

SWTPC MODIFICATION -- APPLICATION NOTICE

Product: DMAF2 QUME DT-8 Disk Drives Date: July 16, 1980 G.K.

Unpacking and Packing Qume DT-8 Disk Drives

When unpacking your Qume DT-8 disk drives, it is very important that you save all of the disk drive packing materials. These materials include the cardboard insert to protect the disk drive head, the styrafoam block which holds the door closed, the plastic bag dust cover, the inner cardboard container, the foam packing inserts and the shipping container. These materials must be used to repack the drive should it ever be necessary to reship the drive or return the drive to the factory for service. Packing the drive in a container other than the one supplied or not properly preparing the drive for shipment can result in costly damage to the drive and/or the drive head. Neither SWTPC, the drive manufacturer, or the carrier will be responsible for such damage.

To repack a Qume DT-8 disk drive for shipment, first unplug the DMAF2 chassis from the AC wall receptacle. Disconnect all cables attaching to the disk drive. Remove the four screws holding the disk drive to the chassis and carefully remove the drive.

Open the disk drive door and carefully insert the cardboard disk head protector so tab on the protector is fully inserted into the drive. Now carefully close the door. Set the styrafoam block against the upper back side of the drive's front panel and tape it in place. This block prevents the door from being opened once the drive is placed inside the inner cardboard container. Carefully place the drive inside the plastic bag dust cover and secure with tape. Now slide the back side of the drive into the inner cardboard container until only the front panel of the disk drive is exposed.

Make sure that you have a foam insert properly positioned in the bottom of the shipping container. Carefully set in the packed drive oriented so the drive has its bottom side down. Now place the remaining foam insert on the top of the drive assembly.

If the disk drive is being returned for factory service, be sure to include documentation describing the problem with the drive and if possible, documention confirming the date of purchase. Drives returned to SWTPC should be addressed as follows:

> Southwest Technical Products Corp. Atten: Service Dept.-- Digital Group 219 W. Rhapsody San Antonio, Texas 78216

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DMAF2 Floppy Disk Unit

Introduction

The Southwest Technical Products Corporation DMAF2 is a dual drive, single and double density, double sided eight-inch disk unit. The DMAF2 is designed to operate with the SWTPC SS-50 bus computer systems. Although the DMAF2 is designed to operate with two drives, up to four drives may be used with a special daisy chained interconnection cable.

Although the DMAF2 Disk Unit was completely assembled and tested at the factory, slight reprogramming of the circuit board may be necessary to operate with your particular computer system. Also, the disk drives may need to be installed in the chassis. It is suggested that this instruction manual be read completely before attempting to use the system. Step-by-step instructions are given for configuring the unit for your particular system to minimize the possiblity of errors.

Disk Drive Installation

The two disk drives for the DMAF2 were probably shipped in their original containers rather than being attached to the chassis. Carefully remove each drive from its shipping container. One drive should be clearly marked with a 0 and the other with a 1. The drive marked O should be installed in the chassis so that it is the left drive (as viewed from the front). Before attaching drive 0 to the chassis, install the 50-pin ribbon cable connector to its mate on the drive as shown in the DMAF2 wiring pictorial. Be sure the connector is installed so that the side of the cable with the colored band is facing toward the drive motor as shown in the pictorial. The drive marked 1 should have an extra wire with a connector on the end attached to the bottom circuit board of the drive. When installing this drive be sure the wire and connector extends out from the back of the drive so that it may be connected to its proper mate on the motor control board. Both drives should be securely fastened to the chassis using the #8 - 32 screws supplied.

Once the drives have been fastened to the chassis the power and control cables should be installed. Although all connectors are indexed and can only be installed one way, the step-by-step procedure should be followed to avoid any errors. The wiring pictorial should be used to aid in connecting the cables.

- () Be sure that the DMAF2 is not connected to the power line.
- () Connect the longer of the two AC cables from the motor control board to its respective socket on drive O. Be sure the connector seats firmly in the socket.

() Connect the other AC cable to its socket on drive 1.

() Connect the longer DC cable to its respective socket on drive 1.

This connector is indexed and can only be installed one way.

- () Connect the remaining DC cable to its socket on drive 0.
- () Connect the motor control cable to its respective socket on the motor control board. Be sure the connector is installed so that the indexing pin in the female portion mates with the clipped or removed connector pin on the board.
- () Install the 50-pin ribbon cable connector on drive 1 as shown in the pictorial. This connector should also be installed so that the banded side of the ribbon cable is nearest the disk drive motor.
- Route the ribbon cable connector thru the slot along the top edge of the rear panel and install the cover using the #8 - 32 black screws supplied with the unit.

Programming the DMAF2 Controller Board

Before installing the DMAF2 controller in your computer system the jumper options on the board need to be set properly. DO NOT, however, change the adjustment of the three controls near the top of the board. These were pre-set at the factory and should only be adjusted by qualified service personnel. Jumper changes are accomplished by moving the small (probably blue) jumper blocks which look like small connectors. A complete description of each jumper position is given in the <u>DMAF2 Controller Board Jumpers</u> section of the computer system documentation manual (if applicable). In most cases the short table on the following page may be used to configure the board for your particular system. Make any jumper changes necessary.

DMAF2 Disk Unit Jumper Requirements

The following tables show the jumper settings to be used with the DMAF2 double density disk controller in various system configurations. In addition to the DMAF2 jumpers, some changes may be required to the MP-09 processor board jumpers.

DMAF Jumper		Table 1.1 D " <u>S</u> " <u>Systems</u>	MAF2 Jumpers <u>Non "S</u> " <u>Systems</u> (<u>69A, 69K</u>)
Halt/Bus REQ		Bus Req	Bus Req
Upper/Lower		Lower	Lower
BA / BA&BS		BA&BS	BA&BS
IRQ/Norm		Norm*	Norm
2 MHz/1 MHz		**************************************	††
Precomp/Norm		Precomp	Precomp
MR/Norm		MR	MR
56K/32K		56K	56K
Desel/Sel		Se1	Desel
Address Select	t	4	4

Table 1.2 -- MP-09 Jumpers

6809 Jumper	" <u>S</u> " <u>Systems</u>	Non "S" Systems (69A,	<u>69K</u>)
BA /BA&BS	BA	BA	
110/BR	BR	BR	
25/35	35	2S	

tt Set to System Clock

* Set to IRQ for UniFLEX© operation

Installing the DMAF2 Controller Board

Now that the DMAF2 controller board has been jumper programmed correctly it may installed in the computer. Most users should follow the instructions given in the system documentation manual of the computer. For other users be sure that power to both the disk and the computer is off before installing the controller. Before installation it is suggested that all memory in the system be checked for proper operation. SWTPC computer systems require no special modifications, but at least 20K of memory should be installed in the computer. The DMAF2 board should be installed in any of the un-used 50-pin card positions in the computer. The remaining end of the 50-pin ribbon cable coming from the disk drives should now be connected to the 50 pin connector on the DMAF2 board. The cable connector is indexed and can only be installed one way.

This completes the installation of the DMAF2 disk system. The disk may now be used as described in the <u>Operating</u> <u>Instructions</u> section of this instruction set.

SWTPC DMAF2 Disk Unit Operating Instructions

The DMAF2 Disk Unit is designed to be as straightforward and easy to use as possible. The DMAF2 has only one operator control on it--the power switch. This switch is located on the rear of the chassis and is easily accessible to the user when used in table top configurations. When installed in a SWTPC desk, it should be left in the ON position. Power is then controlled by the switch installed on the desk.

Loading Flexible Disks

To load a flexible disk, simply depress the pushbutton located on the center of the front panel. The loading handle is spring loaded and will then expose the load aperture.

Insert the flexible disk in the load aperture with the label toward the operator and facing the loading handle (see figure). Be sure that the flexible disk is inserted fully within the drive.



Write Protect Option

Having the write protect notch on a diskette closed with a piece of tape will allow the diskette to be written on. Leaving the notch open will disable write privileges.



The LED's on the drives are drive select/head load lights and are activated only when the head for a particular drive is loaded on a diskette. They are not power indicators.

The disk controller has been designed to load the head and turn on the drive motors only when necessary. When the computer requests data from the disk, both motors will activate and the correct head will load. After the information has been retrieved the head will unload and both motors will turn off approximately 60 seconds thereafter.

Just like cassette tapes, diskettes are made of magnetic materials and can be erased by stray magnetic fields. It is an excellent idea to back-up all important disks on spare diskettes. The following precautions should be followed concerning diskettes:

- 1. Return the diskette to its storage envelope whenever it is removed from a drive.
- 2. Keep diskettes away from magnetic fields and ferromagnetic materials which might become magnetized. Strong magnetic fields can distort recorded data on the disk.
- 3. Replace storage envelopes when they become worn, cracked or distorted. Envelopes are designed to protect the disk.
- 4. Do not write on the plastic jacket with a lead pencil or ball point pen. Use a felt tip pen.
- 5. Heat and contamination from a carelessly dropped ash can damage the diskette.
- 6. Do not expose diskettes to heat or sunlight.
- 7. Do not touch or attempt to clean the disk surface. Abrasions may cause loss of stored data.
- 8. Flexible disks must be in the same temperature and humidity environment as the disk drive for a minimum of 5 minutes before installing the diskette in the disk drive. These environmental requirements are as follows:
 - Temperature 50° F (10° C) to 80° F (27° C); maximum gradient of 20°F (11.1°C) per hour

Relative 8% to 80%, maximum wet bulb Humidity 82°F (29.4°C)

Booting the Disk Unit

After connecting the disk unit to the computer an attempt can be made to boot the system.

Before booting the system be sure that the computer and disk are both powered up. Next insert a diskette containing the disk operating system into drive 0 and close the door. The boot can then be executed to load the operating system. Computers containing a DISKBUG© or SBUG-E© monitor have an internal disk boot which is executed by entering a D command. Users without those monitors must enter the boot by hand as listed in the disk operating system software documentation.

Problems

If any problems are encountered in booting the disk unit, the REGTEST and STEPTEST diagnostics may be used to determine if the disk controller is operating properly. Power up the computer system and the disk unit. The disk unit is on when the cooling fan runs. If you do run into some kind of problem(s) check the following:

1.) Make sure you have at least 20K of RAM memory.

- 2.) Run the memory diagnostics and verify this memory to be good.
- 3.) Makes sure the disk controller board is properly programmed with the shorting blocks.
- 4.) Makes sure the DMAF2 disk controller board is plugged onto the computer system and is properly seated.
- 5.) Make sure the flat ribbon cable is plugged on the disk controller board and is oriented correctly.
- 6.) Makes sure the flat ribbon cable is plugged onto both disk drives and is oriented correctly. Check the orientation very carefully.
- 7.) Make sure the power connectors are plugged into their mates on the back of both drives.
- 8.) Makes sure the miniature connector going to the FD-M motor control board is oriented properly and plugged onto the connector pins as specified in the instruction set.
- 9.) Confirm that the cooling fan on the disk system is running. It should run whenever the disk system is turned on.
- 10.) Make sure you have the proper diskette installed in the system.
- 11.) Run the REGTEST diagnostic (details follow).

12.) Run the STEPTEST diagnostic (details follow).



REGTEST

The REGTEST diagnostic can be used to verify that the various registers on a DMAF2 disk controller board are being accessed properly. REGTEST assumes that the disk drives are connected to the controller and power is applied as described in the checkout instructions.

To use the REGTEST diagnostic, the code must be entered into the computer instruction by instruction using the memory examine and change function of the computer's monitor. Program execution should then be started at hex location 0100 by either setting the program counter to 0100 and typing G or by typing J 0100 depending on your monitor. REGTEST will then check each register and will alternately select drive 0 and then drive 1. Correct drive selection is indicated if the LED on the front of drive 0 lights briefly and if the LED on drive 1 lights briefly when the one on drive 0 goes out. Both LEDs should never be on at the same time. Both drive motors should be running. If any register errors are detected an X will be displayed. If no errors are detected a + will be displayed. The diagnostic should be allowed to run until 256+'s have been displayed.

REGTEST may be exited by depressing the RESET switch on the computer. A diskette need not be installed in the drive.

STEPTEST

The STEPTEST diagnostic can be used to verify that the track selection circuitry of the system drive and the controller are working properly. If desired, a blank diskette may be used in place of the supplied system diskette.

To use the STEPTEST diagnostic, it should first be entered into the computer instruction by instruction using the memory examine and change function of the computer's monitor. A diskette (perferably blank or at least write protected) should then be installed in drive 0 and the door closed. Program execution should then be started at hex location 0100 by setting the program counter to 0100 and typing G or by typing J 0100 depending on the computer's monitor. STEPTEST will then select drive #0 and check to see if the index hole sensing and motor control circuitry is working properly. If so, the disk drive heads will be moved back and forth between track 00 and track 76. STEPTEST outputs no information to the user--if the heads move back and forth across the diskette, proper operation is assumed.

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STEPTEST - 6809 Version

			* HEAD	STEPPING	PROGRAM		
F020			COMREG	EQU	\$F020		1791 COMMAND REGISTER
0100				ORG	\$0100		
0100 0103 0105 0107 0109 010B 010D 010F 0111 0113 0115 0117 0119 011B	8E F0 C6 FE E7 04 E6 84 C5 80 26 F3 C6 08 8D 0C C6 4C E7 03 8D 11 C6 18 8D 02 20 F0	20	START LOOP	LDX LDB STB LDB BITB BNE LDB BSR LDB STB BSR LDB BSR BSR BRA	#COMREG #\$FE 4,X 0,X #\$80 START #\$08 EXEC #76 3,X DEL28 #\$18 EXEC LOOP		LOAD THE COMMAND ADDRESS SELECT DRIVE #0 STORE IN DRVREG MOTORS ON, WAIT UNTIL READY RESTORE THE HEADS EXECUTE THE COMMAND TRACK 76 STORE IN DATA REGISTER WAIT FOR 1791 SEEK COMMAND EXECUTE THE COMMAND RE-DO THE STEPPING
011D 011F 0121 0123 0125 0127	E7 84 8D 07 E6 84 C5 01 26 FA 39		EXEC WAIT	STB BSR LDB BITB BNE RTS	O,X DEL28 O,X #1 WAIT		EXECUTE THE COMMAND WAIT FOR 1791 LOOP UNTIL NOT BUSY
0128 012A 012C	8D 00 8D 00 39		DEL28 DEL14 DEL	BSR BSR RTS	DEL14 DEL	andra State 1980 - State State 2000 - State State State	
0100							

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REGTEST - 6809 Version

		* DMAF2 F	REGISTER	TESTING	PROGRAM	
F000 F80A F024		ADDREG OUTCH DRVREG	EQU EQU EQU	\$F000 \$F80A \$F024		START OF DMAC REGISTERS CHARACTER OUTPUT ROUTINE DRIVE SELECT LATCH
0100 0100	8E F0 00	START	ORG LDX	\$0100 #ADDREG		LOAD ADDRESS OF REGISTERS
0103 0106 0108 010A 010C 010C	F6 01 6B E7 84 E7 01 E7 02 E7 03 E7 88 21		LDB STB STB STB STB STB	BYTE 0,X 1,X 2,X 3,X \$21,X		STORE IN REGISTERS
0111 0114 0117 0119 0118 0110	E7 88 22 E7 88 23 E6 84 8D 39 E6 01 8D 35		STB STB LDB BSR LDB BSR	\$22,X \$23,X 0,X TEST 1,X TFST		START READING DATA
011F 0121 0123 0125 0127	E6 02 8D 31 E6 03 8D 2D E6 88 21		LDB BSR LDB BSR LDB	2,X TEST 3,X TEST \$21,X		
012A 012C 012F 0131 0134 0136	8D 28 E6 88 22 8D 23 E6 88 23 8D 1E 7C 01 68		BSR LDB BSR LDB BSR INC	1ES1 \$22,X TEST \$23,X TEST BYTE		INCOEMENT THE DATTERN
0130 0139 013B 013E 0140 0142	C6 FE F7 F0 24 8D 20 C6 FD F7 F0 24		LDB STB BSR LDB STB	#\$FE DRVREG DELAY #\$FD DRVREG		SELECT DRIVE O WAIT AWHILE SELECT DRIVE 1
0145 0147 0149 014C 014F	8D 19 C6 FF F7 F0 24 86 2B AD 9F F8 0A		LDB STB LDA JSR	DELAY #\$FF DRVREG #"+" ΓΟυΤCH]		DESELECT ALL DRIVES PRINT A +
0152	20 AC	TECT	BRA	START	na ang babana Pantang akatapa	RE-DO THE TEST
0157 0159 0158 015F	27 06 86 58 AD 9F F8 0A 39	ОК	BEQ LDA JSR RTS	ок #"X" [OUTCH]		OUTPUT A X IF ERRORS
0160 0163 0165 0168 0168	8E FF FF 30 1F 8C 00 00 26 F9 39	DELAY DEC	LDX LEAX CPX BNE RTS	#\$FFFF -1,X #0 DEC		
016B	00	BYTE	FCB	0		TEMPORARY STORAGE LOCATION
0100			END	START		



Technical Information

The following sections contain a limited amount of technical information on the DMAF2. This information is not supplied to serve as a repair manual. Service should only be performed by qualified personnel. Some information may be useful in configuring the DMAF2 for your particular system.

How it Works

The DMAF2 disk unit can be broken down into four major parts: disk controller board, motor control board, power supply and the disk drives.

Disk Controller Board

The purpose of the disk controller board is to interface the disk drives to the computer system. The DMAF2 Controller Board is very complex and field service should not be attempted.

FD-M Motor Control Board

The motor control board turns AC power to the disk drives motors on and off as determined by the timer on the controller board. Integrated circuit IC1 on the board is an optically coupled triac which in turn drives Q1, a larger triac. The optical coupling is required to isolate the disk system's ground from the AC power line. NOTE: The motor control signal from the disk controller board is fed to two unused pins on both of the disk drives thru the flat ribbon cable. The miniature three-pin connector on the motor control board must be plugged onto these unused pins on one of the two drives otherwise the drive motors will not turn on. The orientation of the connector is important. Check the instruction set for complete details. Some of the components on this motor control board are connected to one side of the AC power line whenever the disk system's line cord is plugged into an AC receptacle regardless of whether or not it is turned on or running. Therefore, exercise extreme caution and never put your hands or tools near the board while the disk system is plugged into an AC receptacle.

P-20 DF Power Supply

The power supply on the disk system is just about as simple as you can make it. The secondaries of the transformer are wired to provide 7 VAC and 32 VAC outputs. These in turn are rectified by separate full wave bridge rectifier circuits providing +9 VDC and +30 VDC outputs. These outputs are then run thru separate integrated regulators Q3 and Q4 to yield the +5 VDC and +24 VDC outputs required by the disk drives. Power for the disk controller board is supplied by the computer system.

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DMAF2 Controller Board Jumpers

The DMAF2 contains a number of jumper programmable options as described below.

HALT/BUS REQ

When in the HALT mode, DMA transfers will take place by halting the processor. When in the BUS REQ position, transfers will be made by utilizing the bus request feature of the 6809. This jumper should normally be in the HALT position.

PRE COMP/NORM

When in the PRE COMP position the DMAF2 controller board will automatically pre-compensate (shift) certain bits written to disk by 250 nS on inner tracks while in the double density mode. Most disk drives require write pre-compensation and this jumper should be left in the PRE COMP position.

BA/BA & BS

When in the BA position the controller will respond to the processor's DMA acknowledge by looking at only the BA (bus available) line. For 6809 systems with the DMAF2 jumper in the BA & BS position, the controller will respond only when BA and BS are high. Normally a jumper on the 6809 processor board automatically puts the BA & BS status on the BA line so the DMAF2 jumper should be left in the BA position.

1 MHz/2MHz

This jumper selects the MEMORY READY line timing in 6809 systems. The jumper should be in the 1 MHz position for 1 MHz computer systems and in the 2 MHz position for systems operating at 2 MHz.

MR/NORM

When in the MR position the system's slow memory line will be pulled low each time an access is made to the DMAF2 board. This jumper should be in the MR position for all 6809 systems running at 2 MHz or when using certain dynamic memory boards.

32K/56K

This jumper changes the decoding so that the DMAF2 will respond to different addresses. It should be in the 32K position for 6800 operation and the 56K position for 6809 systems.

UPPER/LOWER

This jumper selects which 512 byte block that the DMAF2 will respond to of the 1K block selected by the 0 - 7 jumper. This jumper should normally be in the LOWER position.

0 - 7

This set of jumpers is used to change the DMAF2's addressing in 1K byte segments. The jumper should normally be left in the 4 position.

IRQ/NORM

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When in the NORM position no interrupts generated by the DMAF2 will be passed to the computer system. This jumper when in the IRQ position will enable interrupts. The jumper should normally be in the NORM position.

<u>32K/56K</u>	UPPE	ER/LOWER	<u>0</u> - <u>7</u>	PHYSICAL DMAF2
32		E E	0	ADDRESS RANGE
32		Ū	Õ	8200-83FF
32		Ľ.	1	8400-85FF
32		U s	1	8600-87FF
32		Ĺ	Ž	8800-89FF
32		U	2	8A00-88FF
32		L .	3	8C00-8DFF
32		a Universitation	· · · · · · · · · · · · · · · · · · ·	8E00-8FFF
32		L	4	9000-91FF
32	3	U	4	9200-93FF
32		L	5	9400-95FF
32		U	5	9600-97FF
32		Ľ	6	9800-99FF
32		U	6	9A00-9BFF
32	a ang sa	L	<u>/</u>	9C00-9DFF
32		U	7	9E00-9FFF
56		E L	0	E000-E1FF
56		U	0	E200-E3FF
56		L	1	E400-E5FF
56		U	1	E600-E7FF
50		L	2	E800-E9FF
50	4 a 1	U	2	EA00-EBFF
50	n for an	L	3	ECOU-EDFF
56			3	EEOO-EFFF FOOO-F1FF
56		- H	4	F200_F3FF
56	n a tha an an a'	Ľ	5	F400-F5FF
56		a 🖥 an	5	F600-F7FF
56		Ĺ	Ğ	F800-F9FF
56		U	6	FA00-FBFF
56		L	7	FC00-FDFF
56	and the second	U	7	FE00-FFFF

DESEL/SEL

With this jumper in the SEL position, additonal addresses on lines A16 - A19 will be output on the bus during DMA transfers. This jumper should be in the SEL position only in 6809 systems utilizing memory boards that use the A16 - A19 address lines such as the S/09 system.

FD-M Motor Control Board



Parts List FD-M Motor Control Board

Res	istors

<u> </u>	R1	180 ohm	1⁄2	watt	resistor
	R2	220 ohm	ij	"	

R3 4.7 K ohm ½ watt resistor

Capacitors

 C1	0.0	1 mf	d @	400 V	' capac	itor
C2	0.1	mfd	@ 4	00 V (capaci	tor

Semiconductors

Q1	TIC206D or TIC216D 400 V triac
 IC1	MOC3011 optically coupled driver

Note: All voltage specifications are minimums.





P-30 DF Power Supply



Parts List P-30 DF Power Supply

	a sa	Resistors			Diodes	
<u> </u>	R1	243 ohm 1% resistor		D1*	1N5402 high current dioc	le
·····	R2	4320 ohm 1% resistor	·	D2*	11 11 11 11	
	R3	not used	. 	D3*	11 11 11 11 11 11	
••••••••••••••••••••••••••••••••••••••	R4	not used		D4*	11 11 11 11 11 11 11 11 11 11 11 11 11	÷
a distriction of the				D5*	not used	
		Capacitors		D6*	1N4003 diode	
	C1	0.1 mfd capacitor		D7*	1N5402 high current dioc	le
	C2	0.1 mfd capacitor		D8*	11 11 11 11	
	C3*	10,000 mfd @ 40 VDC		D9*	11 11 11 11	
		electrolytic capacitor	<u> </u>	D10*		
· · ·	C4*	29,000 mfd @ 15 VDC		D11*	1N4003 diode	
		electrolytic capacitor		D12*	1N4003 diode	
<u>.</u>	C5*	1,000 mfd @ 25 VDC	<u> </u>	D13*	1N4003 diode	
		electrolytic capacitor		D14*	not used	
1999 - 1997 - 19	C6	not used				
		• • • • • • • • • • • • • • • • • • •				
			Regulator	rs .		
	Q1*	LM323 +5 VDC regulator		Q3*	not used	1
	Q2*	LM317 adjustable regulator		Q4*	not used	
		n an an an an Anna an Anna Anna Anna An	Aiscellane	ous		
	T1*	Power transformer 50-60 Hz		F1	2½ amp slo-blo fuse	
		Primary: 120/240 VAC		J24	Jumper Installed	
		Secondaries: 12 VAC @ 1.5	amp			
		12 VAC @ 1.5	amp			
		7 VAC @ 3	amp		ration in the second	
		24 VAC @ 200) ma			

All components flagged with a (*) must be oriented as shown in the component layout drawing and pictorials.



Drive Programming - Remex Disk Drives

In order to use the supplied disk drives they must first be programmed to enable the functions required by the system. The following description should be used in conjunction with the DRIVE PROGRAMMING PICTORIAL to program the Remex disk drives.

- () Turn one drive upside down so that the door is toward you and so that you are looking at the component side of the circuit board. Jumper selections are made on these drives by small shorting blocks which look like connectors without any wires attached.
- () Install the DRIVE O jumper (DS1) as shown in the pictorial.
- () Remove the jumper labeled "DL" if it is installed.
- () Using a flat blade screwdriver or IC puller, carefully remove the pull-up resistor block as shown in the pictorial. This drive is now programmed as DRIVE 0. A notation should be marked on the back or top of the drive labeling it as drive 0.
- () Turn the other drive upside down and install the jumper block in the DRIVE 1 location (DS2) as shown in the pictorial below. Do not remove the pull-up resistor block from this drive.
- () Remove the jumper labeled "DL" if it is installed. This drive is now programmed as DRIVE 1.
- () Be sure that on BOTH drives the only other jumpers installed are as follows:

4000 S2 U-U BB-CC -15V

an Ar**an** An antar an Ar State an An an

() R67 on the disk drive should be changed from a 10K to a 100K for the power up-RESET circuit to function properly.

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-B

Drive Programming--Qume Disk Drives

In order to use the supplied disk drives they must first be programmed to enable the functions required by the system. The following description should be used in conjunction with the DRIVE PROGRAMMING PICTORIAL to program the Qume disk drives.

Turn one drive upside down so that the door is toward you and so that you are looking at the component side of the circuit board. Jumper selections are made on these drives by small shorting blocks which look like connectors without any wires attached.

) Install the DRIVE O jumper as shown on the pictorial below.

()

L

(

()

1

Using a flat blade screwdriver or IC puller carefully remove the two pull-up resistor blocks as shown on the pictorial. This drive is now programmed as DRIVE O. A small notation should be marked on the back or top of the drive labeling it as drive O.

Turn the other drive upside down and install the jumper block in the DRIVE 1 location as shown in the pictorial below. Do not remove the pull-up resistor blocks from this drive. The drive is now programmed as DRIVE 1.



DRIVE PROGRAMMER PICTORIAL

Data Separator Adjustment Procedure--DMAF2 Disk Controller

Adjustment of the data separator on the DMAF2 disk controller board requires some special equipment including a good dual channel oscilloscope and a disk formatted with all "1's". This adjustment requires a technical ability and should only be done by qualified personnel.

- 1.) Connect channel A of an oscilloscope to test point TP1 and channel B to TP2. The scope should be set on 1 uS/div. and 2 volts/div. The scope should be set to trigger on channel A.
- 2.) Install the special "All ones" alignment disk in drive 0 and execute the SINGLE DENSITY LOAD HEAD program below: (if the controller boad has a jumper in the 32K position rather than the 56K position, use addresses 9020 and 9024 rather than F020 and F024 in all the following programs:)

0100	86	DE
0102	B7	F024
0105	B6	F020
0108	20	FB

3.) Adjust the DF pot for 1 uS pulses on channel A. Adjust the VCO pot for the waveform shown below:



4.) With the oscilloscope controls invert channel B and add channel A and channel B. The waveform should be as below:



Adjust the VCO and DF controls to minimize the width of the displayed spikes.

5.) RESET the computer and execute the DOUBLE DENSITY LOAD HEAD program listed below:

0100	86	FE
0102	B7	F024
0105	B6	F020
0108	20	FB

Adjust the MFM pot for the waveform shown below:



6.) Secure each pot with a dab of liquid silicone rubber cement. RESET the system and remove the alignment disk.





Parts List - DMF2A Disk Controller

Resistors

R1 1K ohm 1/4 watt resistor	R29 150 ohm 1/4 watt resistor
R2 1K " " " "	R30 150 " " " "
R3 10K ohm potentiometer	R31 150 " " " "
R4 10K "	R32 10K " " " "
R5 140 ohm 1% resistor	R33 470 " " "
R6 806 ohm 1% resistor	R34 10K " " "
R7 2.2K ohm 1/4 watt resistor	R35 10K " " " "
R8 2.2K " " "	R36 10K " " " "
R9 5K ohm potentiometer	R37 10K " " " "
R10 270 ohm 1/2 watt resistor	R38 10K " " " "
R11 10K ohm 1% resistor	R39 10K " " " "
R12 1.1K ohm 1% resistor	R40 10K " " "
R13 3.48K ohm 1% resistor	R41 10K " " "
R14 3.48K ohm 1% resistor	
R15 1.1K ohm 1% resistor	R43 10K " " " "
R16 10K ohm 1% resistor	R44 10K " " "
R17 1K ohm 1/4 watt resistor	
R18 1K " " " "	TR46 7.5K 1/4 watt resistor
R19 150 ohm 1/2 watt resistor	TR47 10K ohm 1% resistor
R20 1K " " " "	R48 10K ohm 1/4 watt resistor
R21 5.6K ohm 1/4 watt resistor	R49 10K " " " " " "
R22 10K " " " "	
R23 10K " " " "	R51 10M " " " "
R24 100K " " " "	R52 1K " " " "
R25 47K " " "	R53 10K " " " "
R26 330 " " " "	R54 4.7K " " "
R27 150 " " " "	R55 10K " " " "
R28 150 " " " "	R56 10K " " "
† Value may vary as necessary to adju	st cycle stretch

Integrated Circuits

<u> </u>	IC1	4558 dual operational	. <u>11</u>	IC21	78L12 12-volt regulator
		amplifier		IC22	4024 voltage controlled
	IC2	96SO2 dual one shot	- 1		oscillator
	IC3	74S112 dual J-K flip-flop		IC23	4049B or 14049 hex CMOS
	IC4	74LS123 dual one shot			inverter
	IC5	14541 timer (MOS)		IC24	74LS86 guad EXCLUSIVE-OR
	IC6	74LS166 shift register			gate
	IC7	74LSO2 quad NOR gate		IC25	74LSO8 guad AND gate
	IC8	74LS240 octal buffer		IC26	74LS32 quad OR gate
	IC9	74LSO4 hex inverter		IC27	74LS33 guad open collec-
	IC10	74LSO2 quad NOR gate			tor NOR gate
	IC11	74LS240 octal buffer		IC28	6844 DMA controller
	IC12	74LS240 octal buffer		IC29	74LS273 octal latch
	IC13	7805 5-volt regulator		IC30	74LS273 octal latch
	IC14	74S112 dual J-K flip-flop		IC31	74LS74 dual D flip flop
	IC15	74LSOO quad NAND gate		IC32	79L12 -12 volt regulator

 IC16 IC17	74LSOO quad NAND gate 74LS74 dual D flip flop	 1C33	74125 quad tri-state buffer
 IC18 IC19 IC20	9602 dual one-shot 74LSO8 quad AND gate 1791 disk controller	 IC34 IC35 IC36	74LS32 quad OR gate 74LS138 decoder 74LS132 quad NAND gate
		 IC37	74LS245 octal bi-

directional transceiver IC38 74LS138 decoder IC39 74LS244 octal buffer IC40 74LS245 octal bi-

directional transceiver

Capacitors

	C1	200 pf poly capacitor		C22	0.1	mfd	canacito	^	
	<u>c</u> 2	0 47 mfd tantalum canaciton	<u> </u>	C22	11		н		
	62	0.047 mfd film capacitor		C23	н	-	11		
	CJ		<u> </u>	024			н		
	64	1300 pr poly		625			· · ·		
. <u></u>	65	U.U47 mfd film		C26					
	C6	1300 pf poly		C27	11	н	на на П		
	C7	110 pf poly		C28	11	11	H _.		
	C8	470 pf poly	<u> </u>	C29	11	11	. H .		
	60	0.1 mfd capacitor		020	н	81	11		
	C10	0.022 mfd film		C21			81		
	010			031	H	-	· •		
		U.I mru capacitor		632			•		
·	C12	4/U pt poly		C33	ы 		и		
	C13	0.22 mfd film		C34	11	61	10		•
	C14	62 pf capacitor		C35	11	H.	81		
	C15	20 pf disc capacitor		C36	H	10	11		
	C16	200 nf nolv		C 27	11	н	N		
	C17	470 nf poly		C3/	μ	н ^т	#1		
	C10	470 pf poly		0.00	11				
	010			639	н	11			
	619	100 pr poly	<u> </u>	L40			10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -		
	C20	470 pf poly		C41	1	mfd	0 15 volt		
	C21	0.1 mfd capacitor			ta	ntal	um capaci	tor	
				C42	22	0 mf	d @ 10 v e	electr	olvtic
			<u> </u>	C43	100	DF		citor	
						F			

C44 0.1 mfd capacitor

Semiconductors

Q1	2N4402	PNP t	ransistor	•	D4	1N4148	silico	n diode	
 Q2	2N4400	NPN t	ransistor	•	 D5	1N4734	5.6 vo	lt zener	diode
D1	1N4735	6.2 v	olt zener	r diode	 D6	1N4148	silico	n diode	
 D2	1N4148	silic	on diode		 D7	1N4148	8	н _	
 D3	1N4148	silic	on diode				in star		

<u>Miscellaneous</u>

Y1 4.00 MHz crystal









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