUs are: The drive itself; the device PCB; the controller; and the hard disk cable. Replacement of the drive itself should be attempted last, to preserve the customer's data.

3.2.1 MAINTENANCE GOALS

MTBF (DRIVE) 20,000 power on hours
MTBF (CONTROLLER) 50,000 power on hours
MTBF (SUBSYSTEM) 14,200 power on hours

MTTR - 1 hour
MTTI - 1 hour
DOA - Not to exceed 2.5%

Components of MTTR;

Activity	Time	# Times/call	Time/call
Customer Intro	15 min	1.0	15.0 min
Subsystem Diag	5 min	3.0	15.0 min
Format RD31	15 min	0.25	3.75 min
R-R Controller	7 min	0.4	2.8 min
R-R RD31 PCB	5 min	0.5	2.5 min
R-R RD31	3 min	0.15	0.45 min
R-R Cable	3 min	0.05	0.15 min
Call Wrap-up	15 min	1.0	15.0 min
		Total	54.65 min

3.2.2 DOCUMENTATION

The following documentation will be provided:

RD31	Technical manual	EK-RD31A-TD
RD31	FS MPS	MP-(TBS)
RD31	IPB	ED-RD31A-IP
RD31	Revision Management	(part of RD31 FMPS)
Rainbow 100 Pocket Service Guide Addendum		EK-PC100-PS-CN3
HARD DISK INSTALL. G.		AZ-GK75A-TV
Rainbow IPB update		EK-SB100-1P-005(?)

3.2.3 PART NUMBERS

Jumper block	12-14314-00
Device PCB	29-25527-00
Standoff	90-00001-39
Controller	54-16019
Disk cable	17-00427-01
Cover plate	74-26788-01
Cover plate screws	90-06020-02

3.2.4 DIAGNOSTICS

Diagnostics will run just as they have in the past. The slight differences will be explained in the Pocket Service Guide Addendum.

3.2.5 TRAINING

Training for the RD31R will consist of the Pocket Service Guide Addendum.

APPENDIX A - ORDER NUMBERS

+-+-+-+-+-+-+
|d|i|g|i|t|a|l|
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INTEROFFICE MEMORANDUM

To: Larry Griswold, LJ02/H11

From: Thomas Zajac
Dept: PCSG Product Mgmt.
Loc: LJ02/I3
DTN: 282-2461
Date: 21-Aug-85

Subject: RD31-on-PC100 Part Number "BOM's

RD31-ON-PC100 PRODUCT STRATEGY:

The RD31 20 Megabyte hard disk will be presented as a "significant" enhancement to the PC100 product offerings. Pricing will remain as it exists currently; the customer will be getting twice as much hard disk storage capacity for the same price. Existing RD51 10MB hard disk products will be obsoleted (unorderable) upon announcement. Upon announcement, existing RD51 10MB based product orders will be converted to the new RD31 20MB variations.

The RD51 10MB disk will simply be replaced in all PC100 product offerings by the RD31 20MB disk on a direct one for one basis. Existing CP/M and MSDOS operating systems that support hard disks are operable with the RD31 20MB hard disk (MSDOS necessitates customer installation of a simple patch). Only the Wini Utility program will need to be modified and re-released to add the 20 MB RD31 capability. The existing PC100 hard disk controller module and cable operate with the RD31 20MB hard disk without modification.

RD31-ON-PC100 PHASE-OVER STRATEGY

CURRENT PRODUCT OFFERING:	CURRENT PRODUCTS TO BE OBSOLETED IMMEDIATELY UPON ANNOUNCEMENT:	CURRENT PRODUCTS POSITIONED TO DEPLETE INVENTORY AND THEN DIE OUT	CURRENT PRODUCTS REMAINING AS VIABLE OFFERING:	NEW PRODUCTS
PC100+(RD51)	--> PC100+(RD51)			PC100+(RD31)
PC100B		----------> PC100B		
PC100A		----------> PC100A		
RDC50-BB		----------> RCD50-BB		
RCD51-BA	------> RCD51-BA			RCD31-BA
RCD51-BB	------> RCD51-BB			RCD31-BB
PC190(RD51)	---> PC190(RD51)			PC190(RD31)
				RD31-BA (DRIVE ONLY)

PRODUCT OPTION NUMBER DESIGNATIONS:

As with the previous offering, there will be two 20MB hard disk upgrade options, one for the PC100A and one for the PC100B. In addition, a drive-only upgrade option will be offered for those users who would want to upgrade their existing 5MB or 10MB PC100 systems. The old RD51/10MB upgrade options will be deleted. The new option numbers are:

New Opt No. and Pricing	DESCRIPTION		
RCD31-BA	20MB STORAGE UPGRADE OPTION FOR RAINBOW 100B. INCLUDES:		
	20MB HARD DISK (RD31-A)		
	! HARD DISK CONTROLLER	54-16019 !	
	! HARD DISK CABLE	17-00427-01 !	(PC1XX-DA)
	! STANDOFF (board)	74-29164-01 !	
	RAINBOW UTILITY DISK	BL- (TBS)	
($2400)	RD31 INSTALLATION GUIDE	AZ-GK75A-TV	
	FRONT COVER PLATE	74-26788-01	
	COVER PLATE SCREWS	90-06020-02	
RCD31-BB	20MB STORAGE UPGRADE OPTION FOR RAINBOW 100A. INCLUDES:		
	20MB HARD DISK (RD31-A)		
	! HARD DISK CONTROLLER	54-16019 !	
	! HARD DISK CABLE	17-00427-01 !	(PC1XX-DA)
	! STANDOFF	74-29164-01 !	
	RAINBOW UTILITY DISK	BL- (TBS)	
($2595)	RD31 INSTALLATION GUIDE	AZ-GK75A-TV	
	FRONT COVER PLATE	74-26788-01	
	COVER PLATE SCREWS	90-06020-02	
	H7842D POWER SUPPLY		
	4" POWER CABLE	17-00318-02	
	PCB RESTRAINT	74-28702-02	

RD31-BA	20MB STORAGE DRIVE-ONLY UPGRADE OPTION FOR RAINBOW 100A OR 100B, 20MB HARD DISK (RD31-A), WINI UTILITY PROGRAM, RD31 WINI INSTALLATION MANUAL. NOTE: DOES NOT INCLUDE WINI CONTROLLER MODULE OR CABLE.	$1500

The PC100+ with RD51/10MB hard disk will be replaced with a RD31/20MB hard disk version. This new version will still be called the PC100+. Pricing will remain as it exists today. The old version will be obsoleted. The new option numbers are:

NEW OPT NO.	DESCRIPTION	PRICING	OLD OPT. NO.
PC100-R2	PC100-B2 + RCD31-BA, 120V (ENGLISH, GERMAN, FRENCH)	$4315	PC100-P2
PC100-R3	PC100-B3 + RCD31-BA, 220-240V (ENGLISH, GERMAN, FRENCH)	$4315	PC100-P3
PC100-R4	PC100-B4 + RCD31-BA, 220-240V (ENGLISH, DUTCH, FRENCH)	$4315	PC100-P4
PC100-R5	PC100-B5 + RCD31-BA, 220-240V (ENGLISH, FINNISH, SWEDISH)	$4315	PC100-P5
PC100-R6	PC100-B6 + RCD31-BA, 220-240V (ENGLISH, DANISH, NORWEGIAN)	$4315	PC100-P6
PC100-R7	PC100-B7 + RCD31-BA, 220-240V (ENGLISH, SPANISH, ITALIAN)	$4315	PC100-P7

The PC190 with RD51/10MB hard disk will be replaced with a RD31/20MB hard disk version. This new version will still be called the PC190. Pricing will remain as it exists today. The old version will be obsoleted. The new option numbers are:

New Opt No.	DESCRIPTION	PRICING	Old Opt. No
PC19R-AA	PC190-B2, PC1K1-FA (WPS KEYBOARD, VR201-A (WHITE MONITOR), PC1XX-AD (256KB), PC1XX-AZ(256KB), RD31-BD, PC1XX-DA, PC1XX-FB (TECH CHAR ROMS), QV062-A3 MS/DOS V2.11, QVA28-A3 ROWS, QVA01-A3 WPS+, QUANTITY 1-9, 120 V	$6495 (QTY 1-9) (QTY 1-9)	PC19P-AA
PC19R-AC	PC19R-AA EXCEPT QUANTITY 10-24, 120 V	$5900 (QTY 10-24)	PC19P-A
PC19R-AD	PC19R-AA EXCEPT QUANTITY 25-99, 120 V	$5450 (QTY 25-99)	PC19P-A
PC19R-AE	PC19R-AA EXCEPT QUANTITY 100+, 120 V	$4990 (QTY 100+)	PC19P-A
PC19R-AJ	PC19R-AA EXCEPT VR201-B(GREEN), QUANTITY 1 - 9, 120 V	$6495 (QTY 1-9)	PC19P-A
PC19R-AL	PC19R-AJ EXCEPT QUANTITY 10-24, 120 V	$5900 (QTY 10-24)	PC19P-A
PC19R-AM	PC19R-AJ EXCEPT QUANTITY 25-99, 120 V	$5450 (QTY 25-99)	PC19P-A
PC19R-AN	PC19R-AJ EXCEPT QUANTITY 100+, 120 V	$4990 (QTY 100+)	PC19P-A
PC19R-AS	PC19R-AA EXCEPT VR201-C(AMBER), QUANTITY 1 - 9, 120 V	$6495 (QTY 1-9)	PC19P-A
PC19R-AU	PC19R-AS EXCEPT QUANTITY 10-24, 120 V	$5900 (QTY 10-24)	PC19P-A
PC19R-AV	PC19R-AS EXCEPT QUANTITY 25-99, 120 V	$5450 (QTY 25-99)	PC19P-A
PC19R-AW	PC19R-AS EXCEPT QUANTITY 100+, 120 V	$4990 (QTY 100+)	PC19P-A

Posted: Mon 16-Sep-1985 11:03
To: @DIST1