Chapter 6

Conclusions.

During the early stage of this study, the communication between IBM 3278 and IBM 3274 is assumed to be BSC, and the IBM 3278 is assumed to have some intelligent functions, the assumption drawn is based on the reference available, section 2.4. Therefore a program is developed to simulated the intelligent function of IBM 3278 that was assumed. Also a hardware is developed base on two Z80A CPU to convert coaxial data to RS-232C. It is assumed that the protocol used between IBM 3274 and IBM 3278 must have a command that allow devices some processing time. Also the interfacing to coaxial cable is delayed, because the hardware components for interfacing to coaxial cable is not readily available, ie. the IC must be imported from overseas, the pulse transformer is scraped from used IBM parts, and the crystal must be specially made. And in later stage, after the coaxial protocol is found, it is found that the IBM 3278 doesn't have the intelligent functions that was assumed earlier. Also the conversion of coaxial data to RS-232C required a high speed and specialized CPU, to handle the high speed data transfer in multi byte mode.

Another hardware is developed to capture data

transmitted in the coaxial cable between IBM 3274 and IBM 3278. This hardware is developed because the information on the coaxial protocol is not available to public. After capturing of data in the coaxial cable, it is found that the protocol was not BSC.

Both hardwares (3270 CIB and 3270 CAB) developed are tested in the test configuration shown in chapter 4 and using the softwares described in chapter 5. It is found to be satisfactory and useful, especially the 3270CIB.

As the result of this study and experience, the following conclusion is drawn.

1. The communication protocol used between the IBM 3274 and IBM 3278 is not BSC. The Protocol found is illustrated in Appendix D. Also the protocol found is only part of the protocol used between IBM 3274 and IBM 3278.

2. IBM 3278 doesn't have any local intelligent function at all. All the intelligent functions are performed by the IBM 3274 or application program.

3. The hardware that can communicate with the IBM 3274 required a high speed CPU to handle the high speed data transfer rate, 8X305 microcontroller or CHIPSLink 82C570 Single Chip IBM 3270 Protocol Controller(Appendix G). In order to communicate with the coaxial cable in

multi byte mode, the CPU must be able to read data from I/O port at the speed of 196.558 KHz (2.3587 MHz / 12 = 196.557 KHz). As illustrated in Appendix N, the speed of 80286 CPU needed for capturing data with data bit 10 and bit 11 must be 20MHz (total average clock cycles required = (48+153)/2 x 196.558 KHz = 19.754 MHz). Also as shown in Appendix O, the speed of 80286 CPU needed for capturing data without bit 10 and bit 11 must be 13 MHz (total average clock cycles required = (35+96)/2 x 196.558 KHz = 12.874 MHz)

As a result of this study, further study into the development of the emulator is possible. The following procedures are recommended for further development.

1. Develops another coaxial interface board, using high speed CPU (8X305), and obtains all the remaining communication protocol.

2. Using the hardware developed in step 1, to simulate the communication with IBM 3274, using the protocol determined from step 1.

3. Develops hardware that will convert the coaxial data to RS-232C, based from the result of step 1 and 2.

4. Develops software that will allow microcomputer to communicate with the hardware developed in step 3.

Also the Display Station Emulation function was found to be more practical if it is implemented on the emulator instead of microcomputer. This is because of the high speed data communication used in coaxial cable, and also the time out in the response time. The Emulator hardware should have system block diagram similar to the IRMA system block diagram, as described in 2.5

The results of this study can lead to further development of IBM 3270 Information Display System Components. The following IBM products have similar concept to this study:

1. IBM 3287 Terminal Printer

2. IBM 3178 Display Station

3. IBM 3279 Display Station