WORKING WITH THE RICOH
MULTI-CHIP SERIAL FRAM ASSEMBLIES

The RICOH serial FRAM assemblies consists of multiple memory components mounted on a double sided circuit board. The purpose of this document is to describe the procedure for reading, archiving and programming the memory parts thereby allowing an entire assembly to be duplicated. The procedure assumes the use of the Andromeda Research EPROM+ programming system with the ASERSM1A in-circuit adapter plus the CABLE8/DD direct drive assembly.

CONFIGURING THE PROGRAMMER, ADAPTER AND DIRECT DRIVE ASSEMBLY

Before connecting to the assembly start the EPROM+ system and select the FM25L256 part. Set the programming unit DIP switch then install the ASERSM1A adapter into the programming unit socket (far left). With the adapter in place set the VOLTAGE switch to LV and set the LV RANGE switch to 3.6. Attach the CABLE8/DD to the CENTER set of pins (SPI BUS). Be sure the brown wire is on the right. The system is now ready to connect to the RICOH assembly.

ATTACHING THE CHIP CLIP TO THE 8 PIN SERIAL FRAM MEMORY PART

The CABLE8/DD connects to a memory part using the surface mount clip. To connect to a chip align the red dot on the clip with the dimple on the memory part. Fully open the clip and position the jaws such that the brass fingers align with the chip pins. Release the clip and confirm that the jaws close around the chip and tightly grip the chip body. Do not force the clip onto the chip as this will distort the clip fingers and damage the clip. *NOTE:* If the clip does not tightly grip the chip body a positive electrical connection cannot be guaranteed.

ATTACHING THE SPIKE POINT ALLIGATOR CLIP TO THE RICOH ASSEMBLIES

There are two RICOH assemblies; one has components on one side and supports a maximum of four FRAM chips. The other has components on both sides and supports a maximum of eight FRAM chips. The four chip assembly and eight chip assembly both require the attachment of the external spike point alligator clip to enable access to the memory parts.

ALLIGATOR PLUG ORIENTATION - Before connection to the FRAM assembly the alligator clip plug must be oriented correctly in the eight pin DIP socket on the CABLE8/DD board. The illustrations on the right show the correct orientation for the plug for each FRAM assembly. Each assembly requires a separate connection point for the clip upper jaw spike.

FOUR CHIP ASSEMBLY - The spike must contact a specific hole on the four chip assembly. To attach the clip open the jaws and carefully align the spike with the **HOLE** as shown in the left illustration below. Release the jaws and the clip will remain in place.
EIGHT CHIP ASSEMBLY - The spike must contact the correct pad (6th counting left from the bottom right) below the white connector. (See right illustration.)
NOTE: In both cases if the alligator clip is not properly connected chip access is disabled.

HOW THE EPROM+ SYSTEM WORKS WITH MULTIPLE CHIPS

The EPROM+ software is specifically designed to work with multiple chips individually or as a group. The system refers to a group of chips as a "SERIES". Working with a series allows you to save multiple chips to a single file. You may then program an identical series of chips from the file by simply connecting each chip in the series to the system in sequence as prompted. The eight chip RICOH assemblies has space to accomodate

eight FM25L256 parts although not all locations may be occupied. (See figure) The figure shows all eight chip positions however 6, 7 and 8 may not be installed. For this example only chips 1 through 5 are considered populated and therefore chips 1, 2, 3, 4 and 5 will compose the series. **NOTE:** Use the same basic procedure for the four chip assembly.
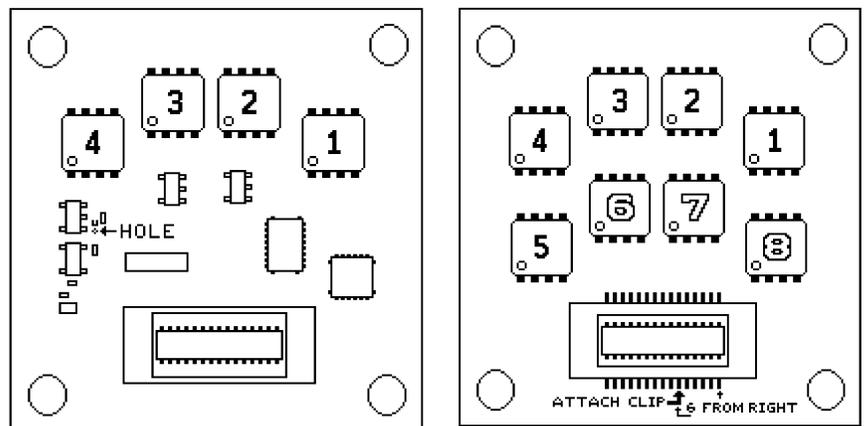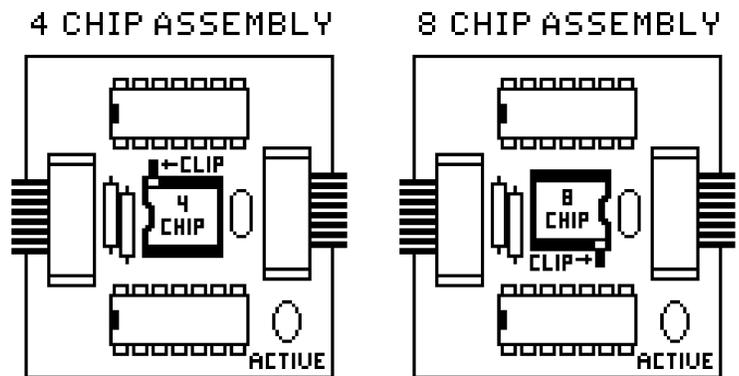
HOW TO SAVE A SERIES OF CHIPS TO A MASTER FILE

This procedure describes how to save a series of chips (1-5) to a master file which can then be used as the source to duplicate the data into another RICOH assembly. Since the assembly consists of a series of individual chips, each chip must be read into the EPROM+ buffer at a specific address in order to properly build the master file. Also since you will be placing the clip sequentially onto each chip you must confirm that the clip is indeed making positive electrical contact with the chip before the chip is read into the buffer. To confirm that the clip is properly attached to a chip enter the buffer editor (command 5) and press "Q" (QUICK VIEW DEVICE CONTENTS). This displays the device contents on the editor screen. Confirm that you see data other than all FF or 00. If so then the clip is connected properly and you may proceed to read the data into the buffer. Each time you connect the clip to a chip use the Q command to confirm a positive connection.

BUILDING THE MASTER FILE IN THE BUFFER

To build the master file you will read each chip sequentially into the buffer at a specific address. In essence you will create an image of all chips, one after the other, in the buffer. (See figure) To begin attach the clip to chip 1 and confirm the connection. Once the connection is confirmed press R (READ DEVICE INTO BUFFER). At the ENTER STARTING ADDRESS -> prompt type 0 and press EN-TER. Respond to the READ (Y/N) -> prompt with Y. The LED on the CABLE8/DD will light while the system reads the contents of the first chip into the buffer. The chip data will appear on the screen. Now move the clip to the second chip and repeat the above procedure (including command Q) except for the buffer starting address enter 8000. This reads the contents of the second chip into the buffer following the data from the first chip. Proceed with each subsequent chip using the starting addresses (top number) in the figure until all chips have been read.

SAVING THE MASTER FILE

Once the master file buffer image is created you must now save the buffer area which holds the data. Before you proceed remember the ending buffer address for the last chip you read. For a five chip series this will be 27FFF. Press ESC to exit the buffer editor and return to the command list. To save the master file press A (SAVE BUFFER TO DISK FILE). Respond to the ENTER FILENAME -> prompt with an eight character filename such as RICOH5 and press ENTER. Respond to the ENTER BUFFER STARTING ADDRESS -> with 0 and press ENTER. Respond to the ENTER BUFFER ENDING ADDRESS -> with 27FFF. Respond to the SAVE (Y/N/(O)PTIONS) -> with Y. The buffer data will be saved to the file. This file is the master file.

PROGRAMMING A RICOH ASSEMBLY FROM THE MASTER FILE

The programming procedure is similar but less complex than the reading procedure. As before, attach the alligator clip to the assembly and attach the clip to chip number 1. Use the main command list D (DIRECTORY OF FILES) command to locate the master file. Hi-lite the filename and press F3. This will load the file into the buffer and display NUMBER OF DEVICES REQUIRED = 5, INSERT DEVICE NUMBER 1, DEVICE STARTING ADDRESS = 0. At the PROGRAM OR SKIP (P/S) -> prompt press P. The system will program the first chip, verify correct programming and then prompt you to insert chip 2. Move the clip to the chip 2 and press P to program. Repeat this process until all chips are programmed. At this point the contents of the file have been transferred into the series of chips.

PROGRAMMING ERRORS

If you encounter a programming error (DEVICE DID NOT PROGRAM CORRECTLY) there are two common reasons:
1. The clip is not making good electrical contact with the chip. Remove and realign the clip on the chip. The system will allow you to reprogram the part without starting over in the series.
2. The chip has BLOCK PROTECT BITS set in the chip STATUS REGISTER. Each chip includes, in addition to the memory array, a STATUS REGISTER. The STATUS REGISTER is a group of 8 bits which are accessed using command Z (DEVICE OPTIONS). Certain bits, (usually 3 and 2) if set (1), enable a chip function called BLOCK PROTECT. If a BLOCK PROTECT bit is set it prevents a portion of the memory array from being programmed. In order for successful programming to occur, the STATUS REGISTER bits must be set to 0. To set status bits to 0 press Z, then press R (read status register), then C (change status register). Use the arrow keys to move to any bit location you wish to change and press the 0 key to change a 1 to a 0. Press ESC then press W (write status register). This will update the chip status register and enable programming.

BUFFER

| 0000 |
| CHIP1 |
| 7FFF |

| 8000 |
| CHIP2 |
| FFFF |

| 10000 |
| CHIP3 |
| 17FFF |

| 18000 |
| CHIP4 |
| 1FFFF |

| 20000 |
| CHIP5 |
| 27FFF |

| 28000 |
| CHIP6 |
| 2FFFF |

| 30000 |
| CHIP7 |
| 37FFF |

| 38000 |
| CHIP8 |
| 3FFFF |