Carlos Dansellas Carlos RK05 Maintenance Tips

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- B. Fitzgerald
- M. Sloan
- D. Jensen
- D. Caruso
- L. Condon

- 1. Disk Pack
- 1.1 Pack Handling Tips
 - 1. Since the pack is not a sealed unit it is very vulnerable to dirt - care must be taken to keep it clean. Always store the pack in the plastic bag when not in use. Smoke particles, fingerprint smudges or specs of dust can cause head crashes and catastrophic destruction of the heads and disk surface.
 - 2. Hold the pack by the handle only! If you don't you can: 1. break off the air vent door scratch the vent door against the disk surface 2 .

 - 3. Get fingerprints and dirt on the disk surface
 - Get fingerprints and dirt on the spindle hub 4.
 - 3. Keep the sector/index slots and the spindle mating surface clean. A very small amount of dirt can cause large runout errors. Dirt on the sector slots can cause very strange system problems.
 - 4. Be sure that the plastic retainer button on the pack access door is lifted out of the way when the door is opened. Do not let the button contact the disk hub when the disk is spinning.
 - 5. Never rotate the disk inside the cartridge unless the cartridge is inserted in a drive.
- 1.2 How to Recognize Bad Packs A Pack is bad if:

- 1. Oxide continuously builds up on newly cleaned heads.
- 2. The pack will not transfer data
- 3. Bare aluminum is showing through the oxide coating.
- 4. The rivets on the air vent door are broken.
- 5. The retainer button is chewed up and plastic shavings are falling into the pack. Do NOT use bad packs. Turn them into the stockroom for refurbishing.

1.3 Pack Seating

There are three types of plastic housings for RK05 disk packs two are all-white and the other is two-tone (gray shell and white access door). The three kinds of packs are made from different plastics and have slightly different dimensions. In order to make the drive compatible with all types, four ECO's were made to the RK05 recently. All four ECO's must be installed in any RK05 shipped from DEC. These ECO's can be recognized as follows: ECO #37 adds a new Duck Bill (stamped Rev C) and adds two new

cartridge support posts (stamped Rev B).

ECO's #36 and #41 add a pair of rubber sleeves to the access door opener.

ECO #39 adds a pair of stronger springs to the door opener. Check all RK05's for these ECO's and be sure they are all installed before operating the drive in a system.

After these ECO's have been installed, do these two things:

1. Insert all types of cartridges available in the drive to be sure that they fit, and that there are no other cartridge receiver alignment problems.

2. Check head/sector alignment using the DEC Alignment Pack.

The cartridge receiver is aligned correctly when there are six points of contact with the pack and three clearance points. The six points of contact are:

1. Two thin rails should touch evenly all along the length of the cartridge.

2. Two cartridge posts in front of drive.

3. Door opener bail.

4. Spring at center top of cartridge.

5. Duckbill (lower slot).

6. Air Duct.

The three clearance points are:

1. Two fat rails on top of cartridge.

2. The four crosspoints on underside of cartridge.

3. The pivot posts and receiver hinge bail.

The position of the pivot posts determines how the top rails ride on the cartridge and also determines the bottom clearances of the four crosspoints and the underside of the cartridge. When tightening these posts it will be necessary to hold their position with an open face wrench while securing the bottom nut with a $\frac{1}{2}$ " socket wrench.

One way to check alignment is to insert a pack at a slightly cocked angle. The receiver should guide the pack onto the posts as the door is closing.

If a pack will not seat on the left post, make sure the top rails of the receiver are not pushing the pack away.

NOTE: Remember that the receiver does not hold the cartridge but is only a guide for it. The pack is actually positioned by the two cartridge posts and the lower lip of the duckbill. The pack should not be resting on, nor be tightly squeezed by, the cartridge receiver. The pack should be able to slide easily.

If the receiver is out of adjustment, use the new alignment fixture and procedure (available from the Quality Assurance Lab) to readjust it.

2. Head/Disk Interference

NOTE: The information in this section is provided as a guide for recognizing and resolving head crashes. However, disassembly, inspection or cleaning of packs may be done ONLY by the Quality Assurance Lab.

2.1 Introduction:

Head/Disk Interference, or HDI (frequently referred to as a head crash) is a result of head contact with the disk surface. Most commonly it is caused by a build up of dirt on the read/write head or a foreign particle in the air stream between the head and disk surface. If the problem is not TOTALLY CORRECTED, it has a propagation effect from drive to drive through pack after pack.

2.2 Recognition:

Head/Disk Interference can be recognized by one or more of the following:

- A. Repetitive hard read errors. Because of adverse propagation effect, do not move any pack with this kind of error to another drive. (DO NOT ALLOW USE OF THIS PACK OR DRIVE UNTIL THE PROBLEM IS FULLY RESOLVED). Investigate further for head/disk interference.
- B. Uncommon noise from the disk as characterized by audible tinkling sound. The noise will progress to a screech. A screech indicates complete destruction of the heads and pack. However, do not confuse this noise with the squeal of the spindle grounding brushes.

A slight tinkling when initially loading heads is allowed if it goes away in two or three seconds.

C. Disk surface damage (to be evaluated by Q A Lab only).

- A pack with any of the following conditions must be replaced: 1. Black deposits or smears that cannot be totally removed with alcohol and Kimwipes.
- 2. A full circle scratch or any other scratch where the aluminum substrate is visible. NOTE: The disk edge may have aluminum visible and cause no problem.
- 3. Multiple adjacent concentric scratches regardless of length check the heads.
- D. Read/Write Head Damage
 - Dark brown or black streaks (burned oxide and/or aluminum) anywhere on the white ceramic head. Clean the head. If the head again crashes on a known good, clean disk, replace the head.
 - 2. Discolored epoxy (normally white) at the R/W element which cannot be cleaned off with alcohol.
 - 3. Other. Bent or broken flexures can result from prolonged HDI or mishandling. Replace any head with this type of damage. DO NOT ATTEMPT REPAIR. The ceramic head gimbal spring is adjusted to <u>+</u> 1 degree landing attitude. If this attitude is disturbed in any way, the head will consistently crash when loaded on the disk.

NOTE: A pack might be reusable if it has the following conditions - but only after it has been thoroughly cleaned.

- 1. Imbedded particle with tapered trailing scratch (comet tail).
- 2. Circular head loading marks at the outer radius of the disk.
- 3. Many small (less than one inch) concentric polish marks all over the disk surface.

The ultimate test of a good pack is one that does <u>not</u> deposit oxide on the head and <u>does</u> transfer data.

2.3 Recovery:

- A. Inspect head and disk packs. Determine which heads and surfaces were involved in the crash. Check all heads and TOTAL pack library for possible spreading of a general crash problem.
- B. Replace all damaged heads and disk pack.
- C. Clean remaining heads.
 - 1. If contamination cannot be removed, the head must be replaced.
 - 2. Check head loading for correct operation by setting drive to READY. Do NOT load by hand since that may cause the heads to crash.
- D. Check disk drive air filters for contamination. Replace if necessary.
- E. Clean inside of disk drive watching particularly for filings, shaved metal, plastic particles, etc.
- F. Mount a known good pack (not the Alignment Pack) on the drive. Turn power on and permit to come READY. Turn power off and check for oxide buildup on heads or other signs of head/disk interference. If satisfactory, turn power back on and run for about 15 minutes. Run the FORMAT program and see if the drive will transfer data.
- G. Mount the DEC Alignment Pack. Check and align all heads.
- H. If original pack on which the crash occured does not appear damaged, mount it. Turn on power and permit to come READY. Turn power off and check for oxide buildup on the heads.
- I. Check the pack and drive thoroughly using the disk pack diagnostics. It will be necessary to reformat the pack. Be sure to run Disk Data for at least 15 minutes.
- J. Inspect heads for oxide after 12 hours of run time. If oxide appears, determine cause and correct.

NOTE: Unless all damaged packs and all damaged heads have been removed from the machines involved and the actual cause of the HDI is determined and corrected, the problem WILL reoccur in a short period of time.

2.4 Prevention:

A. Proper cleaning of R/W heads.

- B. Insure air filtering system has no leaks and filters are clean. A dirty filter will cause contamination build up and excessive heating of the drive unit.
- C. Insure no foreign particles are being generated within a drive due to interference between disk and cartridge or between sector slots and index/sector transducer.
- D. Careful handling of disk packs. Bumping of disk packs against file cabinets or drive front covers can bend the sector disks.
- E. Disk packs must be kept clean. Always place the pack in a plastic bag whenever the pack is taken out of a drive.

The best way to reduce the number of head crashes is to keep all equipment clean - the packs, the heads and the interior of the drive. If a crash occurs, don't spread it around. Stop using both the pack and the drive on which it occured until the problem is resolved.

3. Head Alignment

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3.1 Head Alignment Tips:

There are a number of tolerances in the mechanical circle between the pack which rides on a spindle, which is mounted on the base casting, which in turn holds the linear transducer, which relates to the voice coil assembly, which in turn holds the heads, which determines the area of the cartridge being read. Head and sector alignments become the major adjustments in determining the final position of the head relative to the disk surface.

A few points on head alignment should be noted:

- 1. Heads should always be clean before alignment is started.
 - A. This can be done with cleaning kit supplied, but only wrap the Texwipe around the wand one time - more than once may cause damage to head because it will be too thick.
 - B. Support the little box on the head very gently with your finger to avoid damage to gimbal when cleaning.
 - C. If scrubbing action is required to remove a dirty spot leave the Texwipe protruding beyond the tip of the wand so that a corner of the wand can be used for gentle scrubbing.

- D. It is a good idea to go over the head with a clean Kimwipe as soon as it is cleaned to remove liquid before it dries and forms a film on the head.
- 2. When doing head alignments or adjustments, hold the head assembly while releasing the servo switch. It was found that the switch may inject a noise spike into the servo system causing the head to fly forward at full speed. Light pressure on the assembly when releasing the switch will prevent this. It was also noted that if you have fat fingers, you can touch the I.C. adjacent to the switch and cause the same action - BE CAREFUL.
- 3. If it becomes necessary to load the heads on one another, place a piece of paper between the heads to prevent the R/W elements from grinding against each other.
- 4. Head locking screws have a nylock insert which prevents their moving once tightened. They are reusable up to about a dozen times. When initially inserting the screws, run the nylock screw through the head clamping hole completely (without a head in) to cut the nylock. This will allow predictable torquing forces when clamping the screw to the head with the torque wrench.
- 5. Head adjustment screws should be backed off after locking so not to apply forward pressure to the head assembly.
- 6. Insure track indicator scale is aligned.
- 7. When heads are realigned or replaced, note if there are any grooves or indentations in the clamping area. Heads that have grooves in this area must be replaced.

NOTE: The grooves can be caused whenever head alignment is done without the proper torque wrench.

8. It has been suspected that some head alignment problems on drives below serial number 7650 may have been due to the positioner head moving slightly during shipment. A special torque wrench (available from the Quality Assurance Lab) is now being used to tighten the hold down bolts sufficiently. If a drive will not stay in alignment, it may be necessary to tighten these bolts.

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This wrench must be set to required torque - 65 in-pounds. When the set torque is reached, the wrench clicks and moves freely through a few degrees of arc. It is then <u>possible</u> to continue applying the torque in <u>excess</u> of the set torque. <u>Don't do it</u>. Release the torque wrench and it will automatically reset itself to click again at the set torque. Don't over torque.

9. It was found recently that the plenum cover screws have a drastic effect on head/sector alignment. If any plenum cover screw is loosened or tightened, it changes the stress pattern in the base plate and may throw the alignment out of spec. Any time a plenum cover screw is touched, check the head/sector alignment and readjust if necessary.

3.2 Head Alignment Procedure

All head alignments must be made with the new DEC Alignment Pack (marked RK05-AC). The procedure for using this pack is described in A-SP-RK05- \emptyset -20. Important points to know about the head alignment procedure are:

- 1. Run the Alignment Pack for 30 minutes to temperature stabilize it before performing the alignment.
- 2. Dirt on spindle disk mating surface can cause excessive runout problems and should be cleaned and rechecked prior to starting alignment.
- 3. Alignment should only be done in temperature ranges of 60-80°F.
- 4. Always use the head alignment torque wrench.
- 5. Alignment should not be touched unless greater than 15% error is seen using DEC Alignment Pack.
- 6. Index timing pulse can be either polarity since the winding in the head may be either way.
- 7. Index/sector adjustment is to be done so the <u>average of both is</u> 70 usec. Not so that either one falls within the 60 to 80 usec range. 60 and 66 is not acceptable and 70 and 76 is not acceptable. 73 and 67 are acceptable.
- 8. Care must be taken when doing head alignment not to exert excessive force on the positioner assembly when tightening or adjusting head screws. It is possible to damage the bearings with too much force.
- 9. Triggering for IBM pack was on INDEX. For the DEC pack it is on the SECTOR. Use of SECTOR with DEC Alignment Pack allows for average alignment of all sectors. Trigger on INDEX for DEC Alignment Pack when checking runout only.

- 10. Handle the alignment pack with care.
- 11. Always remove the shipping brackets before operating or aligning the drive.
- 12. If the sector timing adjustment cannot be made because the heads are too far out, replace the heads, do not bend them. Bending of heads is not allowed for any reason whatsoever.
- 3.3 Cylinder Address Conversion Table.

The cylinder addresses listed in the alignment procedure and maintenance manual are in decimal notation. Here's a decimal to octal conversion table for the most commonly used cylinders. Always use the octal numbers in conjunction with the diagnostic.

	Track Address	
Decimal		Octal
0		0
4		4
64		100
85	and an	125
105		151
125		175
202		312

3.4 PDP-11 Oscillating Seek Program.

The PDP-11 program listed below is a handy aid when checking the servo signals or performing head alignment. After toggling in the program and patching the drive unit number, the program will cause the drive to seek back and forth between the cylinder addresses set in the left and right bytes of the switch register. Setting the same cylinder address in both bytes will make the drive stay on that cylinder.

Operating Instructions. 1. Toggle program starting at location 1000.

2. Toggle registers RØ-R6.

3. Toggle the drive unit number into bits (15-13) of location 1032: XX0000 will select drive XX, surface Ø XX0020 will select drive XX, surface 1

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- 4. If error checking or other changes are to be added, change the NOP's in location 1050 and 1052 to jump to (ADDITIONAL) code address. Jump back to location 1054 at the end of added code.
- 5. Load address 1000; start.
- 6. Set desired cylinder addresses (0-312) into the LEFT and RIGHT BYTES of the switch register.
- 7. Leave ZEROES in the LEFT switch register BYTE while setting up the G-938 card. DECIMAL 2, 4, 64 and 202 cylinder seeks may then be accomplished by setting octal 2, 4, 100 and 312 into the RIGHT switch register BYTE.
- 8. CAUTION!! EXCEEDING octal 312 in either BYTE will require a program restart unless error code has been added. (see 4).
- 9. Setting the SAME cylinder address in both BYTES will result in continuous seeks to THAT address.
- 10. This program may be modified using the CORE and MOD commands of the UPDATE program. UPDATE may also be used to output the modified version of any program to Dectape, Decpack or DEC papertape.
- 11. Repetitive RESTORES may be accomplished by changing the ELEVEN in location 1060 to a THIRTY-ONE.

RK05 OSCILLATING SEEK PROGRAM

STARTING	G ADDRESS 1000	RO WORK
		R1 177570 (SR)
DISK ADI	DRESS (15-13)	R2 1014 (SUBROUTINE)
CHANGE I	LOCATION 1032 I	F R3 177404 RKCS
DISK IS	OTHER THAN DRI	VE R4 177412 RKDA
ZERO		R5 JSR WORK
		R6 4000 STACK POINTER
1000	11100	
1000	11100	MUV SK, KU SIAKI
	4512	SWAD, RU
an an ang sa	4012	
	11100	MOV SR, RU
1 (1)	4312	
TATS	112	BR, START
1014	241	
1014	241 42700	CLC SUBROUTINE
	42700	* MACK OUT LOWER BILE
	6000	
	6000	
	6000	ROR ADDRESS SHOT
	0000	NOR
1030	62700	פע חת 8 0
1000	XX0000	* $YY = DTSK ADD (15-13)$
	2220000	XX = DISK ADD (13-13)
1034	105713	TATE BYCS
1034	100376	BDI. BRANCH IF CONTROLLER IS BUSY
	32737	BIT BIGMON II CONTROLIDIR ID DODI
	100	* MASK (ACCESS READY)
	177400	* RKDS
1046	1774	BEO BRANCH IF NOT READY
1050	240	NOP JUMP MAY BE INSERTED FOR
1052	240	NOP MODIFICATION
n in the second seco		
1054	10014	MOV RO, RKDA
	12713	MOV 11, RKCS (SEEK AND GO)
	11	OR 31, RKCS (RESTORE AND GO)
1062	205	RTS

100

4.

Compatibility

Head alignment and sector/index timing are the two major causes of incompatibility between drives. To insure that two or more drives are compatible with each other, all drives must be set up using the new alignment procedure. Other things that can cause incompatibility are:

1. Low power supply voltages.

2. Dirty mating surfaces between pack and drive.

3. Head cables reversed in one drive.

After insuring that all drives are adjusted properly, you can verify compatibility by using the conversion mode of RKll Disk Data (or similar RK8/e program) and performing the following steps:

- Insert cartridges in all drives to be checked for compability. Label the packs A, B, C, etc.
- 2. Write (and write check) a random pattern over the full surface of each disk.
- 3. Move all the cartridges to different drives and read them back without error. Then write and write check as in step 2.
- 4. Repeat step 3 until all the packs have been read error free by all the other drives.

For example, to check compatibility among three drives:

Drive Number Ø 1 2

Step	1	Insert	Packs	Α	в	C ·	Write/Write check
Step	2	Rotate	packs	С	Α	В	Read/Write/Write check
Step	3	Rotate	packs	B	С	Α	Read/Write/Write check
Step	4	Rotate	packs	A	в	C	Read/Write/Write check

Positioner

5.

A few points to know about the positioner are: There are precision surfaces on the positioner and spindle - when replacement is necessary be very careful not to bang it around or drop it.

When one is replaced, insure it is returned in the same box the new one arrived in. Otherwise it will be damaged and not reworkable. The glass slide attached to the carriage-coil assembly is not field replaceable. It must be aligned parallel to the motion of the carriage, i.e., matched to the carriage, bearings and ways and requires a special fixture. If the slide is damaged, the complete positioner must be replaced. The photo cell transducer can, however, be replaced.

Positioners do make audible noises while in operation due to the fact that they operate in an audible range.

There are plastic tires which are used in the positioner which the voice coil assembly rides on. These tires tend to develop a flat spot when remaining in one position for a period of time. It is most noticable in the track 180 area since this is one complete revolution of the time from the home position. (The flat spot can develop at any position that the carriage holds for more than ten minutes). This, in itself, is not a problem and is present to some extent in every RK05. Seek failures around cylinder 180 are caused by bad bearings - not the flat spot.

The coils in the positioner assembly should at no time rub against the magnet pole pieces. The assembly can rub if the spring loaded carriage is pressed hard enough - don't do it.

6. Adjustment Check List

6.1

Servo Signals (Adj. Pots are listed in sequence from module connector down).

			Do NOT adjust	If adj. is necessary,
Signal	Test Pt.	Adj.	Unless outside	set to this
		Pots	this range	value
		G938		
CA	ASI	R66	9 to 11	10v P-P
CO	ASl	R64	+ 0.2	0V
SA	AMl	R31	9 to 11	10v P-P
SO	AML	R29	<u>+</u> 0.2	0 v
LSA	AJl	R80	3.0 to 3.5	3.3v
LSO	AJl	R78	± 0.1	0V
VA	AM1	R76	3.1 to 3.3	3.2 msec
vo	AMI	R73	<u>+</u> 0.2	0V
		н604		
Accel.	AHl	R15	13 to 15	14 msec.
			1	

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6.2 Data Window (G180)

Signal	Test Pt.	Adj. Pot	Do NOT Adjust Unless outside This range	If adj. is necessary, set to this value
Open Loop	TPI	R54	480 to 520	500 nsec
Closed Loop (PDP-8 or 1	DP11	R55	430 to 450	440 nsec
Closed Loop PDP-15	TPI	R55	380 to 400	390 nsec

6.3 DEC Alignment Pack Signals

			Do NOT Adjust	If adj. is
Signal	Test Pt.	Adj.	Unless outside	necessary, set to
		Pot	This Range	this value
Index/Secto	r Trigger on	M7700	Average: 68 to	70 usec average,
	AR2. Look	R6	72, or either	with both heads
	at G180,		head outside	between 60 usec
and a second	TP3 & TP4	an a	60 to 80.	and 80 usec.
Head	Trigger on	Head	Error > 15%	6%
Alignment	AS2, Look at	Adjust		
	G180, TP3 &	Screws		
	TP4			
Head	G 180	None	Replace head if	l v. minimum
Alignment	TP3 &		in minimum	
	TP4		amplitude is not	
		la de la composición	produced	
	•			

6.4 Power Supply

Signal	Test Pt.	Adj. Pot	Do NOT adjust unless outside this range	If adj. is necessary, set to this value
+15	H743 J1-1 or AD2	+15reg. R17	14.5 to 15.5	+15V
-15	H743 J1-2 or AB2	-15reg. R17	-14.5 to -15.5	-15V
+5	H743 J1-3 or AA2	+5 reg. R7	4.85 to 5.15	+5V

Abstract:

The RKll Logic Test is for checking out basically the functional logic of the Controller. Used correctly, it can be an effective analytic and diagnostic tool.

Requirements:

- 1) PDP 11 with 8K memory
- 2) RK11 3) Drive (RKØ5) or simulator.

Note: There is a mode of operation wherein the drive-independent logic can be checked and simulator or drive is not required for that. Time Required:

Error free first pass on PDP 11/20 with core: 2 mins. The time is considerably less on 11/40, 45 and MOS or Bipolar memories. Starting Address:

200 for any mode of operation.

Program Control Modes:

- 1) Paper Tape
- 2) DDP Dump Mode
- 3) DDP Chain Mode
- 4) ACT 11
- 1) Paper Tape:

In the start of the program, a question

DRIVES TO BE TESTED?

is asked, to which the user should reply with drive members to be tested.

Eg: for 3 drives 0, 1, 2

DRIVES TO BE TESTED? 0, 1, 2 (CR)

Drives do not have to be in logical order, thus for drives 2 and 4.

DRIVES TO BE TESTED? 2, 4 (CR)

If only one drive is to be selected, it should be so indicated.

If only the drive-independent logic of the controller is to be tested and no drive is available, the reply should be just a "carriage return."

2) DDP Dump Mode:

On starting, the following message would appear REPLACE DRØ DDP-PAK BY OTHER

After the DDP pack has been replaced, "carriage return" should be typed in. On this, the previous question (Drives to be tested?) appears and should be answered as indicated before.

The DDP pack should be replaced or that drive should not be tested.

3) DDP Chain Mode:

Since in this mode, the program is chain-loaded from the pack on drive \emptyset , that drive is not tested and the message appears to that effect.

DRØ NOT TESTED

4) Act 11

The program is loaded by the Monitor and all available drives are tested.

Switch Options=

SW 15 = Halt on error

If set, the program halts on encountering an error, after typing out the error message and pertinent information. Pressing "continue" restores normal operation of the program. SW 14: Loop on test.

The program loops on the sub-test that is being executed when the switch is put on. Switch 14 is usually used in conjunction with SW 15.

SW 13 = Inhibit error printouts.

Note that this switch does not inhibit all type-outs, but only error message print-outs. Used usually with SW 14 (looping on test) on SW 9 (looping on error).

SW 12 = Lock on the sector in error.

Used only for Tests 47, 50, 51 where "WRITE" and "READ" of the entire disk is done. The program loops on the sector that showed error. Eg: if there was an error while doing a "READ" on sector 4, cylinder 27 then "READ" of the same sector, cylinder is done as long as the switch is set.

SW 11: Inhibit iterations

When set, each subtest is executed only once.

SW 10: Bell on error.

Used in conjunction with SW 13 (inhibit error type-outs) so that even when there is no error message an indication as whether an error occurred or not could be given.

SW 9: Loop on error

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The sub-test is looped from the point of error to the previous "SCOPE" statement. This switch is different from SW 14 - loop on test. "Loop on test" loops on the entire test, whereas "Loop on error" loops from the point of error, thus providing a tight scope loop.

SW 8: Select sub-test

This switch in conjunction with switches 0 to 7 is used to select a sub-test for execution. Thus, if Test 56 is to be selected switch register would be 000476.

Program Structure:

There are three distinct parts of the program. 1) Initial Set-up Phase:

Setting up of initial pointers, vectors, tables etc. is done in this section. It is in this section that the decision is made about the program mode - paper tape, DDP chain, dump or ACT11. Relevant questions and instructions are given. Flags are set up to indicate which drives are to be tested.

2) Drive-Independent Controller Tests:

In this section, that part of the controller is checked which does not depend on signals from the drive. These tests consist of basic bit-banging of registers, count patterns through registers, controller initializing logic, addressing logic, byte addressing etc. Since drive signals are not required, it is not necessary to have a drive to execute this section of the program.

3) Drive-Dependent Controller Tests:

This section forms the major part of the program, wherein most of the controller logic is checked.

Just before entering this section, the program finds out which drive is to be checked. If in DDP chain mode, drive \emptyset , if present, is skipped and the next available drive is selected.

At the end of this section, a check is made if all the drives present have been tested. If not, control is transferred to the beginning of this section.

Thus, one pass of the program involves doing

- 1) Drive-independent tests once
- Drive-dependent tests for all the available (selected) drives.

Quick Verifying Mode:

Whenever the program is normally started (SA=200) the first pass is a quick verifying one, in which none of the subtests are iterated.

Subsequent passes are iterative, i.e. subtests underto specified iterations (usually 50). If these iterations are to be inhibited SW 11 should be set.

End of Pass:

At the end of every pass, a message is printed

END PASS XXXXXX

where XXXXXX = pass number.

Loops:

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There are two kinds of loops:

1) SW 14: Looping is done for the entire subtest.

For example,	TST16:	SCOPE
	TST17:	SCOPE

If SW 14 is set, looping is done from TST 17 to TST 16. SW 9: Loop on Error. Here looping is done from the point of error to the previous SCOPE statement.

TST16 = SCOPE ERROR 16 ERROR 17 SCOPE TST17:

If there is an error at "ERROR 16" looping is done from that point back to TST16. Thus SW 9 provides a tighter scope loop than SW 14.

Scope Handler:

The IOT trap is used by the SCOPE statement. When SCOPE is executed, an IOT trap occurs to memory location "\$SCOPE". The scope handler starts at "\$SCOPE." Depending on the switch settings, this handler decides if looping is to be done, iterations are to be inhibited etc. This handler also keeps track of the test numbers for correct sequencing and other pointers.

Error Handler:

In EMT trap, instruction is used for the error statement (eg. ERROR S). The lower byte of the EMT is encoded to give different error messages at different points. When the error statement (EMT) is executed, a trap to memory address "\$ERROR." The handler strips the EMT instruction and recovers the lower byte which is a pointer to the Error Table. The pointer to the Error Table is used if an error message is to be typed out. Depending on the switch settings, the handler makes a decision about halting on error, inhibiting typeouts, bell on error or loop on error. If an error message is to be printed, an exit is made to the "Error Message Typeout Routine" located at \$ERRTYP.

- 7 -

Trap Handler:

Many commonly used routines in the program are called through the "TRAP" instruction. On execution of the "TRAP" a trap to "\$TRAP" occurs. The Trap Handler is located at "\$TRAP." The Trap Handler will pick up the lower byte of the "TRAP" instruction and use it to index through the Trap Table for the starting address of the desired routine. Then, using that address, an exit is made to that routine.

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921366 080004 15771 SCOPE 923372 014700 161320 MOV RCS, MG 923372 021206 080801 MOV RCS, MG 921402 012701 161336 161316 MOV RCS, MG 921402 012701 161336 161316 MOV RCS, MG 921412 022777 080814 161310 BIS #14,4MKDA IST DITS FOR SECTOR 12 (DECIMAL) 92142 012777 080804 161272 MOV #21,4MKDA IREAD WGT DITS FOR SECTOR 12 (DECIMAL) 921424 012777 0808049 BOT *1,4MKDA IREAD WGT MS ERROR SKOULD OCCUP %0H- 921424 030249 080095 MOV #2,4RKM IRITO THIS BIT NEXER 921424 0302476 080048 IST #142844,4RK IOD NEST TO SITHALINER 921424 012767 080948 157476 MOV #3,5KEG2 INKS ERROR 921424 012767 080949 157476 MOV #3,5KEG2 INKS ERROR 9214242 041430 SET OTSIN			us sections				F CIFARF	D HY CUNTROL' R	ESET.
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021372 012707 021372 0121372 0121372 021372 0121372 101314 MOY RKER, H1 021472 012777 010314 101316 BIS #14, PHKNA JSET BITS FOR SECTOR 12 (DECIMAL) 021422 012777 000314 101272 MOY #01984 JREAD 1 HORD 021422 012777 000302 101272 MOY #01984 JREAD 1 HORD 021424 012717 000302 101272 MOY #01984 JREAD 1 HORD 021426 012777 000302 101272 MOY #01984 JREAD 1 HORD 021426 012717 0000049 BIT #10, PHKNA JREAD 1 HORD JREAD 1 HORD 021426 012716 080249 NOP JREAD 1 JREAD 1 HORD JREAD 1 HORD 1 JREAD 1 JREAD 1 <td></td> <td>421370</td> <td>016700</td> <td>161326</td> <td></td> <td></td> <td>MOV</td> <td>RKCS, NØ</td> <td></td>		421370	016700	161326			MOV	RKCS, NØ	
WDV RKER, M1 WDV RKER, M1 JOET ADRES OF DRIVE W21442 L16777 L13136 L0116 WDV DMIYAUJSRKGA JOET ADRES OF DRIVE W21422 L12777 G08014 L01316 BIS #14,8KKDA JOET ADRES OF DRIVE W21426 L12777 G08014 L01316 BIS #14,8KKDA JOET ADRES OF DRIVE W21426 L12777 G08014 L0137 MOV #01,9KKDA JOET ADRES OF DRIVE W21432 L12717 JG80205 MOV #01,9KKDA JOET ADRES NOULD OCCUR WDH W21432 B08095 MOV #0,9KEG JINTO THIS BUS ADRES W21442 J327110 Ø80939 BIT #09,9KEG2 JINTS FROR SKOLLO OCCUR WDH W21452 J24767 J080499 157476 MOV #59,8KEG2 JINTS IN RKER MIN NOT SET ON SIHULATING W21462 J24130 BEG 23 JINTS FROR SKOLLOCUR WDH JINTS FROR JINULATING W21461 J227100 J080801 251 JINULATING JINULATING	1. 5 m	N21374	612716	สีสีตั้นชา		1	MOV	#1. 0R0	
Distance		421492	3316701	161314			MOV	RKER, H1	
Dist Dist <thdis< th=""> <thdist< th=""> Dist Di</thdist<></thdis<>		121494	616777	161336	161316		MOV	DRIVAU, ORKDA	JGET ADRES OF DRIVE
321425 12777 161275 MOV #=1,0KKC IREAD 1 408D 321426 12777 9039021 161272 MOV #UDUF,0KRAA INTO THIS BUS ADRES 321426 12777 9039015 NOV #UDUF,0KRAA IREAD, GØ (FROM NX SECTOF) 321426 312710 908019 NOV #UDUF,0KRAA INTO THIS BUS ADRES 321426 312710 908040 BIT #40,0K1 IDID NXS BIT SET IN RKER # 321426 312710 008040 157476 BKE 1475,0KRCG ITHIS BUS ADRES 321424 140224 140204 IST #40,0K1 IDID NT SET IN RKER # ID NOT SET 321425 140204 157476 MOV #405244,0Kg IDID NT SET ON SIHULATING 321424 140204 157476 MOV #402244,0Kg IDID NT SET ON SIHULATING 321424 140204 140204 157476 MOV #140204,0Kg INXS BIT SET ON SIHULATING 321446 122710 0049021 251 MOV #140204,0Kg		121412	152777	000014	161310		BIS	#14, @HKDA	SET BITS FOR SECTOR 12 (DECIMAL)
221425 12777 033002 161272 MOV #UUTBUF,PRKBA IINTO THIS BUS ADRES 221442 12710 0308005 NOP NOP NREAD, GO (FROM NS SCTOF) 221442 380240 NOP NOP NREAD, GO (FROM NS SCTOF) 221442 380240 NOP NNS ERROR SHOULD OCCUP NOPH 221442 030240 BIT #140,041 INTS ERROR SHOULD OCCUP NOPH 221452 044767 001730 JSR PC,GT2RG IGO GET RKCS, RKER 221452 124770 000040 157476 MOV #140204,083 INTS ERROR 221452 12470 140224 15: CMP #140224,083 INTS ERROR 221454 122710 140224 15: CMP #140224,083 INTS ERROR 221452 140433 JSR PC,GT2RG IGO GET RKCS, RKER INTS ERROR 221450 140131 ERROR ISI INTS ERROR INTS ERROR 221451 140431 EST ISR IST ERROR IST ET 221452 021710 0000001 25: <		021420	612777	177777	161276		MOV	#=1,0HKWC	JREAD 1 WORD
021434 0127109 000005 MOV #9,0R8 IREAD.GB (FROM NX SECTOF) 021434 0000409 NOP INXS ERROR SHOULD OCCUP 100H- 021442 032711 000049 BIT #40,0R1 1010 NXS BIT SET IN RKERS 021442 032711 000049 BNE 15 IVES, BRANCH 021454 0127109 000049 157476 MOV #40,8KE2 ITHIS BIT (INXS) IN RKERS 021454 0127109 157476 MOV #40,8KE2 ITHIS BIT (INXS) IN RKER (10 NOT SET 021454 0127109 140204 15: CMP #140204,0R3 INXS ERROR 021470 001433 BEC 23 IYES, READ INXS ERROR 021470 00470 BS1700 JSR PC,GT2RG IOD HE & ERR BIT SET7 021470 004700 JSR PC,GT2RG IOD HE & ERR BIT DID NOT SET INXS ERROR 021470 004700 JSR PC,GT2RG IOD HE & ERR BIT DID NOT SET INXE ERROR 021470 0000001 25: MOV #1,9R0 IONTRL RESET IOD NOT SET 0214		821426	012777	003002	161272		MOV	#UUTBUF, @RKBA	INTO THIS BUS ADRES
021440 080240 NOP INXS ERROR SHOULD OCCUR WWH- DID NXS BIT SET IN RKER # 1010 NXS BIT SET IN RKER # 102446 021442 032711 080040 BNE 15 IVES, BRANCH 021442 032717 080040 157476 JSR PG,GT2RG 160 CET RKCS, RKER 021443 010 NXS BIT SET IN RKER #10 NOT SET IVES, BRANCH IVES, BRANCH 021444 122710 140204 157476 ERROR 130 INXS ERROR 021470 080440 157476 ERROR 130 INXS ERROR INXS ERROR 021464 122710 140204 151 CMP #140204,0Rd IOID NOT SET 021470 2014767 201700 JSR PG,GT2RG IOD NOT SET 021471 BE0 25 INXS ERROR INXS ERROR INXS ERROR 021472 080401 25: NSR PG,GT2RG IOD NOT SET INXS ERROR 021472 080401 25: INXS ERROR IOD NOT SET INXS ERROR INXS ERROR 021476 104131 ISR PG,GT2RG IOD NOT SET INXS EROR IOD		021434	012710	000005			MOV	#5,@RØ	JREAD, GØ (FROM NX SECTOR)
D21442 D32711 000040 BIT #30,8M1 IDD NXS BIT SET IN RKER D21452 D30710 JSR PC,GT2RG IGD GET RKCS, RKER D21454 D12767 000040 157476 MCV #30,8KE2 INKS BIT DID NOT SET DN SIHULATING D21454 D12767 000040 157476 MCV #30,8KE2 INKS BIT DID NOT SET DN SIHULATING D21454 D12767 000040 157476 MCV #40,8KE2 INKS BIT DID NOT SET DN SIHULATING D21454 D12710 140204 15: CMP #140204,0R3 INKS ERROR INKS ERROR D21454 D12710 000001 DS:F MCV #140204,0R3 INKS ERROR INKS ERROR D21476 104131 BEG Z% IYES, RRANCH INKS ERROR INKS ERROR D21500 D12710 0000001 2S: MOV #1,0R80 ICMTRL RESET IMEN D21500 D12710 0000001 2S: MOV #1,0R80 ICMTRL RESET IMEN D21500 D12710 0000001 2S: MOV #1,0R80 ICMTRL		021440	300240			4 ³⁶	NOP		INXS ERROR SHOULD OCCUR MUM
921446 GD1006 BNE 15 IYES, BRANCH 921454 912767 0007730 JSR PC,GT2RG IGG GCT RKCS, RKER 921454 912767 000040 157476 MOV #40,SKEG2 ITHIS BIT (NXS) IN RKER 11D NOT SET 921454 912767 000040 157476 MOV #40244,0R3 IDD NOT SET ON SIHULATING 921464 132710 140204 15: CMP #140204,0R3 IDD NOT SET ON SIHULATING 921476 301403 BE0 25 IYES, BRANCH 921476 1001706 JSR PC,GT2RG IOD HE 4 ERR BITS SET? 921476 104131 ERROR 131 INKS ERROR 921476 104131 ERROR 131 INKS ERROR OCCURED 921506 12716 000001 25: MOV #1,9RU IONTAL RESET CLEAR NN:S BIT I 921506 12716 0000001 25: MOV #1,9RU IONTAL RESET CLEAR NN:S BIT I 921506 12716 0000001 ERROR 125 IONTAL RESET DION 'T CLEAR NOT SIT 921506 10167 15		321442	232711	000040			BIT	#40,0K1	IDID NXS BIT SET IN RKER
#2145g 204767 001730 JSR PC,GT2RG 160 GL RKCS, KER 110 NOT SET #2145g 204767 000040 157476 MOV #40,5KEG2 INIS BIT (NS) IN RKER "ID NOT SET #21462 124130 INXS BIT DID NOT SET ON SIHULATING INXS BIT DID NOT SET ON SIHULATING #21464 122710 140204 15: CMP #140204,0RG IDI NE S ERROR #21472 204767 001700 JSR PC,GT2RG IGO GET RKCS, KER #21472 204767 001700 JSR PC,GT2RG IGO GET RKCS, KER #21472 204767 001700 JSR PC,GT2RG IGO GET RKCS, RKER #21472 204767 001700 JSR PC,GT2RG IGO GET RKCS, RKER #21472 204767 001700 JSR PC,GT2RG IGO ET RKCS, RKER #21472 20476 0040801 25: MOV #1,080 INTRL RESET #21500 312710 00080801 25: MOV #1,080 IGT ARCS OCCUPED #21500 312711 T57 F41 JD10 CNTRL RESET IEAROR		021446	001006				BNE	13	IYES, BRANCH
#21454 #21767 #200040 157476 MOV #30, 5462 171459 174753 174754 #21462 124130 ERROR 130 iNXS BIT IDD NOT SET DN SET DN 17476 #21462 122710 140204 15: CMP #140204, #Rg iDD NE SET DN 15T DN 175T DN 100 NT SET DN 15T DN 175T DN 175T DN 100 NT SET DN 175T DN		021450	204767	001730			JSR	PC, GT2RG	JOD GET RECS, REER DEED DID NOT SET
021462 134130 ERROR 190 IAXS BIT DID NOT OUT OUT DATAGET TO INXS ERROR 021464 022710 140204 15: CMP #140204,@Rd IDID HE & ERR BITS SET? 021470 301403 BEQ 23 IYES, BRANCH 021470 0040001 USR PC, GT2RG IGO EET RKCS, RKER 021476 104131 ERROR 131 IHE OR ERR BIT DID NOT SUT WHEN 021500 312710 0000001 25: MOV #1,@R0 IONTRL RESET 021500 312710 0000001 25: MOV #1,@R0 IONTRL RESET CLEAR NMS BIT1 021500 312710 0000001 25: MOV #1,@R0 IONTRL RESET 021500 312710 0000001 25: MOV #1,@R0 IONTRL RESET 021500 312710 0000001 25: MOV #1,@R0 IONTRL RESET 021500 312710 0000001 25: MOV #1,%REG1 IOT ADRES OF RKER 021510 01167 157440 MOV #43,%REG1 IOT ADRES OF RKER 021520		021454	Ø 1276 7	000040	157476		MOV	#40,\$KEG2	INT DIT NADI IN ADEN STAND
921464 922140 140204 15: CMP #140204,0R0 IDID HE & ERR BITS SET? 921472 004767 001700 JSR PC,0TZRG IGO GET RKCS, RKER 921472 0040001 25: MOV #1,0R0R IAI 921476 104131 ERROR IAI IME O ERR BIT DID NOT SHIT WHEN 921476 104131 ERROR IAI IME O ERR BIT DID NOT SHIT WHEN 921476 104131 ERROR IAI INTERSET 921500 012710 0000001 25: MOV #1,0R0 IONTRL RESET 921500 0121710 0000001 25: MOV #1,0R0 IONTRL RESET 921500 012167 157440 MOV #1,8RC0 IOET ARES OF RKER 921514 010167 157440 MOV #1,5KEG1 IOET RKES CONTENTS 921522 104125 ERROR 125 IONTRL RESET OID NOT CLEAR 921522 227140 000200 35: CMP #200,#R0 IWERE HE & ERR BITS CLEAHED? 921526 104125 BEO 1572 IYE		021462	104130			,	ERROR	150	INVO REDOUD
821464 122710 148204 15: CMP 148204, MA3 iVES, BRANCH 821470 981433 BEG 23 iVES, BRANCH iVES, BRANCH 821476 184131 BEROR 131 iVES, BRANCH 821476 184131 ERROR 131 iVES, BRANCH 821476 184131 ERROR 131 iVES, BRANCH 821476 184131 ERROR 131 iVES, BRANCH 821500 12710 000001 25: MOV #1,9R# iCNTRL RESET 821500 012167 157440 MOV #1,9R# iCNTRL RESET CLEAR NHS BIT? 821510 012167 157440 MOV #1,9R# iGET ADRES OF RKER 821520 194125 ERROR 125 iCNTRL RESET DID NOT CLEAR ERROR iCNTRL RESET DID NOT CLEAR 821522 122710 000200 35: CMP #200, RR0 iHERE HE & ERR BIT' CLEAR iYES, EXIT 821522 122710 000200 35: CMP #200, RR0 iHERE HE & ERR BIT' CLEAR iYES, EXIT 821520									INXA LKKUK Joto He - Edd Dits Set?
921478 301433 BEG 23 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110 110		021464	122710	140204		15:	CMP	#140204,010	INTE BOYNCH Inte de cuu dita acti
221472 20476 10476 201700 258 FV 0 140 10 100 0 160 00 10 10 100 0 160 00 10 221476 104131 ERROR 131 100 0 160 00 000 100 000 00 221500 312710 0000001 251 100 0 170 000001 100 00000 221500 312710 0000001 251 100 000001 100 00000 100 00000 221500 312710 0000001 251 100 000001 100 00000 100 00000 221500 31167 157440 MOV #1,\$REG0 100 0000 REC 00 RKER 100 000 00 221510 101067 157440 MOV #1,\$REG1 100 000 REC 00 REC 00 NOT CLEAR 221522 122710 0000200 351 CMP #200,\$R0 100 NT RL RESET DID NOT CLEAR 221522 122710 000200 352 CMP #200,\$R0 100 NT RL RESET OID NOT CLEAR 221524 101267 157420 MOV RK,\$REG3 100 NT SET N RKER 221526 101067 157420 MOV RK,\$REG3 100 NT SET N RKER 221534 11267 157416 MOV RK,\$	•	821470	301433	an an 1911 f				24 80 01280	CA CET RKCS. RKER
021476 104131 ERROR 104 INX SEROR OCCURED 021500 312710 0000001 25: MOV #1,@R0 ICNTRL RESET 021504 F05711 TST ERG S ICNTRL RESET IDID CNTRL RESET 021504 F05711 BED 35 IVES, BRANCH 021506 D01405 BED 35 IVES, BRANCH 021510 D10167 157440 MOV F1,SREGU IGET ADRES OF RKER 021520 104125 ERROR 125 ICNTRL RESET DID NOT CLEAR 021522 J22710 000200 35: CMP #200,@R0 IWERE HE & ERR BITS CLEARNED? 021520 J02152 J22710 000200 35: CMP #200,@R0 IWERE HE & ERR BITS CLEARNED? 021520 J02152 J22710 000200 35: CMP #200,@R0 IWERE HE & ERR BITS CLEARNED? 021520 J0267 157420 MOV R0,SREG0 IGET ADRES OF RKCS 021520 10267 157420 MOV R0,SREG1 IGET RKCS BITS ERR OR HE WER!! 021540 <td></td> <td>021472</td> <td>00476/</td> <td>001/00</td> <td></td> <td></td> <td>JOK</td> <td>434</td> <td>THE OR FRE BIT DID NOT SET WHEN</td>		021472	00476/	001/00			JOK	434	THE OR FRE BIT DID NOT SET WHEN
021500 012710 000001 25: MOV #1,9RV iCNTRL RESET 021506 001405 BEO 3% iPES, BRANCH 021510 01017 157440 MOV R1,SREG0 iGET ARES OF RKER 021514 01167 157440 MOV R1,SREG0 iGET ARES OF RKER 021514 01167 157436 MOV R1,SREG0 iGET RKER CONTENTS 021520 104125 ERROR 125 iCNTRL RESET DID NOT CLEAR 021522 J22710 000200 3S: CMP #200,9R0 iNKE R 021520 104125 ERROR 125 iCNTRL RESET DID NOT CLEAR ifer ARES OF RKCS 021520 10267 157420 MOV R0,SREG0 iGET ARCS CONTENTS 021530 10267 157416 MOV R0,SREG1 iGET ARCS CONTENTS 021520 10267 157420 MOV R0,SREG1 iGET ARCS CONTENTS 021530 10267 157416 ERROR i25 iRKCS BITS ERR OR HE WERET NOT 021520 177402 000000 021466		0214/6	104131				ENNUN	4 4 4	INXS FROR OCCURED
0230000271100000423.TSTFR1JDID CNTRL RESET CLEAR NEWS BITT021506001405BEC35JYES, BRANCH021516010167157440MOVRI,SREGUJGET ADRES OF RKER021514J1167157436MOVFR,SREGUJGET AKER CONTENTS021520104125ERROR125ICNTRL RESET DID NOT CLEAR021522J22710000220035:CMP#200,FR0021526004405BECTST2IVES,EXIT021526001667157420MOVR0,SREGØJGET ADRES OF RKCS021526010667157420MOVR0,SREGØJGET ADRES OF RKCS021530010667157420MOVR0,SREGØJGET RKCS CONTENTS021530010667157420MOVR0,SREGØJGET ADRES OF RKCS021530010667157416MOVFR,SREGØJGET RKCS CONTENTS021540104125ERROR125JRKCS BITS ERR OR HE WERE NOT021520177402000000021462140204000040002152017740200000002146214020400004000215401774040002000214761402040000400		101500	a1 871 (000000		75.	MOV	#1.@RV	ICNTRL RESET
Ø21506Ø31465BEC3%JYES, BRANCHØ21510C10167157440MOVR1,SREG0JGET ADRES OF RKERØ21514J1167157436MOVØR1,SREG1JGET ADRES OF RKERØ21520104125ERROR125JCNTRL RESET DID NOT CLEARØ21522J2271000020035:CMP#200,@R0Ø21522J2271000020035:CMP#200,@R0Ø21522J2271000020035:CMP#200,@R0Ø21522J2271000020035:CMP#200,@R0Ø2152010267157420MOVR0,SREG2JGET ADRES OF RKCSØ21530U10267157416MOVR0,SREG1JGET RKCS CONTENTSØ21540104125ERROR125JRKCS BITS ERR OR HE WERE NOTØ21520177402000000ØR462HE OR ERR OF HE WERE BIT'Ø21520000000ØR2462140204000040O21520177402000000ØR462HE OR ERR DIDN'T SETPCREGADD RECVDPCRKCSRKERØ21540177404000200ØR1462400040		021500 001504	012/10	000001		69.	TST	AH1	DID CNTRL RESET CLEAR NES BITT
021510 010167 157440 MOV R1,SREG0 IGET ADRES OF RKER 021514 01167 157436 MOV R1,SREG1 IGET ADRES OF RKER 021520 194125 ERROR 125 IGET ADRES OF RKER 021522 020710 000200 35: CMP #200,@R0 IWERE HE & ERR BITS CLEARED? 021526 001405 BEQ TST72 IVES,EXIT 021530 010667 157420 MOV R0,SREG3 IGET ADRES OF RKCS 021540 10267 157420 MOV R0,SREG3 IGET RKCS CONTENTS 021540 10267 157416 MOV eR0,SREG3 IGET RKCS CONTENTS 021540 17402 000300 IZ25 IRKCS RKER BER 021520 17402 000300 IZ2462 <td></td> <td>021004</td> <td>00711</td> <td></td> <td></td> <td></td> <td>REO</td> <td>35</td> <td>YES, BRANCH</td>		021004	00711				REO	35	YES, BRANCH
021514 J1167 157436 MOV \$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$		421510	010167	157440			MOV	R1, SREGØ	JGET ADRES OF RKER
021520104125ERROR125ICNTRL RESET DID NOT CLEMR021522J2271000020035:CMP#200,@R0IWERE HE & ERR BITS CLEARNED?021526001405BE0TST72IWERE HE & ERR BITS CLEARNED?021526001067157420MOVR0,SREGØIGET ADRES OF RKCS021534610667157416MOV@R0,SREG1IGET RKCS CONTENTS021540104125ERROR125IRKCS BITS ERR OR HE WERE: NOT021520177402000000@R0,SREG1ICLEARED BY CNTRL RESET021520177402000000@R00000@R1462021540177404000200PCRKCSRKERPCREGADDRECVDPCRKCSRKER021540177404000200021476140204000040		121514	311167	157436			MOV	ØR1, SKEG1	GET RKER CONTENTS
221522J22710ØØØ200JS:CMP#200,@RØJWERE HE & ERR BITS CLEARNED?021526001405BEQTST72JYES,EXIT021530010267157420MOVRØ,SREGØJGET ADRES OF RKCS021534011267157416MOV@RØ,SREG1JGET RKCS CONTENTS021540104125ERROR125JRKCS BITS ERR OR HE WERE NOT021520177402000300Ø21462140204000040021520177402000300Ø21476140204000040021540177404000200Ø21476140204000040		021520	194125				ERROR	125	ICNTRL RESET DID NOT CLEMB
#21522 J2271# 000200 3\$: CMP #200,@R0 ;WERE HE & ERR BITS CLEARLD? #21526 001405 BEQ TST72 ;YES,EXIT #21530 610667 157420 MOV R0,\$REG0 ;GET ADRES OF RKCS #21534 511667 157416 MOV @R0,\$REG1 ;GET ADRES OF RKCS #21540 104125 ERROR 125 ;GET ADRES OF RKCS #21540 107402 000000 error ;GET RKCS RKER ERR BIT' #21520 177402 000000 @21462 140204 000040 #21520 177402 000000 @21462 140204 000040 #21540 177404 000200 @21476 140204			4 · · · · ·						INXS BIT IN RKER
021526001405BEQTST72IVES,EXIT021530010267157420MOVRØ,SREGØ;GET ADRES OF RKCS021534011267157416MOV0RØ,SREG1;GET RKCS CONTENTS021540104125ERROR125;GET RKCS CONTENTSCNTRL RESET DIDN'T CLEAR REGISTERPCREGADDRECVD021520177402000300021462CNTRL RESET DIDN'T CLEAR REGISTERPCRKCSPCREGADDRECVD021462021520177402000300021462CNTRL RESET DIDN'T CLEAR REGISTERPCRKCSPCREGADDRECVD021476021540177404000200021476140204000040020040		Ø21522	122710	000200		3\$:	CMP	#200,0R0	INERE HE & ERR BITS CLEAND?
U21530U10267157420MOVRU, \$REG0;GET ADRES OF RKCSU21534U1267157416MOVRU, \$REG1;GET RKCS CONTENTSU21540104125ERROR125;GET ADRES OF RKCSCNTRL RESET DIDN'T CLEAR REGISTERERROR'ERR BIT' DIDN'T SET IN RKERPCREGADD RECVDPCRKCSRKER ERR BIT'021520177402000000021462140204000040CNTRL RESET DIDN'T CLEAR REGISTER'ERR BIT' DIDN'T SETNEREPCREGADD RECVDPCRKCSRKER021520177402000000021462140204000040CNTRL RESET DIDN'T CLEAR REGISTERPCRKCSRKERPCREGADD RECVDPCRKCSRKER021540177404000200021476140204000040		021526	001405				BEQ	TST72	IYES, EXIT
#21534£11267157416MOV ERROR#RØ, \$REG1 125¡GET RKCS CONTENTS IRKCS BITS ERR OR HE WERE NOT ¡CLEARED BY CNTRL RESETCNTRL RESET DIDN'T CLEAR REGISTER PC 021520*ERR BIT' DIDN'T SET IN RKER PC 000000*ERR BIT' DIDN'T SET IN RKER PC 021462*ERR BIT' DIDN'T SET IN RKER PC 000040CNTRL RESET DIDN'T CLEAR REGISTER PC 021540*ERCS RKER ERR BIT' 17404*ERR DIDN'T SET 000200PC 021540PC 177404RKCS 000200RKCS 021476	• •	Ø21530	010067	157420			MOV	RØ, SREGØ	JGET ADRES OF RKCS
021540 104125 ERROR 125 JRKCS BITS ERR OR HE WERE NOT CNTRL RESET DIDN'T CLEAR REGISTER 'ERR BIT' DIDN'T SET IN RKER PC REGADD RECVD PC RKCS RKER ERR BIT' 021520 177402 000000 021462 140204 000040 CNTRL RESET DIDN'T CLEAR REGISTER PC RKCS RKER ERR BIT' PC REGADD RECVD 021462 140204 000040 021540 177404 000200 021476 140204 000040		021534	011067	157416			MQV	erø, sregi	JGET RKCS CONTENTS
CNTRL RESET DIDN'T CLEAR REGISTER'ERR BIT' DIDN'T SET IN RKERPCREGADD RECVDPCRKCSRKER ERR BIT'Ø2152Ø1774Ø2000000Ø21462140204000040CNTRL RESET DIDN'T CLEAR REGISTERHE OR ERR DIDN'T SETPCREGADD RECVDPCRKCSRKERØ2154Ø1774Ø4000200Ø21476140204000040		021540	104125				ERROR	125	JRKCS BITS ERR UR HE WEHE NYT
CNTRL RESET DIDN'T CLEAR REGISTER 'ERR BIT' DIDN'T SET IN RKER PC REGADD RECVD PC RKCS RKER ERR BIT' 021520 177402 000000 021462 140204 000040 000040' CNTRL RESET DIDN'T CLEAR REGISTER HE OR ERR DIDN'T SET HE OR ERR DIDN'T SET PC REGADD RECVD PC RKCS RKER 021540 177404 000200 021476 140204 000040			· ·			1. J.			ICLEARED BY UNING RESET
PC REGADD RECVD PC RKCS RKER ERR BIT* Ø2152Ø 177402 000000 Ø21462 140204 000040 000040 CNTRL RESET DIDN*T CLEAR REGISTER HE OR ERR DIDN*T SET DIDN*T PC REGADD RECVD PC RKCS RKER PC REGADD RECVD PC RKCS RKER Ø21540 177404 000200 Ø21476 140204 000040		•	A11				TED	1	DE DITI DIDN'T SET IN RKER
PC REGADD RECOD Ø2152Ø 177402 000000 Ø21462 140204 000040 CNTRL RESET DIDN'T CLEAR REGISTER HE OR ERR DIDN'T SET PC REGADD RECVD PC REGADD RECVD 021540 177404 000200			CNTRL I	RESET DII	DECUD	AR REGIS	IER	• <u>F</u>	RR BIT DIDN I SET IN MELEN
CNTRL RESET DIDN'T CLEAR REGISTER HE OR ERR DIDN'T SET PC REGADD RECVD 021540 177404 000200			20150G	KEGADD	REGVD			20	1462 140204 000040 000040
CWIRL RESET DIDN'T CLEAR REGISTERRE OR ERR DIDN'I SEIPCREGADD RECVDPC021540177404000200021476140204000040			021320	111402	000000		•	102	
PC REGADD RECVD PC RACS REA 021540 177404 000200 021476 140204 000040			CNTRL F	RESET DID	N'T CLEA	R REGIST	ER	n	DU DAUC DAED F OU FUU DIDM I DEI
NCIJAN 1/1404 000800 NCIAIO IAUGUA DUDUAD			PU 001540	REGADD	RECVD			A	PU ARUS AREA 21476 140204 000040
		· ·	061340	1//4/04	BURSOBO				01110 11001 00000 VIEN

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