VWE System 3.0
User Guide and Technical Manual

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Control Towers

There are many items that are to be covered under Control Towers. Each one will be treated as a separate item if possible.

Launch Computers

Startup

The following is a step by step order of events for starting up and setting up the Launch Computer for the Mission Type for the set in the morning.

1) Turn on the monitor
2) Turn on the Computer
3) Make sure that the Game Replay folder is on the Desktop.
4) Run the correct Operator's Console for the set.
5) Select **Apple-7 Reset** in order to Reset all settings.
6) Using the Reset Control Box reset all of the cockpits on the set. Give the cockpits time to Run through all of the screen tests. (Approx. 1 min.)
7) Select **Apple-4 Long Load** in order to set the correct load for the mission setting.
8) Select **Apple-G** in order to start the load.
9) After the load is complete (Approx. 10 min.), start the mission using **Apple-U**.
10) Check each cockpit to be sure it is operating normally.
11) Check to make sure after the mission is complete that the Mission Review Computers ran the Mission Review.

Shutdown

The preferred shutdown method for the control towers is to simply quit out of the console (Apple-Q) then turn off the monitor. It presents no danger to leave the computers running.

Software Installation

Software upgrades of the control towers is one of the most complicated operations that will be performed on the c omputers. It is best if you use Timbuktu Pro from the Tech Computer to deliver the new software to each of the computers. This is done using the send files option. This allows the same software to be copied to the Four control tower computers at the same time. For more info on Timbuktu and how to send the files please refer to the Timbuktu Procedure section.

Each Launch Computer has a software folder in the hard drive. Inside this folder is up to the last three versions or updates. When you get a new update you create a new folder in the software folder for it. ex. update 12.2.2 has a folder 12.2.2. Each update will more than likely have to be updated as far as the network_configuration and or load_software. The updates will usually indicate what changes and what needs to be changed to bring it up on the system.

Note 1: When a short load is used, it might be advantageous to also restart the console. The console looks like a simple piece of paper on which you type in the settings preferred for the next adventure. In reality it is a program which translates textual fields into computer instructions for the cockpits to follow. Considering the console must translate and communicate millions of instructions per second, the longer it is used, the greater the chance for error. Refreshing the console takes a fraction of a minute, and sometimes can solve potential problems.

When to short load

1) After a reset

Why reset/short load

1) Frozen graphics on primary screen
2) No names on cockpits after pushing start
3) Transmission error message
4) Black screens after selecting Apple U.
5) Non responsive Mechs
6) Floating or miniature Mechs
7) Otherwise corrupted mission

If short load doesn't work - try

1) Long load

Note 2: When the operator pushes the reset button, all eight cockpits plus the camera ships are reset. Doing a short or long load; however; only sends the files needed for cockpit operation to the cockpits selected with the "on" switch checked the console. The rest will lack the files until they too are selected and loaded with the appropriate files.

The wise solution is, after a reset; turn all cockpits "on" at the console and use camera ships or directors in the cockpits which are not used in the next adventure. This insures that the proper files are loaded into all to the cockpits.

Make sure that as soon as the next adventure is started, however, to change the extra camera ships and directors back into the appropriate vehicles.

Long loads

The "long load" installs the graphics files, the game files and the current settings (console settings ...i.e. Mech choices or scenario). The cockpits will take a long load when primary monitors will show the memory test messages, or the quick game loader message.

A long load for all eight cockpits takes approximately 14 minutes.

When to long load

1) After a reset; first thing in the morning
2) After a reset; which was preceded by a failed short load.
3) After a reset; during the process of changing adventure software.

Note 3: If one cockpit has an obvious graphics scramble on the primary screen and all other cockpits functioned properly during the last adventure, do a reset on that one cockpit only and long load that cockpit. After the single cockpit is long loaded, a reset cam be done and the entire set can be short loaded. See Note 1.

Resets

Short loads will only load the game files and current settings (see short loads). They will not load the graphics files. The graphics files must be previously loaded with a long load (See long load). The short load will only take if a reset has been done. In other words, the primary screens of the cockpits must show the memory check messages or the quick game loader message.

A reset should be used as a recovery tool for unexpected malfunctions of the missions. These malfunctions are usually software produced and tend to cause incomplete or otherwise corrupted missions. Although a reset is sometimes used to recover from operator error, with seasoning, the tower technicians will eventually limit their need for such recoveries.

The reset button is wired independent from the actual arcnet network and has no effect on the control tower console screen. After a reset, the console clock will continue to tick until the next mission is started. Each separate reset button (Alpha, Beta, Gamma, Delta) is wired to all eight cockpits and both camera ships. The reset button at Alpha resets only Alpha cockpits, as does Beta with Beta, and Gamma with Gamma, and Delta with Delta.

The reset button activates a 12 volt surge of power through all eight cockpits and the two camera ships. The button needs only to be pushed a fraction of a second. Holding the button for extended periods of time will not clear out any extra problems. On the contrary, it will potentially cause problems by overheating components.

The reset button will clear the cockpits memory of the "game files" and the "current setting". It will also reset the cockpit computers, displays, and pilots moveable controls.

It is important that for the last reset before the game is reloaded that all hands and feet are off of the controls. The reset sets the joystick, throttle, and foot pedals to the neutral position so that when the next adventure is run, any control movements can be properly decoded by the cockpits computers. If the pilot is tilting the joystick during the reset, the neutral position will be improperly set and the vehicle will most likely travel in circles. To reset the joystick use the Diagnostics.

Game Replay

The game replay folder when active on the desktop is essentially a link from the Launch computer to the Mission Review computer. Without that link you cannot send the game file necessary for the Mission Review. If you need to mount or make active the game replay folder active on you computer follow these steps.

1) Open chooser under the apple menu.
2) Select apple share
3) Select the appropriate Mission Review computer for your set.
Ex. Beta set would select Beta Mission Review.
4) Select Guest and hit OK.
5) Highlight Game Replay and hit OK.
6) Close out Chooser window.

You should now see the game replay folder on the desktop. If you cannot find the proper mission review in the chooser window then go and check the mission review computer and make sure it is either plugged into the network or that it has not crashed. If you are unable to see any choices for chooser then check the launch computer to make sure it is plugged into the network. For ethernet problems please refer to **Ethernet** portion of procedures.

Arcnet

Description

Each group of eight cockpits are linked together with their own control computer. There are a total of four groups of eight cockpits labeled "Alpha", "Beta", "Gamma", and "Delta".

The control computer (Alpha, Beta, Gamma, or Delta), holds a host card (A/Rose card) for that group of cockpits. In order for the A/Rose card to operate properly, an extension called A/Rose must be in the extensions folder of the control tower system folder. The A/Rose controls the set up and initiation of the data in a game side. All of the nodes (cockpits and computers) are linked together using an Arcnet HUB. The HUB is located next to the Launch Computer. The light on the front of the HUB represents proper continuity for each connection. The Arcnet network is made up of a star type network configuration. In other works each cockpit or camera ship is connected directly to the hub and not to each other.

Arcnet problems

If the network is not responding properly questions to ask would be...

1) Is there power to all of the nodes?
   - a) camera ships
   - b) control computer
   - c) HUB
   - d) cockpits

2) Are the connections tight?
   - a) HUB
   - b) nodes (cockpits, host computer, camera ships)
   - c) Cabling improperly terminated
   - d Improperly seated or faulty CPU in cockpit

3) Is there a software problem?
   - a) reset cockpits
   - b) quit console and restart console
   - c) quit console, restart computer, restart console

4) Is the host card seated properly?
   - a) Exit console and power down the computer
   - b) take off computer cover
   - c) gently but firmly push down card
   - d) reassemble work station
   - e) restart computer and console

Note: Shoving things in-between computers can upset the cable which connects to the host card.

Camera Ship Monitors

The camera ship monitors are extremely simple. In order to turn them on you simply turn them on. You need to set the input to LINE using the remote controls. In order to turn them off you simply turn them off. They need to be turned off each night.

Mission Review

Description

The mission review computers present a birds eye view of the prior adventure at twice the normal rate. The actual program that runs, presenting the review is different for Red Planet than for BattleTech. The program for Red Planet is called Post Modern and the program for BattleTech is called Flight Recorder. In later versions of the software the BattleTech mission review has been called BTMR.

Flight Recorder and Post Modern are both found in a folder called "game replay" which is stored on the desk top of the mission review computer. This "game replay" folder has 'file sharing' turned on via the 'file / file sharing' selection from the system (finder) menu bar. File sharing is turned on for this folder because the corresponding control tower computer uses it for sending game replay information in a file called "temp_spool". After the mission review is played, the computer renames temp_spool to last_spool.

In order for this to take place, the game replay folder must be "mounted" on the corresponding control tower computer desk top. please refer to **Control Towers - Game Replay**.

Startup

Red Planet and BattleTech have two different applications therefore each is different to startup. For BattleTech you simply startup the flight recorder or under the apple menu select the BattleTech Alias for the flight recorder. For Red Planet you need to do the following:

1) Select either the Post Modern or the Red Planet Alias in the apple menu for it.
2) Select under the special menu Hide Menu bar or Apple Y.
3) Next key in Apple J in order to activate the auto import feature.

If a temp_spool is in the game replay folder each will start to load and play the mission. A BT temp_spool file being played on the Red Planet mission review will cause the review to crash and vice versa. If a temp_spool file is not present, the MR software will wait until a Control tower sends the file to be played.

Red planet mission review crash

If the Red Planet Mission Review crashes...

1) Take control of the mission review computer via Timbuktu (see **Timbuktu**)
2) While holding the Apple key down, hit the "Q" key.
3) If the mission review computer doesn't exit the program, the computer will need to be reset.
4) Once the program is exited, click on the icon in the far upper right hand corner.
5) Notice which programs are running. The finder should be the only program.

6) If the print monitor is there with a diamond next to it, there may be printer problems.
If there is a problem then
a) Drag the arrow down to the print monitor and check the printers
b) When the print monitor launches, it might give a message about the problem
c) If it offers the options to "cancel printing" or "try again", choose try again. If this fails then cancel the print job.
d) The print monitor should then show the status of what needs to be printed
e) If there are many print jobs backed up, you might cancel some jobs.
f) If when you check the print monitor and it has stopped printing, restart printing by selecting the "resume printing" choice form the "file" menu
g) Exit the print monitor by clicking the upper right hand square
7) Relaunch Red Planet Mission Review

Relaunch Red Planet Mission Review

A normal relaunch of mission review would go as follows...

1) Select Red Planet from the Apple Menu.
2) From the "Special" menu option choose "Hide Menu Bar" or **Apple Y**.
3) Next hit **Apple J** in order to activate the "Auto Import"

By the time the mission review computer is rescued from an unfavorable state, the next mission review might be waiting to play. If this is the case then when you select "Auto Import" or Apple J the mission will automatically start to load.

The mission reviews use two screens. The "main" screen appears on the left monitor. The "vehicle status" screen appears on the right monitor whenever a mission is being reviewed otherwise you should see the Red Planet splash screen displayed on both monitors.

The review will start to play in the condition described above. After the review has completed the Red Planet Splash screen will return and will erase the main screen and the vehicle screen.

If you need to reprint or redisplay a previous mission then do the following

1) Hit **Apple O** or Open file.
2) Select the file to open. It will either be Last_Spool or Temp_Spool.
3) The cursor will Disappear or be frozen until the file is completely read.
4) After the file is read hit **Apple P** in order to reprint the mission.
5) In order to start a playback of the file hit **Apple H.**
6) If you ever wish to stop a review during playback hit **Apple G.**
7) After the mission is played it will return to the Red Planet splash screen as normal.

BattleTech mission review crash

If the Battle Tech Mission Review crashes...

1) Take control of the mission review computer via Timbuktu (see **Timbuktu)**
2) Close any error message boxes by selecting **"OK"**
3) If the computer is locked up it will be necessary to physically reset it.
4) If the program is not running, select the BattleTech Misson Review from the Apple Menu.

The Battle Tech Mission Review should be ready for operation at this point.

Recovery or replay of BattleTech Mission Review

1) Choose "Open" from the "File" menu or Apple O.
2) Choose "last spool" from the dialog box
3) Select the "Play" option from the Playback menu.
4) When the review is over, choose "Close" from the "File" menu.

Reprint a BattleTech mission pilot log

1) Choose "Open" from the "File" menu
2) Choose "last spool" from the dialog box
3) After the file has been loaded, select the Print" choice from the "File" menu
4) After checking the options of the print dialog box, click the print button
5) When control is returned to the computer, select the "Close" option from the "File" menu.

Shutdown

When closing down for the night use Timbuktu to get to the Mission review computer. Apple Q or quit out of the application and exit Timbuktu.

Then shut off the monitors.

Touch Screen Computers

Starting up

The touch screen computers in the lobby and in the control tower areas are set up so that upon powering up the computer the touch screen program is automatically initiated. This was done by placing a Alias of the touch screen player in the startup items folder under the system folder.

When powering up the touch screen computers the monitor should be on first. If this is not done then the computer will not recognize the touch screen ability of acting as a mouse. Also check to see if the touchscreen CD-ROM is in the computer.

1) Turn on the Touch screen Monitor.
2) Turn on the computer.
3) Open up the Mac 'N Touch Control Panel and make sure that the touch screen is set to 'Drag'.
4) Close to control panel and start up the Touch screen program.

Exiting

In order to Exit the Touch screen program you need to hook up a keyboard to the computer and simply hit **Apple-Q**.

Problems

If the touch screen does not respond to touch

1) Restart the computer. The malfunction may due to the monitor not being on when the computer was initially started up.

2) Check the connections between the monitor and the computer. The monitor has a connector for the touch screen ability that should be plugged into the same port as would the keyboard or the mouse. Also check the monitor connection and power connections.

3) Check to be sure that the touch screen control panel is present. If not then when the computer starts up it will not check to see the touch screen ability of the monitor is there.

4) Swap cables if you can't find any of the above to be a problem.

5) Last resort would be to swap the monitor with a working touch screen and see if it works. If it does then you possibly have a bad monitor.

Shutdown

It is recommended for shutdown to simply shut off the monitors. If you wish to shutdown the touch screen computers completely simply do the following.

1) Turn off the monitor.
2) Turn off the Computer.

Most of (if not all) the Touch screen Computers have a external speaker that should be turned off as well.

Timbuktu

Description

The Timbuktu program is an application which allows users to take control of another computer on the same network. This is especially useful with the mission review and res server computers because they do not normally have a keyboard or mouse connected to them.

Using Timbuktu

Other computers can only be accessed through Timbuktu with passwords which the managers and technicians have. Normally, Timbuktu can be started using the Apple menu. Once the program has been started, a dialog box listing all of the computers that can be connect to, should be displayed. If that dialog box is not present, that using the menu at the top of the screen, choose the 'File/New Connections' selection.

In the dialog box, using the mouse pointer, choose which computer that you need to connect to. Once that your selection has been highlighted, choose one of the icons to the left of the list, depending which functions that you need to perform. The control icon is the most used icon. It allows the user to be able to do anything that they could do if they were actually at that terminal. Once the icon has been chosen, Timbuktu will ask for a password. The passwords are case sensitive. The proper password will allow you to continue. Any other variation will not.

Once the proper password has been entered and the "enter" key has been pressed, the remote computer's screen will appear on the local screen with a black boarder around it. At the top of this black boarder is the name of the remote computer. Above the black boarder is a menu. The screen within the black boarder might also have a menu. It is important not to confuse these two menus. The menu outside of the boarder is the menu of the local computer; in other words it is the Timbuktu menu of the computer that you are stationed in front of. The menu within the black boarder, if there is one, is the menu of the remote computer, or the one that you are attempting to control or observe.

Control Icon

The Control Icon is used when you wish to control the other computer directly. This allows you to operate that computer remotely as if you were standing there. You are able to type, use the mouse, change files, and change settings remotely.

Observe Icon

The Observe Icon is used when you wish to watch another computer remotely without being able to affect its operation. You will not be able to affect the computer by typing, moving your mouse, or any other method.

Send File Icon

The Send File Icon is used when you wish to send one or more files to one or more remote computers. You select the files you wish to send on the left hand side and select which computers to send to on the right hand side. This is a good use for sending the same files to multiple locations with out having to copy each file individually through chooser or some other method.

Exchange File Icon

The exchange Icon is like the Send file Icon in that you can send files to another computer but it allows you to retrieve files from the remote computer at the same time. You can only do this with one remote computer at a time but you do not need to send files there and then control that computer to send files to you.

Quitting Timbuktu or opening new connections

When all processing at the remote computer is finished, either quit Timbuktu, or close the present connection and open the next.

To quit Timbuktu, simply use the mouse pointer, go the 'File' menu, and choose 'Quit'.

To close the current connection and open the next, the following can be done...

1) Click the square in the left hand upper corner of the black boarder with the mouse pointer
2) Choose "New connection" from the file menu
3) Follow the procedures above for "USING TIMBUKTU"

Adding new users or changing passwords

A new password may be required for Timbuktu if the old one is compromised. To change the password...

1) Choose "Define Users..." from the Setup menu.
2) Highlight the user in the window which is not a guest. In a new centre this user is called "Squanto". Click the button labeled "Delete User".
3) Click the button marked "New User".
4) Put in a new user name. Check the box located to the left of the new user name. This will allow for password access without having to be a registered user.
5) Click all the privilege boxes on the right of the new user name.
6) Click "Okay" on the dialog window.

Reservation System

This will be covered in two parts. The first part is dealing with the server and the second with the client.

4D Server

Startup

There are three files you are concerned with. Those being the 4D server itself and the two supporting files which end with the .Comp and .Data designations.

The 4D Server is nothing other than the application itself. The .comp (e.g. USResSys.308.comp) file is the preset or setup file which the 4D server uses to organize and format the data file. You should never have to mess with this file unless you are installing a new version which has been sent. The .data (e.g. USResSys.308.data) file is where all information is stored. This included data such as player information, operator shifts, scheduling, etc. It is important however that both the .comp file and the .data file both be in the same folder.

There are two ways to start up the 4D server. The first way is to simply select the 4D Server application itself and double click. The server will start up then ask you where the .comp file is. Once you have selected the .comp file it will search for the .data file. If it is in the same folder as the .comp file it will proceed to start up. If not you will have to direct it to the proper location of the data file or it will also ask if you wish to start a new data file. It is highly recommended that the .data file and the .comp file be placed in the same folder.

The second way to start up the 4D server is to double click on the .comp file. It will proceed to find the application that created it or it uses (which is the 4D server application.) If the .data file is in the same folder then it will proceed to start up. This is the recommended method of starting up the 4D server.

Troubleshooting

There is not a whole lot you can do if there is a problem with the server. The best you can do is simply to either shut it down and try to restart it. Or if the computer has quit out on its own an attempt to restart the program my be undertaken. Another error may be that the dongle in the back of the reservation server has come loose. The dongle is the piece of plastic which ACI provides with every 4D server program. It is their version of copy protection. The dongle is plugged into the ADB port of the mac and it is strobed everytime 4D is used. If the dongle has been removed, any attempts to log into the system will result in an error reporting that the user liscense has been exceeded.

If any other problems occur with the reservation system it is highly recommended that you call VWE Technical Support or Doug Chandler.

Below is a procedure with the reservation system which repairs several problems with corrupted data. It should not be done without VWE supervision and it is written down here as a reminder to the personnel who have been trained in it's use.

Warning-This should only be done by personnel that have been shown exactly how to do the procedure below. If you are unsure about the procedure then do not do it and call VWE Technical Support or Doug Chandler.

1) Timbuktu to the Res Server.
2) Make sure that you have a file labeled *****.comp.good on the desktop. If you do not then don't proceed any further and call Doug Chandler.
3) Have everyone log off the Res Server.
4) Shutdown or Quit out of the Res Server.
5) Go to the Reservation Software folder.
6) Find the folder with the current version you using.
Ex. Current Version is 308 so you will find a folder labeled Version 308 Folder.
7) Remove or trash the .comp file.
8) On the desktop is a file labeled .comp.good
Duplicate the file then move the copy to the Reservation Software folder.
9) Change the file name from .comp.good.copy to .comp
10) Restart the 4D Server.

Warning-This should only be done by personnel that have been shown exactly how to do the procedure above. If you are unsure about the procedure then do not do it and call VWE Technical Support or Doug Chandler.

4D Client

The 4D client is a application that interfaces with the server for the use of reservations, departure info, inventory, reports, etc.

In order to start up the 4D client simply double click on the 4D Client Icon. It will take a second then ask which .comp file to use. There should only be one file to choose from. IF there is more than one to choose from check with a Manager for which one is currently being used.

After start up the VWE splash screen will come up and the login box will appear. Type in your call-sign and password. Next a screen will appear asking to continue or newday. Unless a manager says so select F2 for continue. New day is used first thing in the morning and should be logged in by the manager. A screen asking for reservation or departure will appear. Select reservations unless you are loading 4D client on a control tower. Departures is used to look at missions that have been signed up and to transfer call-signs from the reservations to the Control Tower Console. After selecting Reservations, the 4D Client will begin to load info on current schedule and up to a week in advance. Once this is done then you will be ready to log reservations or run reports. Reports should only be run by the managers. Hit Apple-R in order to bring the reservations screen up.

Quickmail

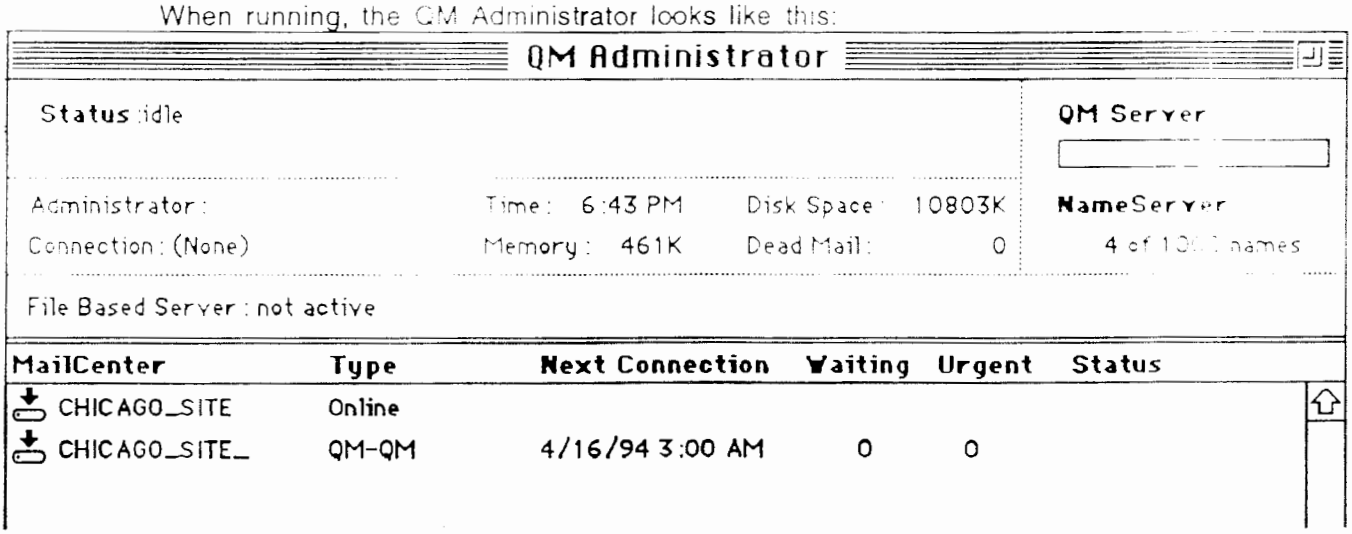
Also included in the VWE Software release is a copy of Quickmail, or QM for short. QM is an electronic mail (E-mail) system for the Macintosh and has been chosen by VWE to help reduce the paperwork normally sent back and forth to the centres. QM will have the capability to 'enclose' other documents with the messages sent to other parties. QM is very user friendly and the user utilizes a simple point and click interface to operate the program. By using QM, each centre will be able to communicate not only with the three corporate offices of Chicago, Glendale and Burbank, but also with other centres. This feature will facilitate the coordination of SiteLink games in the future.

With the implementation of QM to the centres, the majority of functions taken by ARA will no longer done through ARA. Faxes between offices and future software transfer will be done using QM.

When installed, QM will consist of two parts: The Quickmail Administrator and the Quickmail Server. The QM Administrator is used to maintain mailcentres which store, forward and transfer the mail messages and additional files to the other mailcentres on other QM Administrator computers. The QM Administrator must be running on the machine with the modem. The QM Server is the program which is responsible for receiving and sending mail to the local mailcentre and can be installed on any computer connected to network with the QM Administrator machine. QM server is responsible for the notification of the user that mail has come in. Normally, most people will only use QM server and the QM administrator will run in the background of the office computer.

The QM Administrator

When running, the QM Administrator looks like this:



Notice that there are two mailcentres shown. The first mailcentre (CHICAGO_SITE in this case) is the on-line mail centre. This mailcentre is used to route mail within a site. Initially, there will only be two users in the local mailcentre: The general site address and the technical site address. It is currently not possible to give every employee a unique address on the e-mail system due to licensing considerations. Expansion of the local addresses may occur it in the future. The second mailcentre (CHICAGO_SITE_) is the QM-QM bridge mailcentre. It is this mailcentre where all the addresses which are outside of the site are stored. This mailcentre will deliver messages

to the other sites and to the corporate offices. The QM-QM bridge will connect to the other sites each evening on the time under the 'Next Connection' column of the QM Administrator window. It will also dial out if there are 'urgent' messages in the mailcentre queue. The QM Administrator will also dial out when there are many messages in the queue, or when forced to by the operator by pressing **Apple-K** when the QM-QM mailcentre is highlighted. Generally, it is best to let the program send the messages automatically.

Occasionally, it may be necessary to add people to Quickmail. The first is to install a new user into your online mail centre. The procedure for this is as follows:

1) Highlight the online mailcentre on the QM Administrator
2) Under the User menu select "Create".
3) Enter the first and last names of the new user
4) Enter their password.
5) Click "Add" to add the new user
6) After you have added the new users click "Done"

The new user may now connect either remotely or using the centre's computers. It must be stressed that addition of new users can only done with VWE's permission since it involves the limitations of the license for the software.

Another occasion is to allow for the addition of new users on the QM-QM mailcentre. To add this type of user use the following procedure:

1) Highlight the QM-QM mailcentre on the QM Administrator
2) Under the User menu select "Create".
3) Enter the first and last names of the new user
4) Enter the address for the new person from the QM phonebook. Usually, this will be either "Glendale", "Burbank" or "Chicago."
5) Click "OK" when the new user is added.

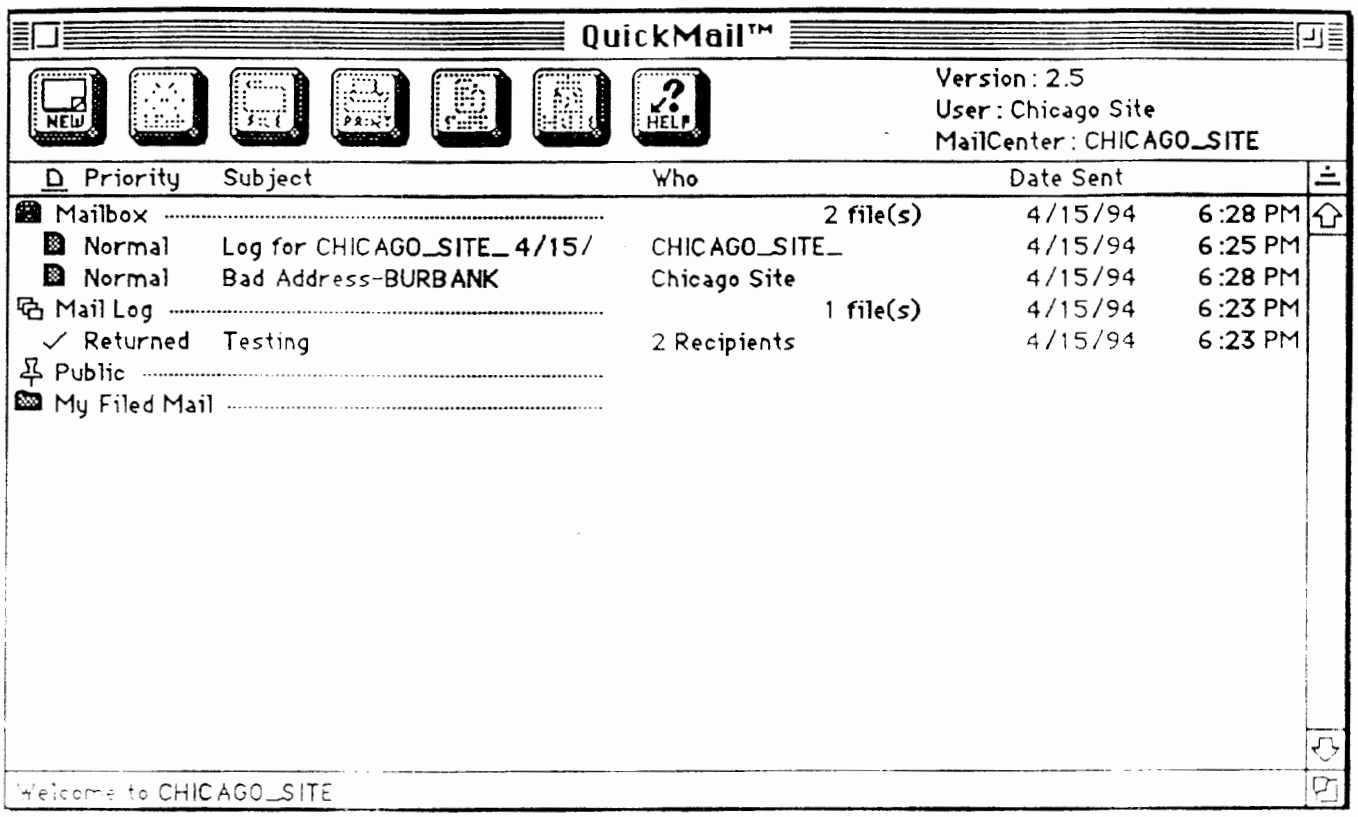
As above, new users should only be added under VWE instructions.

It is important to let QM Administrator run constantly if you are to receive all messages in a timely and reliable manner. It is also impossible for QM Server to connect to the mailcentres if the QM Administrator is not running. For this reason, the QM Administrator will be installed to run when the office computer is turned on. It is okay if you hide the program under the finder. It will run just fine in the background.

The maintenance of the mailcentres is done locally and your head tech will be the QM custodian. Any questions dealing with QM can be asked to VWE Technical Support.

QM Server

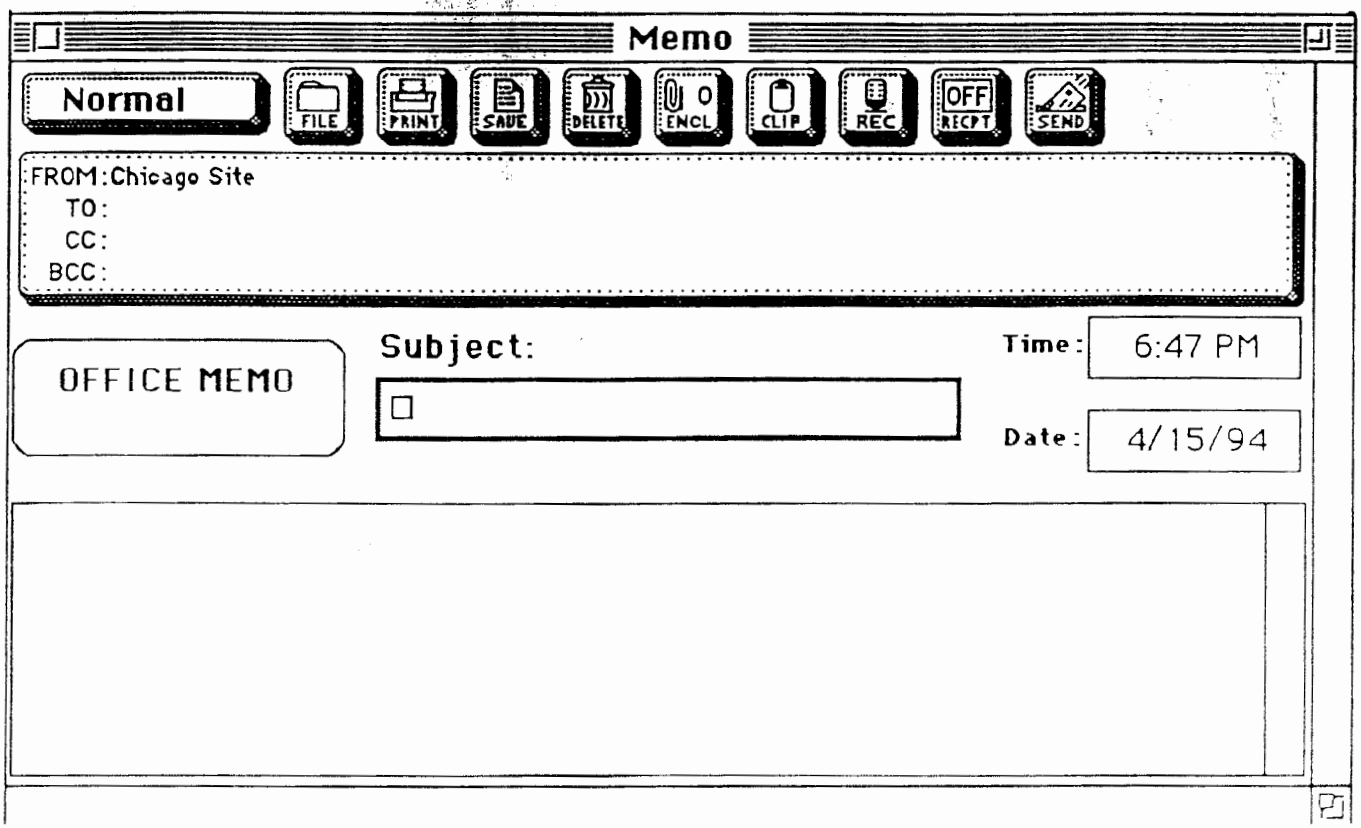
QM server will be installed on the office computer and on the technicians computer. This program will reside in the apple menu on those two computers and will look like this:



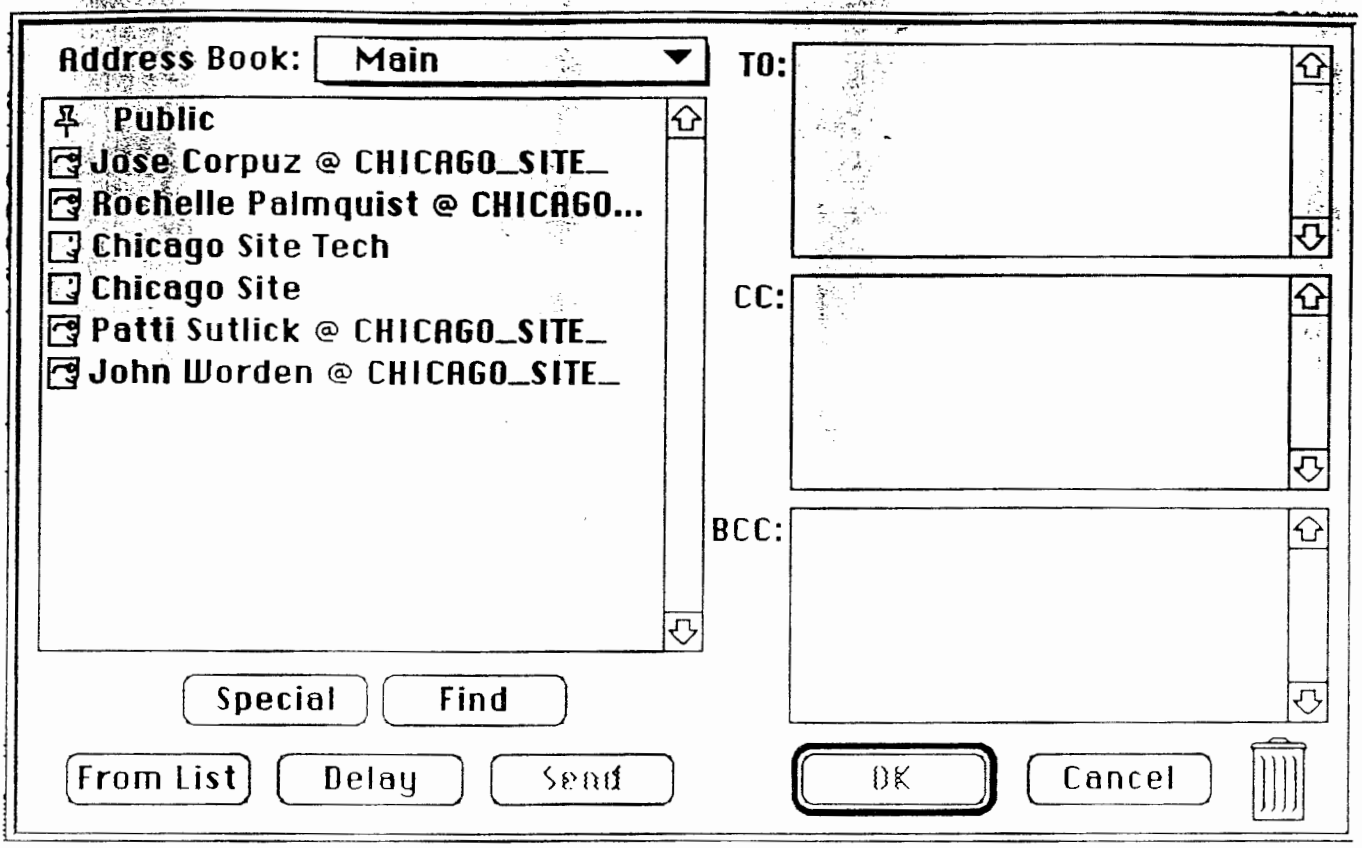
On the top line of the program menu are seven major buttons which cover the basic functions of e-mail. Next to the operations buttons version number of the program, the user logged into the mailcentre and the mailcentre logged into. Immediately below the program buttons are headers showing the properties of the mail. These include the icons, the priority of the messages, the subject of the message, who sent them and the time and date the message was sent. All icons which are not shadowed have information contained within them which has not been examined previously.

The first icon will show the mailbox. The mailbox can be double clicked to reveal the messages inside. It cant hen be double clicked again to hide the messages. Beneath, the open mailbox any messages which have been received by the QM Server. Message may then be highlighted and double clicked to be read. An alternative is to highlight the message and to click on the 'Read' button on the top of the window. To close the message, click on the close box on the top right hand close box on the window. The message will still remain in the mailbox until it is deleted. Messages may be deleted by highlighting the message and clicking the delete button on the top of the window. Any open message may be printed out by clicking the 'Print' button. Highlighted messages may be deleted by clicking the 'Delete' button on the button bar. Highlighting a message and pressing the 'File' button will place the message in the folder 'My Filed Mail' for future reference. QM Server also has an extensive on line help utility which can be accessed by pressing the 'Help' button. There is a folder called 'Mail Log' which stores all messages dent by this user. It is important to periodically check and clean out this folder to prevent the buildup old files on the QM Administrator's machine's hard drive.

Creating and sending a message is done by clicking on the 'New' button on the button bar. Once the 'New' button is clicked a dialog box will come up showing the various forms available for your messages. Most of your messages will be using the 'Memo' form and this form looks like this:



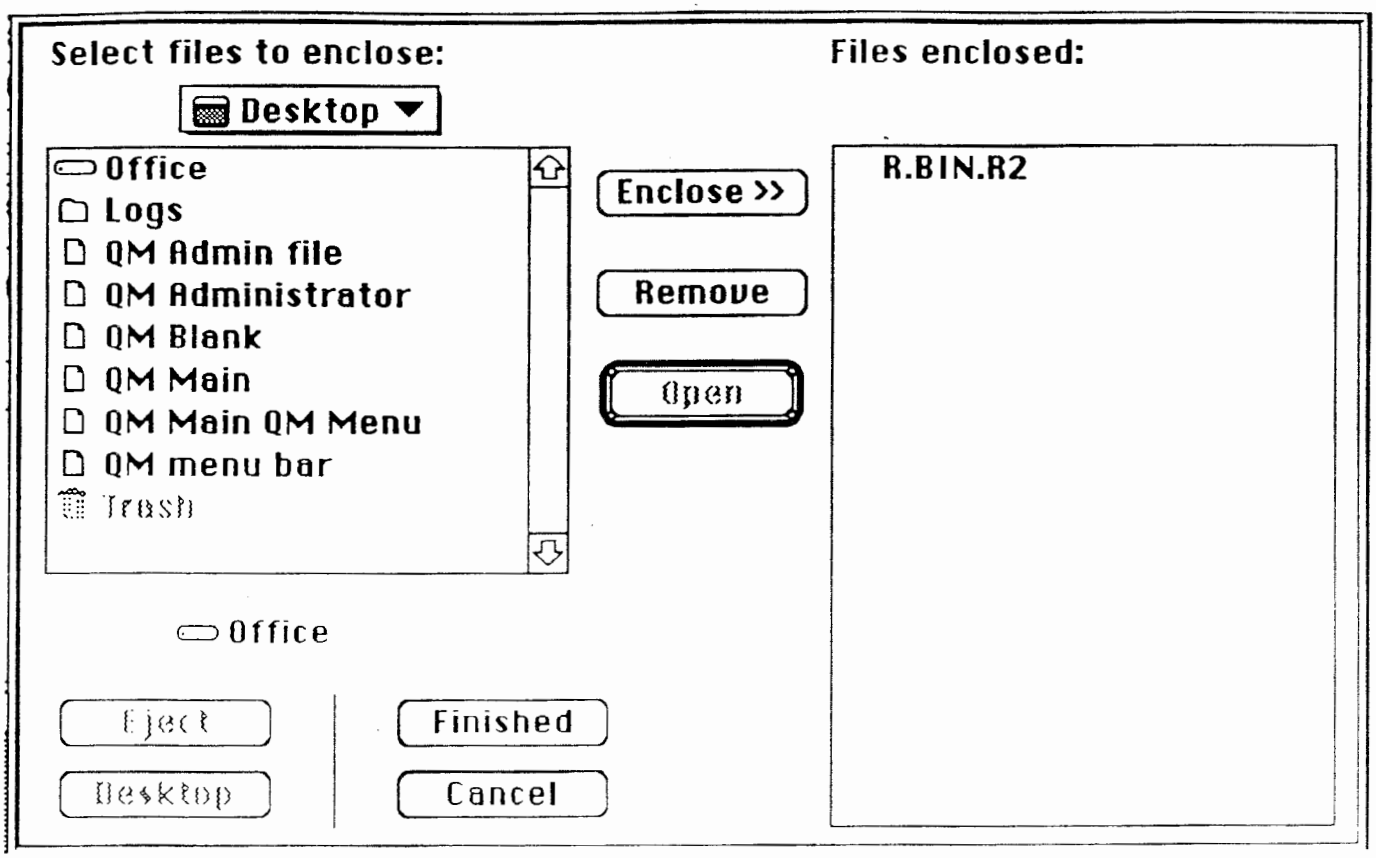
The memo form consists of the priority button, the command buttons, the distribution box, the subject field, the date/time stamp, and the text field. By clicking on the various fields, the contents may be manipulated. All messages must have a subject. To send the message, click the distribution box. A window showing the various addresses will be shown:



Highlight and drag the recipients to the appropriate boxes on the right side of the window. To remove someone from the distribution box, drag their name to the garbage. After the distribution list is done, click 'send' if your message is ready to send or 'OK' if you have more to write. After you have finished writing, you can click the 'Send' button to send your message.

The priority of your message may be changed by clicking the priority bar on the top of the message form. All messages will be distributed by priority, with 'Urgent' the most important and 'Bulk' the least. 'Urgent' messages will normally be sent within 10 of being sent by QM Server.

Most of the command buttons on a form are self-explanatory. Several need explaining. The 'Enclose' button allows users to send other documents or files with their messages. When clicked, the enclose button brings up the following window:



To enclose a file locate the file on the window on the left and highlight. Enclose the file with your message by clicking the 'Enclose >>' button and click 'Finished' when done. When this is done, everybody who will receive the enclosed file. To recover an enclosed document, this process is reversed: The message is accessed, the 'Enclose' command button is pressed, the enclosed file is selected as is the destination, and the 'Retrieve' button is clicked. When this is done the enclosed file received will be retrieved.

The 'Record' button brings up a window much like the record sound window when the sound control panel is brought up. This allows voice messages to be enclosed with your messages. Including voice messages should not be done since the sound files may be very large and this may take the modem excessive time to transfer the sound file.

The 'Receipt' button turns on the receipt function. If this function is turned on, when the message is received and read, a receipt is sent back to the user.

On the top menu bar is a pull down menu labeled 'Quickmail.' The 'Quickmail' menu deals with the maintenance of the QM Server. This menu bar and all the other features of the QM server program are available on the on-line help utility.

Retrospect

Description

Retrospect is the software package used to do the nightly backups and network backups done at each site.

Setup

In order to setup the backups you need to make sure that the retrospect software is on the computer that has the tape device connected to it and that each of the remote computers has the retrospect remote in the control panels.

You now have to setup the remote devices so that you will be able to backup from them. This will involve having the Serial Numbers for retrospect handy. Do the following to configure the remotes.

1) Select Configure from the left hand side of screen.
2) Select Remotes from the right hand side of screen.
3) Select Network
4) Select the remote to install
5) Enter the Serial Number for the Authorization Code.
6) Enter the name of the Remote.
7) Enter Nothing for the security.
8) Make sure the volumes are highlighted that you wish to be able to backup from.
9) Select Done.

Do this for each remote. This will allow you to select any of these to be able to do backups.

Cataloging a New Tape

You need to have a Storage Set or Catalog for each tape. Therefore you need to create a catalog for each tape that you are using for nightly backups. Here is how you set up a Catalog.

1) Select Configure from the left hand side of screen.
2) Select Catalog from the Right hand side of screen.
3) Select Create New.
4) Enter the name of the Catalog. Ex. For Fridays tape enter Friday.
5) Select Save.

Do this for each tape.

Backing up

Below is a procedure that was written for doing a Manual Backup.

1) Make sure all computers that you wish to do backups of are up and running with no applications running.
2) On the server quit out of the 4D application. It will ask how long for disconnection. Enter 0 min. and hit ENTER.
3) Select the "Retrospect" Icon under the apple menu using the Office Computer.
4) Click on the "Immediate" Icon on the left hand side of Retrospect Window.
5) Click the "Backup" selection on the right hand side of window.
6) The new window should show each of the computers that are installed on the network of the Las Vegas Site.
7) Select the "volumes" or systems you wish to backup.
ex. "Res Server"
8) After clicking "OK" the new screen will show the possible destination volumes. The one that should be used is named after the tape you are using. EX. If it is backups for Monday then select the Monday destination and be sure you are using the Monday tape.
9) After clicking "OK" the application should start scanning the computers you have selected. After scanning you will have to select backup again and then it will ask you if you will wish to execute. Hit "OK"
10) If you are doing a full network backup it will take 2-3 hours. if you are doing the nightly backup it should take 15-30 min. Do not leave the computer until you see a bar graph and the fact that the computer is now copying to the tape.

Restoring

Restoring is much like doing the backup only in reverse. The source being the catalog of the tape. The Destination being location you want the files to be placed.

1) Select Immediate from the left side of the screen.
2) Select Restore from the right side of the screen.
2) Select Restore and not search.
3) Select the storage set to restore from.
4) Select the destination to restore to.

If you wish you can set the criteria so that only selected files are restored. Else you proceed with the restore.

Restoring from a Tape with no Catalog

In order to do a restore you need to have a catalog for the tape. If you have received a tape in the mail with instructions to restore its contents to you hard drive this is how you do it.

1) Select Tools from the left side of the screen.
2) Select Repair from the right side of the screen.
3) Select Recreate from tapes.
4) Select the tape that you are trying to catalog.
5) Select "NO" unless the type was sent you stating it was encrypted.
6) Select Save.
7) It will now begin to scan the tape and create the Catalog.
8) When it asks you to insert tape-2 click on Choices unless there is a second tape.
    1) Select Done.

You now have a Catalog of the tape and can a Normal Restore following the steps above for **Restoring**.

Writing Script Files

Script files are used for doing automatic backups. These scripts can be used to do the nightly backups. Below is a run through on how to set up the scripts for nightly backups.

1) Select Scripts from the left hand side of the screen.
2) Select Edit from the right hand side of the screen.
3) Select New.
4) Select Backup.
5) Enter the script name then select new.
    Ex. If the script is for Friday backup name the script Friday.
6) Select Sources
    1) Select Add.
    2) Select the Device you wish to back up. Ex. Res Server
7) Select Destination
    1) Select Add.
    2) Select the Catalog to use. Ex. Friday Script use Friday Catalog.
8) Select Schedule
    1) Select Add.
    2) Select Day of week.
    3) Set the time in the am you wish the back up to start.
    4) Set the day to run on.
        Ex. If you wish to backup Friday then select Saturday and set the time to 1:00 am so that the backup of Friday is done Saturday morning.
    5) Select OK

After completing the script for each day all you have to do is make sure the correct tape is in the tape device for that day.

Note: The backup will not run if the wrong tape is the machine. It will wait until you put in the correct tape for the backup.

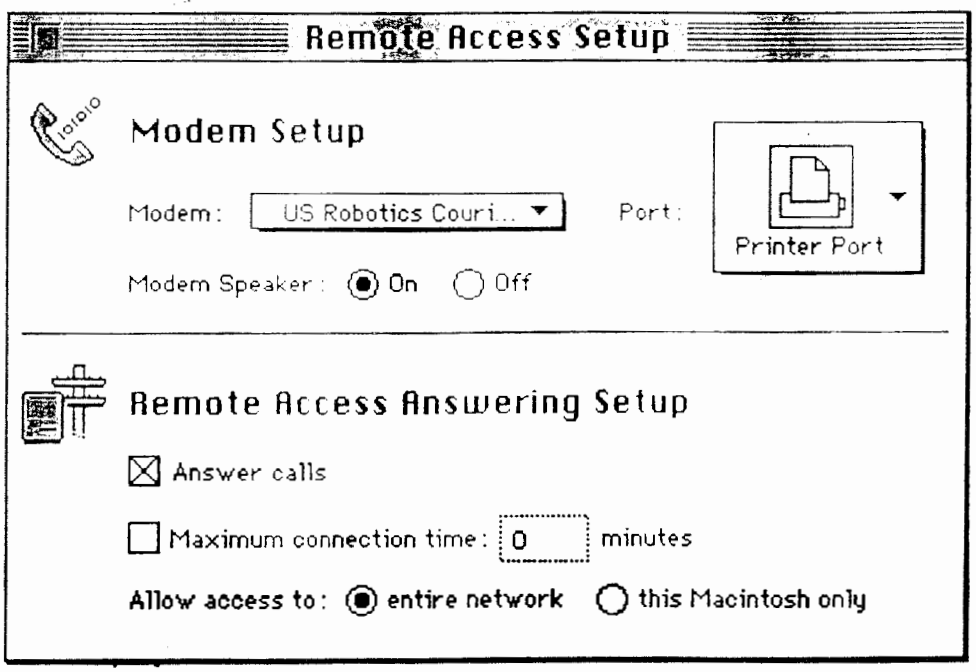
Appletalk Remote Access

ARA is used mainly by the Chicago Technical Staff in order to dial into each center and be able to access files, transfer files, or to help the center technician remotely. The following is how to set up ARA in order for the Chicago Support to dial in.

Setup Remote Access

In order for the Chicago Support Staff to dial-in the Center Technician needs to make the computer, and modem used for the Quickmail is accessible for use. The computer should have ARA or Remote Access already installed on the computer. If not this needs to be done. You will find the Remote Access and Remote Access Setup applications under the Control Panels if it has already been installed. If ARA is installed then do the following steps.

1. Quit out of the QM Administrator for Quickmail.
   You may need to take the QM Administrator out of the Startup File in the System folder to keep it from starting back up when you reboot the computer later on in this procedure.
2. Swap the modem from the Modem port to the Printer Port.
3. Access Remote Access Setup from the Control Panels.
4. Be sure that the settings match the figure below.

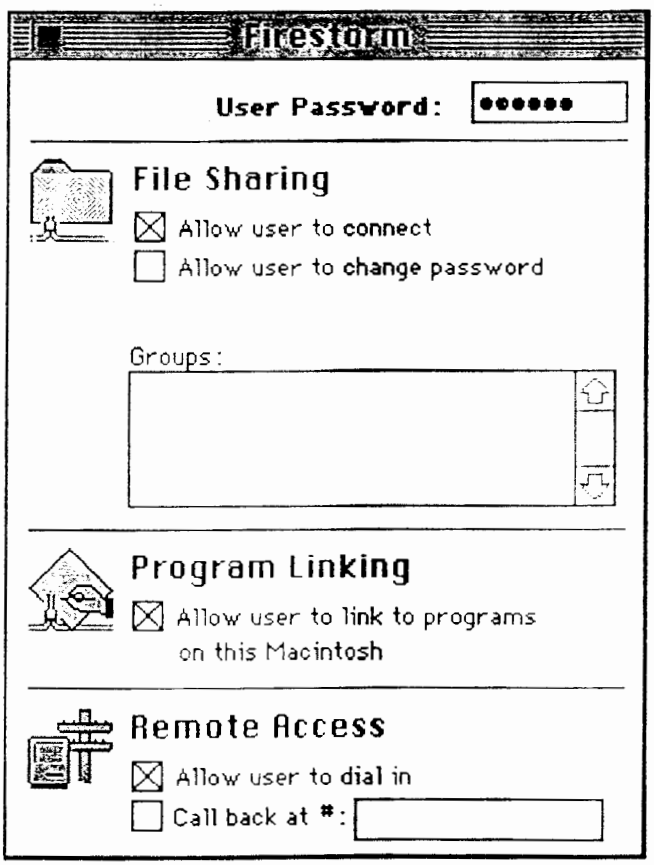


The Modem should be set for the type of modem being currently used. At the present time of the writing the modem selection that should be used is the US Robotics Courier V32.bis setting.

Setting Users & Groups

Next you will need to set up a guest file so that the Support Staff can gain access to the computer once the modems have linked up.

1. Select Remote Access from the control panels.
2. Under Setup Select Users & Groups.
3. Go to File and Select New User.
4. Rename the New User with a name that the Support Staff will give you.
5. Open the New User File that you just changed the name of. Below is the Window you should now see.



6. Type in a User Password that the Support Staff will provide for you.
7. Be sure that under File Sharing the Allow User to Connect is marked.
8. Be sure that under Remote Access the Allow User to Dial In is marked.
9. Be sure that under Program Linking the Allow User to Link to Programs on this Macintosh is marked.
10. Close the Window. It will ask you if you wish for the user information to be saved. Hit Save.

That should do it for setting up Remote Access. You may be instructed by the Support Staff to reset the computer so that the Remote Access will initialize the modem upon startup.

In order to restore QM Administrator back just switch the modem back to the modem port and make sure that under Remote Access Setup that the Automatically Answer is disabled. Be sure to put the QM Administrator Alias back into the Startup Folder if you removed it before. Then restart the computer. This should bring everything back up to working order for Quickmail.

Ethernet

Description

The Ethernet network is the method used to connect all of the apple computers and network printers together. This includes the office, reservations, mission review, reservation server, and the control tower computers. This also includes the two laser printers.

At each node (computer or printer) of the network there should be connector in the wall which resembles a telephone jack. These all lead back to the Tech Office and plug into an Ethernet 10T HUB. The lights on the Hubs indicate proper connection to the different nodes.

All of the nodes use a "FriendlyNet Adapter" manufactured by Asanté. This adapter is a small plastic box with a green light in the center of it which plugs into the back of the node. The light on the adapter will illuminate if there is proper continuity.

Problems

When a node no longer recognizes the network, There are two things to check before doing any thing else. This is due to these being the most common problems.
Check the following:

1) The Friendly Net Adapter.
   a) If it is lit green go to step 2.
   b) Check Connections.
   c) Check Ethernet Hub.
   d) Check Link Status for that Node.
2) Open the control Panels
   a) Select Network
   b) Make sure that Ether talk is selected.

If a computer is turned on or restarted when the ethernet network is improperly connected the computer will automatically change to "Local talk" networking. This is a potential problem to look for.

The solution is to reestablish the proper continuity of the network.

1) Open the Control Panels from the Apple Menu.
2) Select Network.
3) Select Ether talk.

Example of Software Directory and Files

12.2.2 - Current Version Folder
Rp 12.2.2 - Red Planet
Bt 12.2.2 - BattleTech
Console - **Console Application**
Console Log - **Console Message Log (Delete Weekly)**
Console Files - Console Files
Spooler - **Spools network traffic for MR**
Log_File
Game Files - Files Folder
Dial_List - **SiteLink Phone #'s**
Full_Load_2_0 - **Full Load Scripts**
Full_Load_2_5
Full_Load_3_0
Full_Load_3_0_No_Icom
Game_Setup - **Last setup on console**
Net_Configuration - **Pod Node # Configs**
Net_Configuration_Work_Copy -**Console Generated**
Scenario_List - **Console List of maps**
Script_List - **Console List Cameraships**
Short_Load_2_0 - **Short Load Scripts**
Short_Load_2_5
Short_Load_3_0
Team_List - **Console List of Teams**
Vehicle_List - **Console List of Mechs or VTV's**
Scenario - Where All Maps are kept
MAPS
Cockpit Software - Files used for Short and Long Loads Scripts.
Battletech_68020_res
Amiga2_5
Amiga3_0
btAudio.dld
btAudio.dld.no_icom
btsecond2_5
btsecond3_0
Battletech_TI_RES
DEVELOPMENT
R.BIN2_5
R.BIN3_0
ROM2_0 -Files most often changed
ROM2_5 - for upgrades
ROM3_0

Bold - Folders
NonBold - Files
In the cockpit software folder all BT specific files are renamed with RP specific files in the Red Planet software folder.

Example of Game Replay Folder

Game Replay
- BTMR 6.0.4.a03 US - **Battletech MR Program**
- Splash - **Splash Screen Art for BTMR**
- RPMR 2.3.2.a01 US - **RP MR Program**
- Post Modem Log
- **Post Files**
  - Map_Picts
  - Map_Rsrc_List
  - Team_Rsrc_List
  - Vehicle_Rsrc_List
  - **Scenarios**
    - Scenario Files - **Map Files for RP used by RPMR**

Example of Network Configuration File with 8 cockpits
Gamma Set Net_Configuration File
Version 12.2.2

```
; First line is the Site Number assigned to you by VWE Corporate
10
; Next line is sitelink dialer timeout, this should be enough for any site
30
;   +---On/Off (console sets this)
;  |   +----Type 1 = ops console, 2 = cockpit, 3 = Camera, 4 = Router
;  |   |   +---- Site Number for this cockpit (same as first line above)
;  |   |   |       +---- Node Number for this cockpit
;  |   |   |       |       +---- Site Number of next cockpit in the loop (same as first line above)
;  |   |   |       |       |       +---- Node Number of next cockpit in loop
;  |   |   |       |       |       |       +---- Cockpit number (console is 0, number cockpits from 1)
;  |   |   |       |       |       |       |       +---- Load config file to full load this cockpit
;  |   |   |       |       |       |       |       |                   +---- Load config for short load
;  |   |   |       |       |       |       |       |                   |                   +---- Cockpit Name
;  |   |   |       |       |       |       |       |                   |                   |
   1   2   10   31      10   32      1     Full_Load_3_0 Short_Load_3_0 "Cockpit 1"
   1   2   10   32      10   33      2     Full_Load_3_0 Short_Load_3_0 "Cockpit 2"
   1   2   10   33      10   34      3     Full_Load_3_0 Short_Load_3_0 "Cockpit 3"
   1   2   10   34      10   35      4     Full_Load_3_0 Short_Load_3_0 "Cockpit 4"
   1   2   10   35      10   36      5     Full_Load_3_0 Short_Load_3_0 "Cockpit 5"
   1   2   10   36      10   37      6     Full_Load_3_0 Short_Load_3_0 "Cockpit 6"
   1   2   10   37      10   38      7     Full_Load_3_0 Short_Load_3_0 "Cockpit 7"
   1   2   10   38      10   39      8     Full_Load_3_0 Short_Load_3_0 "Cockpit 8"
   1   3   10   39      10   40      9     Full_Load_3_0 Short_Load_3_0 "Camera 1"
   1   3   10   40      10   127    10     Full_Load_3_0 Short_Load_3_0 "Camera 2"
   4   1   10   127     10   31      0     Full_Load_3_0 Short_Load_3_0 "Operator"
```

Example of Network Configuration File with 8 Cockpits set up as SiteLink Gamma Set Net Configuration File
Version 12.2.2

Notice Cockpit 8 is set as a Router and not a Cockpit.

```
; First line is the Site Number assigned to you by VWE Corporate
1 0
; Next line is sitelink dialer timeout, this should be enough for any site
3 0
;   +---On/Off (console sets this)
; |   +----Type 1 = ops console, 2 = cockpit, 3 = Camera, 4 = Router
; |   |   +---- Site Number for this cockpit (same as first line above)
; |   |   |       +---- Node Number for this cockpit
; |   |   |       |       +---- Site Number of next cockpit in the loop (same as first line
above)
; |   |   |       |       |       +---- Node Number of next cockpit in loop
; |   |   |       |       |       |       +---- Cockpit number (console is 0, number cockpits
from 1)
; |   |   |       |       |       |       |       +---- Load config file to full load this cockpit
; |   |   |       |       |       |       |       |                   +---- Load config for short load
; |   |   |       |       |       |       |       |                   |                   +---- Cockpit Name
; |   |   |       |       |       |       |       |                   |                   |
  1   2   10   31      10   32      1     Full_Load_3_0 Short_Load_3_0 "Cockpit 1"
  1   2   10   32      10   33      2     Full_Load_3_0 Short_Load_3_0 "Cockpit 2"
  1   2   10   33      10   34      3     Full_Load_3_0 Short_Load_3_0 "Cockpit 3"
  1   2   10   34      10   35      4     Full_Load_3_0 Short_Load_3_0 "Cockpit 4"
  1   2   10   35      10   36      5     Full_Load_3_0 Short_Load_3_0 "Cockpit 5"
  1   2   10   36      10   37      6     Full_Load_3_0 Short_Load_3_0 "Cockpit 6"
  1   2   10   37      10   38      7     Full_Load_3_0 Short_Load_3_0 "Cockpit 7"
  1   4   10   38      10   39      8     Full_Load_3_0 Short_Load_3_0 "Router" <- Router
  1   3   10   39      10   40      9     Full_Load_3_0 Short_Load_3_0 "Camera 1"
  1   3   10   40      10   127     10    Full_Load_3_0 Short_Load_3_0 "Camera 2"
  4   1   10   127     10   31      0     Full_Load_3_0 Short_Load_3_0 "Operator"
```

System Overview

The VWE system 3.0 pod is a virtual reality entertainment pod designed and manufactured by Virtual World Entertainment Inc. The pod is designed to be the basis of the cab based VR experience in a Virtual World Centre location based entertainment (LBE) facility.
The system 3.0 pod is designed as an improvement of system 2.5 by the addition of a sound board in the card cage, and an improved CPU which uses SIMMs rather than ZIP style DRAM.
The usual configutation of game pods are the linking of 8 cockpits together along with the connection of several Macintosh computers to administer and supplement the game.

The VWE System 3.0 consists of two major components:

1. System 3.0 cockpits connected to each other via an arcnet networl
2. Macintosh computers connected via an ethernet network. One macintosh per side functions as the link between the cockpit arcnet network and the apple ethernet network.

A typical set up (also referred to as a "Set" or "Side") of cockpits are shown in block diagram in Figure 1.

The experience at a Virtual World Site is designed to follow the following steps:

1. The player signs up for a game (or "Adventure") at the reservation system. The player's usage history is accessed. This information is used to find other players and to set up adventures with other players of the same ability. If no information on this player is already in the database, it is entered now.

2. At the scheduled time, the players are brought into the theatre. Inside the theatre the players are shown the pre-show which consists of a short (6-7 min) movie which introduces the controls and objectives of the adventure. It is during this timewhich the players may ask any questions of the staff concerning the adventure. It is at this time where game information such as callsigns, enviromental conditions and maps are taken by the operator and entered into the control computer.

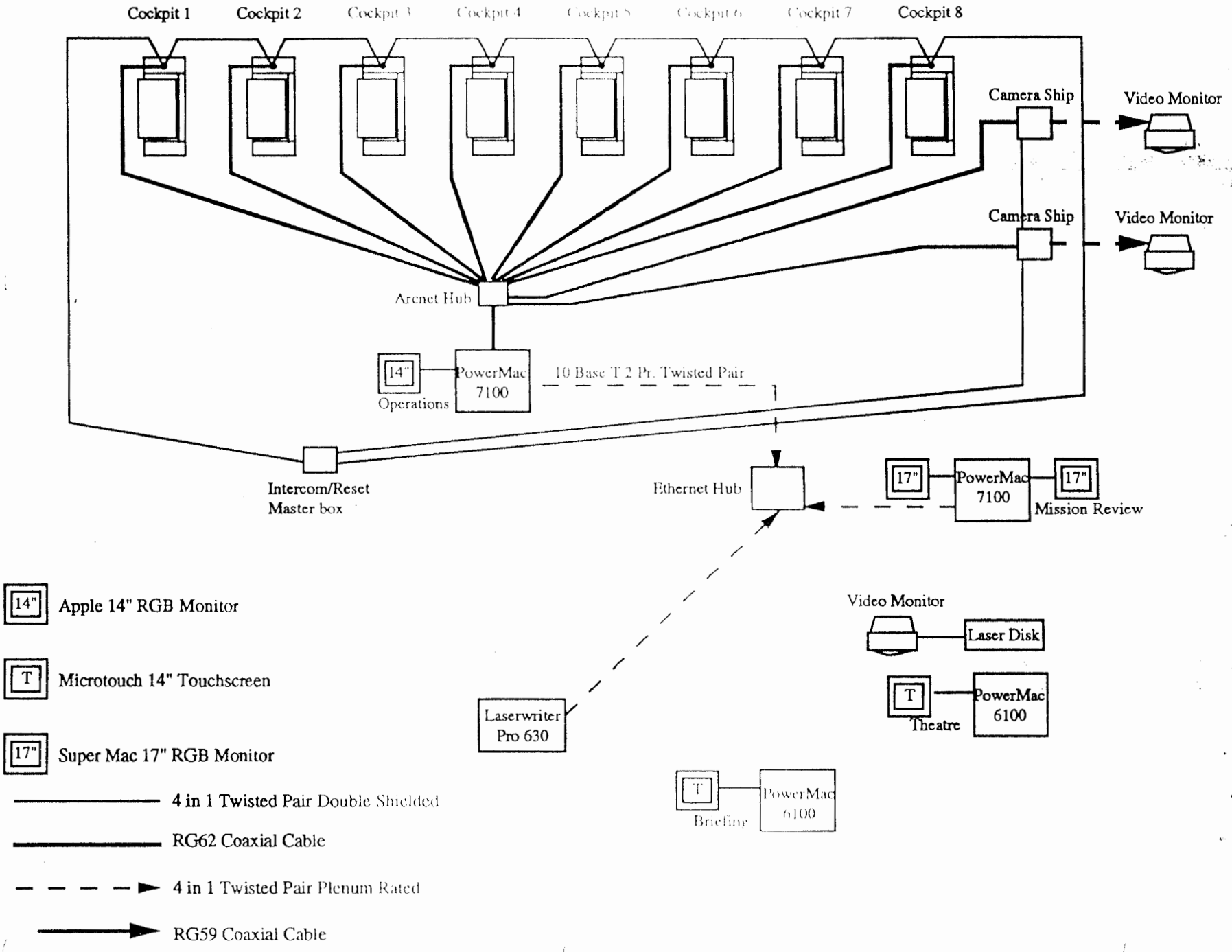
3. As the previous adventure ends, the players are brought to their cockpits. When the pilots are in their cockpits, the adventure begins. Players will play for the entire time alloted. The playing time is guaranteed and is used regardless of the performance of the individual pilot.

4. At the end of their alloted time the players are removed from the cockpit and ushered into the mission debriefing area. Here the players will view their mission review and find out how they performed. A pilot's log is printed out for each player and picked up at the laserwriter.

3.0 Cockpit Overview

The cockpit is made up of many different things, interacting together to create a simulation. These items are:

CPU


Cockpit 1
Cockpit 2
Cockpit 3
Cockpit 4
Cockpit 5
Cockpit 6
Cockpit 7
Cockpit 8
Camera Ship
Video Monitor
Camera Ship
Video Monitor
Arcnet Hub
14"
Operations
PowerMac 7100
10 Base T 2 Pr. Twisted Pair
Intercom/Reset Master box
Ethernet Hub
17"
PowerMac 7100
17"
Mission Review
Video Monitor
Laser Disk
T
Theatre
PowerMac 6100
Laserwriter Pro 630
T
Briefing
PowerMac 6100
14" Apple 14" RGB Monitor
T Microtouch 14" Touchscreen
17" Super Mac 17" RGB Monitor
4 in 1 Twisted Pair Double Shielded
RG62 Coaxial Cable
4 in 1 Twisted Pair Plenum Rated
RG59 Coaxial Cable

Controls main screen rendering and controls network communication for the cockpit

Amiga

Controls images on the secondary screen

In version 2.5 cockpits, the Amiga also generates the sound in the cockpit

Sound Board

Sound creation, mixing and amplification

Enables pod to pod communication via intercom

In version 2.5 cockpits, the intercom system is handle by an intercom slave board. The mixing and amplication of sound is done with an amplifier board.

Backplane

Supplies connections for data transfer between the CPU, Amiga, Remote I/O and Sound Board.

Provides power connections to the above boards

Remote I/O

Controls all players interaction with cockpit and player. This includes all the displays, the joystick, the throttle, the foot pedals, and the keypad

Sends the player I/O to the main CPU for processing.

Primary Monitor

Player's window into the simulation.

Secondary Monitor

Supplies supplemental information to the player

Power

Main power to the cockpit is 115V AC. This is distributed to both monitor transformers and the three DC power supplies

12V DC power supply supplies power to the Amiga, fans and the light bulbs [illegible] the LCD display

12VDC Linear Supplies to the sound board for audio amplification. In [illegible] the linear supply also powers the amplifier board.

5VDC Supplies power to the CPU, Sound Board and to the Remote I/O [illegible] Backplane

Player Interface Device

Advance Player Toggles

Change the player mode from basic to standard to veteran to master [illegible] these also control crosshairs, fine/standard foot pedal control and VTV motor configuration

Weapons Displays

On the left and right side of the Main Monitor. These display and control weapons configuration

Key Pad

Use for cockpit maintenance and for overheat codes in BT

Joystick

Used for vehicle control

Throttle

Controls vehicle speed

Foot pedal

Used for steering

Advanced Function

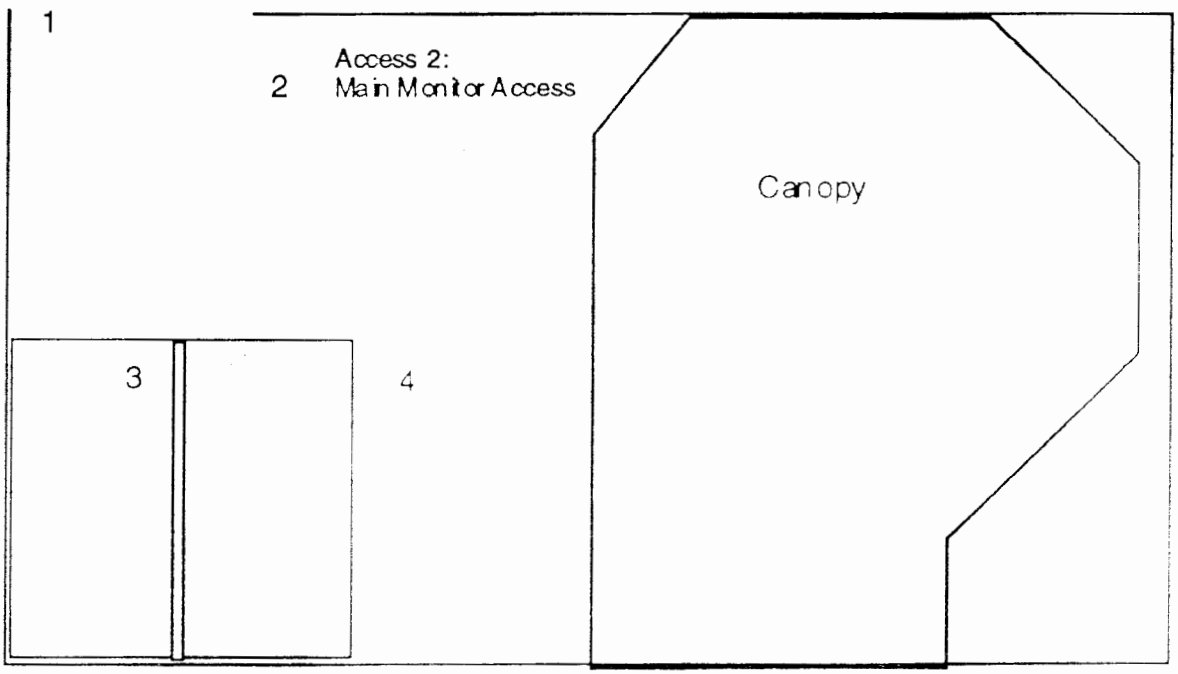
Radar Zoom, infrared, Indirect Firing Control, Search Light Control, Mech Torso Centering.

Video Select Panel

Selects between Radar, Map and Indirect Firing Control in BT. Reset Player Controls in RP.

The access to the various parts of the cockpit inerior is shown in below:

Access 1 (Top Mainainance Access):
Remote I/O
All Networking Connection
Primary Monitor Transformer
Cooling Fans



Access 3:
Card Cage (CPU, Amiga, Sound Board)
12VDC Power Supply
5VDC Power Supply
12V Linear Power Supply
Primary Isolation Transformer
Secondary Monitor Transformer

Access 4
Secondary Screen

There is also an access panel (Access 5) on the other side of the cockpit for maintaining the backplane connections.

The main access panels, 1 and 3 are hinged and key openable
Panel 4 is keyed and is removable.
Panel 2 and 5 are removed by unscrewing retaining bolts.

Cockpit Power Distribution

Each Cockpit is indipendently supplied by 110V AC power from the Breaker Switch Box in either the Tech Office or Power Room. Each center is a little different in this regard.

The 110V AC power is connected to the cockpit at a Switch Box that is located just under the lip of the front section of the cockpit just behind the decorative flange on the bottom. The power is then connected to the Main Isolation Transformer located inside the lower frontmost access panel. The switch should completely cut the transformer from the power when it is thrown to the off position. This is the main source for turning off the cockpit.

From the Main Isolation Transformer, power is then connected to the Terminal Block located just in front of the card cage. From this point power is then distributed to the rest of the cockpit. Located on the Terminal Block is a switch that can also cut power to the cockpit but should only be used for doing a power reset of the cockpit and not for nightly shutdown. This is mainly due to the power is still going to the Main Isolation Transformer.

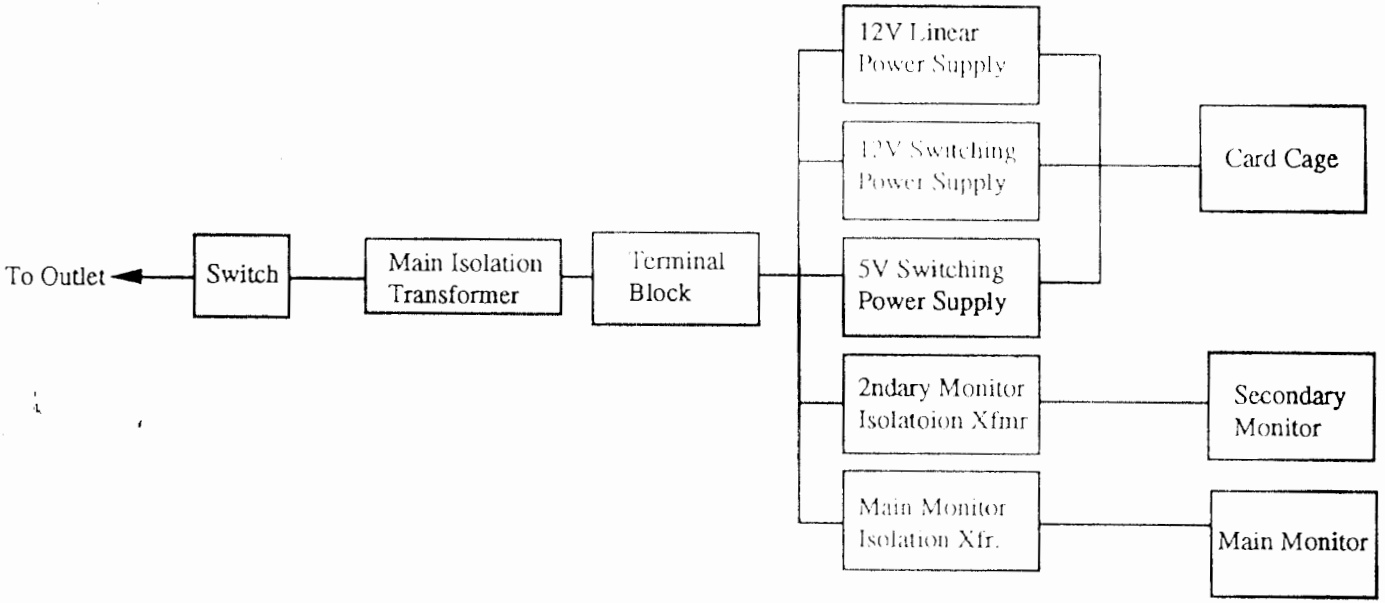
From the Terminal Block power is distributed to the following: 12V Linear, 12V Switching, 5V Switching, Secondary Monitor Isolation Transformer, Main Monitor Isolation Transformer.

The 12V Linear Power Supply is used by the Amp Board in the 2.5 Cockpit and is Used by the Sound Board in the 3.0 Cockpit due to the Sound Board in the 3.0 Cockpit has the Amp Board Built into it.

The 12V Switching Switching Power Supply is used to power the amiga board, fans, light bulbs and LCD displays.

5V Switching Power Supply are used by the card cage to supply power to the Cpu, Sound Card in the 3.0 cockpit, Remote I/O Board, and the slave intercom board in the 2.5 cockpits.

The Secondary and Main Monitor Transformers are directly connected to their own respective monitors.


To Outlet
Switch
Main Isolation Transformer
Terminal Block
12V Linear Power Supply
12V Switching Power Supply
5V Switching Power Supply
2ndary Monitor Isolatoion Xfmr
Main Monitor Isolation Xfr.
Card Cage
Secondary Monitor
Main Monitor

The Card Cage

The card cage, or cage, is the heart of the VWE cockpit. In this aluminum enclosure lies the CPU, and Amiga cards which allow the cockpit to store, process, and communicate information with the other cockpits in the LAN. The card cage is the heart of the cockpit.

The card cage is secured to the cockpit frame by rubber shock mounts that are fastened to the cockpit's forward bulkhead and the rear supports. These shock mounts are attached to the cage by screws which can be accessed when the cage is empty and completely disconnected. These screws are difficult to remove, but fortunately, few repairs necessitate the removal of the cage itself.

Examination of the cage reveals the presence of three circuit boards or cards mounted inside. These cards are easily identified by the handles mounted on the top and bottom of the cover plates of the cards. Additionally, the rest of the available space on the card cage are covered with plain, flat aluminum plates to prevent damage and to act as a container of RF emissions. The cards are, from left to right as you face the cage: The Amiga Board, the CPU board and the Sound Board.

Insertion and Removal of the Cards in the Card Cage

In order to prevent damage to the components of the cockpit, all removal and insertion of cards in the cage must be done while the power to the cockpit is turned off.

The insertion of the individual cards is done by inserting the card into the appropriate slot. Leading up to the 300 pin connector for each slot are a set of plastic guide rails. Insert the card into the guide rails and gently slide the card in the cage. While sliding the card down the guide rails make sure that the three large guide pins on the 300 pin connector and the guide holes on the card line up. Push the card firmly into the cage. The card is properly inserted when the card clicks into the connector and the front plate of the card is flush with the front of the cage. Secure the card down in the cage by tightening the securing screws located on the top and bottom of the card front plate.

The removal of cards in the card cage begins by the loosening of the securing screws on the top and bottom of the card front plate. The handles on the top and bottom of the card are lifted towards the outside of the cage and the front plate is cracked forward out of the cage. The card is then slowly slid out from the cage. Examine the board for any obvious breakage. If the card is determined to be faulty, send the board to VWE for repair.

Any other work done on the individual cards themselves is to be done under VWE supervision.

When a card in the card cage is proven defective or malfunctioning, it must be removed and replaced. Under no circumstances are the cards themselves to be the subject of repair by the technical staff of the individual centres without VWE supervision. All repairs or modifications of the individual cards themselves are to be done only by VWE engineers and technicians or under their supervision. Any attempt to modify the cards by individual centres will void the warranty given by VWE. Malfunctioning cards are to be returned to VWE for repair and replacement.

Backplane Connections

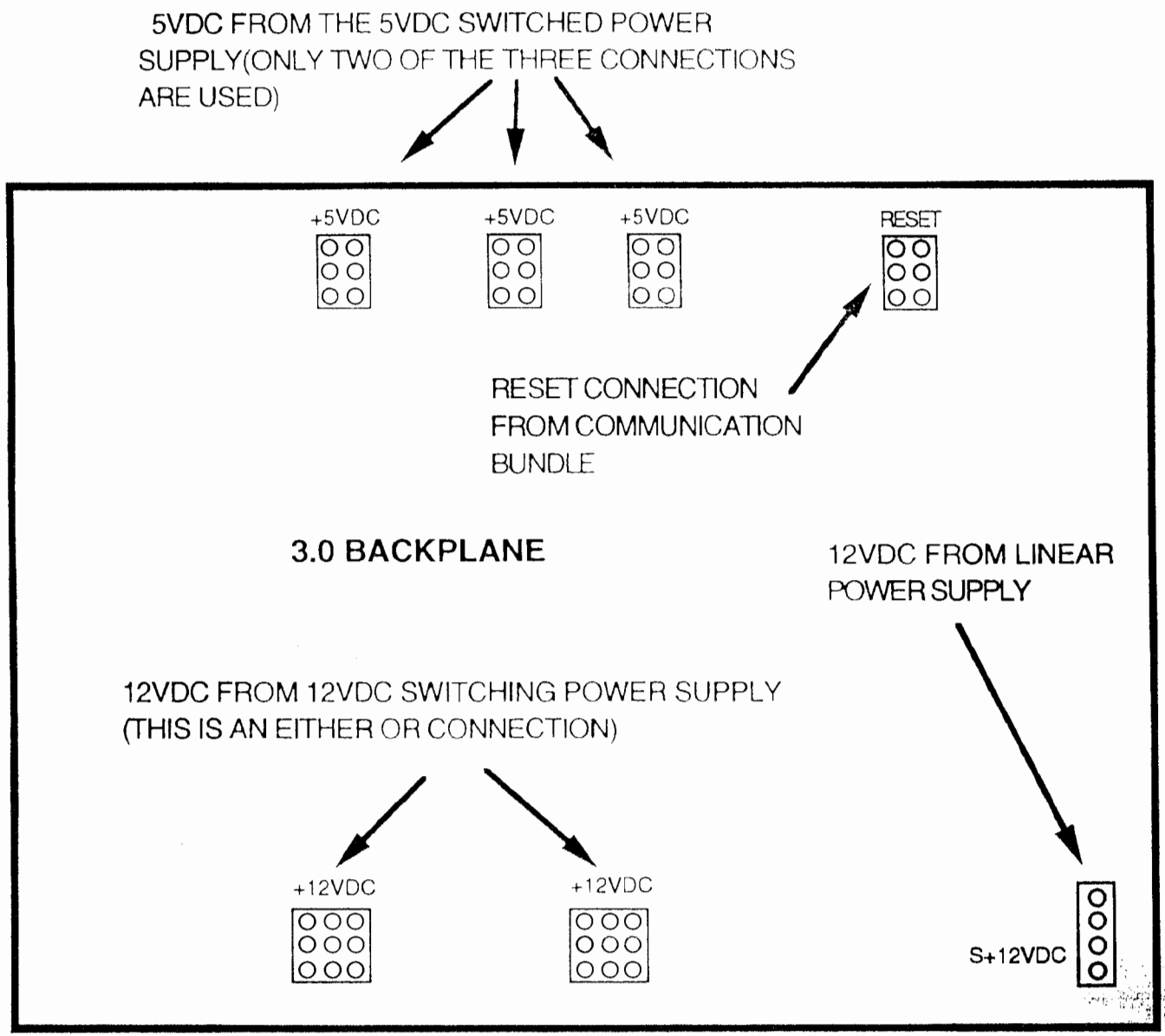
In the rear of the card cage is are several connections. These connections to the backplane are not manipulated nearly as often as the CPU connections, but all must be made in order for the cockpit to function properly. Most of the connections deal with power and are illustrated below:

The '+5V DC' and the '+12V DC'connections are self evident. All the power connections are interchangeable within their voltage group. Any 5V receptacle can be used to plug the RI/O power cord and the main 5V in. Either 12V receptacle can be used for the 12V power.

One of the 5V power receptacles is used to connect the 5V power to the Remote I/O board.

A six pin .93" receptacle is used to connect the reset line from the main communication bundle to the backplane.

On the lower right hand side of the backplane is the 4 pin connection for the 12V linear power supply.


5VDC FROM THE 5VDC SWITCHED POWER SUPPLY(ONLY TWO OF THE THREE CONNECTIONS ARE USED)
+5VDC
+5VDC
+5VDC
RESET
RESET CONNECTION FROM COMMUNICATION BUNDLE
3.0 BACKPLANE
12VDC FROM LINEAR POWER SUPPLY
12VDC FROM 12VDC SWITCHING POWER SUPPLY (THIS IS AN EITHER OR CONNECTION)
+12VDC
+12VDC
S+12VDC

The CPU

The CPU is the main processing board for the 3.0 cockpit. On this board lies the main CPU of the computer as well as the RAM and the arcnet controller. Normally, the CPU only has a RGB output to the main screen. On Cameraship CPU's the addition of a scan converter is added in order to put out NTSC signals to be video taped and distributed throughout the centre.

The majority of problems with the game not operating properly are usually due to a malfunction to the CPU. Major problems such as the start up tests being failed, the cockpit locking up unexpectedly, or main screen abnormalities are usually fixed by replacing the CPU. Additionally, if the CPU is not seated tightly, the proper operation of the cockpit will most likely be impaired.

CPU Connections

The front of the CPU has several connections mounted on the front plate. These connections are illustrated in the following page:

The Node ID DIP switch bank is where the node assignment to the cockpit is set. Without the proper DIP switch setting proper communication to and from this cockpit is rendered impossible. The exact settings for node numbers is determined during initial installation. A record of the node number is recommended for each individual centre. The DIP switches are binary switches which has the switches 'up' or away from the board and the on position. Switch one is the least significant digit while switch eight is the most significant. As an example, node eleven is displayed with switches 1, 2, & 4 in the up position.

The Scan Converter output is a BNC connector which connects to the coax cable labeled 'Comm Main Video.' The use of this output requires that a functioning scan converter be mounted on the CPU board. This port produces the video signal from the cockpit to the video distribution system. On CPU's equipped with scan converters, the scan converter is mounted on the CPU socket J4. The scan converter is then secured by using four sets of nuts, spacers and bolts on the corners of the scan converter.

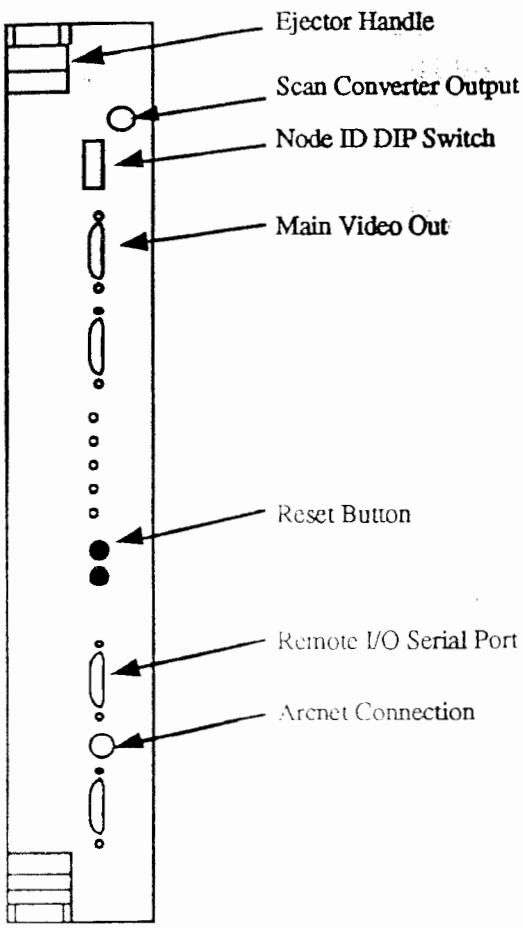
The Main Video Out is connected to the DB9 cable labeled 'Main Screen Signal' and is a standard VGA connection which drives the primary screen in the cockpit.

The Reset Button is the primary reset button on the cockpit. Depressing this button will initiate a reset of the entire cockpit.

The Interrupt Button beneath the reset button will force an interrupt on the CPU. This is used only under VWE supervision as a debugging tool.

The Remote I/O Serial Port is connected to the cable labeled 'Remote Serial Cable' and is the connection used for communication between the remote I/O board and the CPU.

The Arcnet Connection is a BNC connection which is attached to the coax cable labeled 'Comm. Bundle.' This is the LAN connection to the cockpit.


Ejector Handle
Scan Converter Output
Node ID DIP Switch
Main Video Out
Reset Button
Remote I/O Serial Port
Arcnet Connection

The Amiga Board

The Amiga board is actually an Amiga 500 motherboard mounted in a VWE carrier board. The function of the Amiga board is to display the graphics on the secondary screen of the cockpit. This board has only one connection other than the usual 300 pin connector on the side to mount into the backplane: The secondary screen video out. This is a standard Amiga VGA output which terminates in a DB9. This connects to the cable labeled for the secondary screen.

If problems with the cockpit involve the secondary screen, the Amiga board is a good place to check. Check that the Amiga board is properly seated in the card cage. Also check that the Amiga 500 motherboard is properly mounted into the carrier board. Most problems which manifest with the Amiga result in a blue secondary screen with white numbers on the left side of the screen. Reseating the Amiga board and long loading the cockpit will usually fix this problem.

The Sound Board

The sound board is the sound generation engine for the 3.0 cockpit. Contained inside the sound board are several Analog Devices ADSP's used for processing sounds stored. The sample memory of the sound board is stored in DRAM mounted on the board. During a long load, the files btaudio.dld or rpaudio.dld is loaded into the sound board. These files are the sample data for the cockpit to use during the game.

The sound board also acts as the amplifier for the cockpit. The speaker connections are on the sound board and the all the speakers take their driving energy from the board. The sound board also acts as the intercom system for the cockpits. The audio intercom information is passed from cockpit to cockpit and decoded by the sound board. The board also functions as a mixer of the various outputs for the user to the speakers.

Major problems with the sound boards usually manifest themselves with the cockpit losing sound during a game. Normally, if this happens sound is reestablished within 15 seconds as the software watchdog will reactivate the audio channels. If the problem with sound dropping our persists, the board may need to be reseated. It has also been noticed with the sound board that low voltage levels will cause the board to produce unreliable operation. Checking the voltage across a de-coupling capacitor on the board while the cockpit is in operation should produce a voltage of at least 4.9 volts. If the voltage on the sound board is lower, the voltage for the cockpit 5V power supply should be raised.

SOUND BOARD

The top minifit connector on the sound board is the amplifier output to the speakers. There are four speakers and four woofers located in the cockpit.

The top two LED displays are digital and analog power indicators. The third one is not used currently. The bottom LED display will indicate a sound board reset.

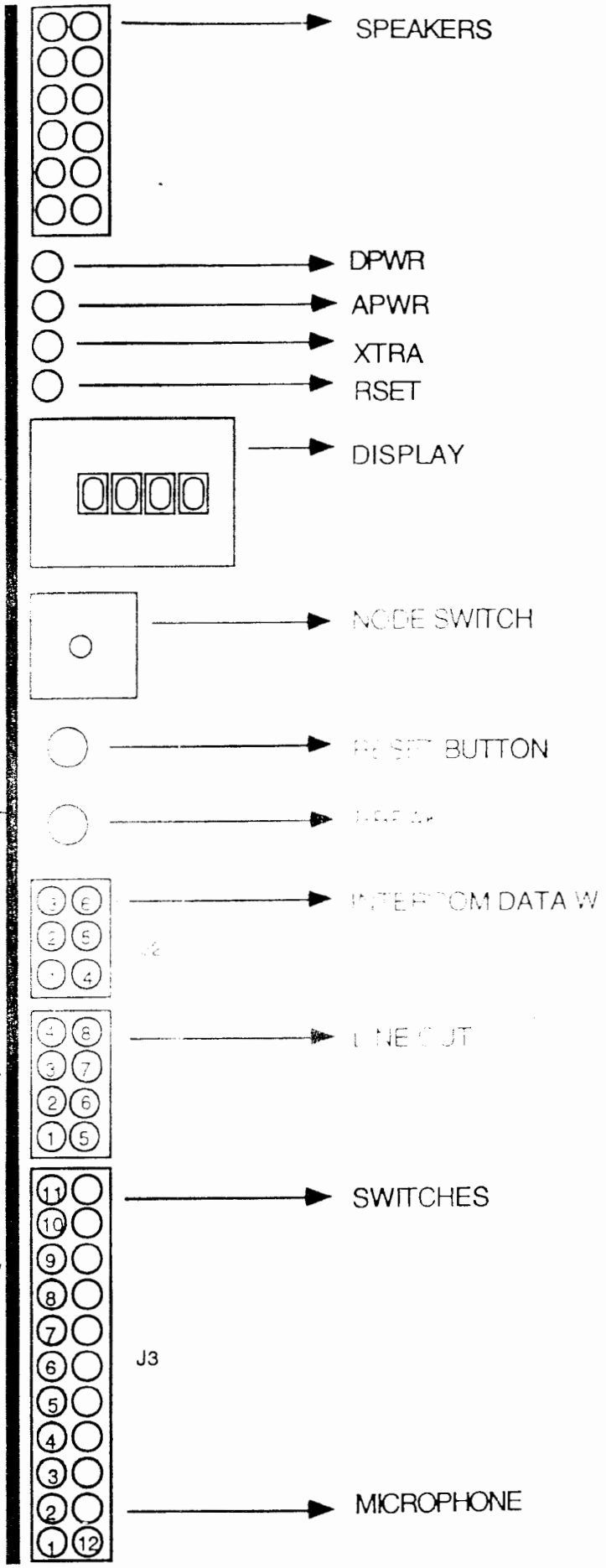
The sound board display is used for several functions. When the sound board is not loaded with software, the far left display flashes a star. As the cockpit sound is loaded, the star will switch to a rotating propeller. The displays are also used to display the current sound board intercom node number, and occasionally... under unfavorable circumstances, error codes.

The small dial rotary switch is used to select the node number for the intercom forewarding chain.
The top push button will cause a sound board reset.
The second push button will generate a sound interupt which should cause a tone out to each speaker. This can be used to test the speakers and sound board. The interupt test should not corrupt the cockpit mission sounds.
The intercom data connector is where the network enters and exits the sound board. Pins 1 and 2 receive input from the previous cockpit and pins 4 and 5 foreward the data to the next cockpit.

For monophonic output for the camera ship, pins 2 and 6 are used on the line out connector. This connector is presently only used for camera ships. Double check the resistor R44 on the sound board to insure that it is a 10K ohm.

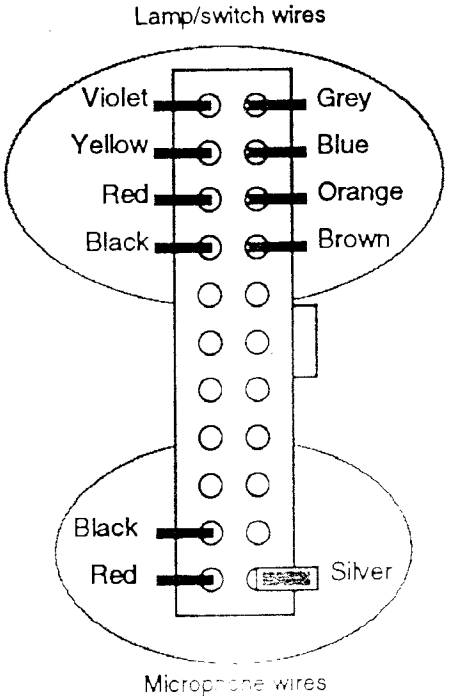
The last connector is a 22 pin minifit type. It houses the wires for the intercom switches which are located in the cockpit directly below the throttle. It also houses the the microphone wires.

A further break down of the wire harnesses on the Intercom data wires, the intercom switch wires, and the microphone wires of connectors J2 and J3, please review the next page.

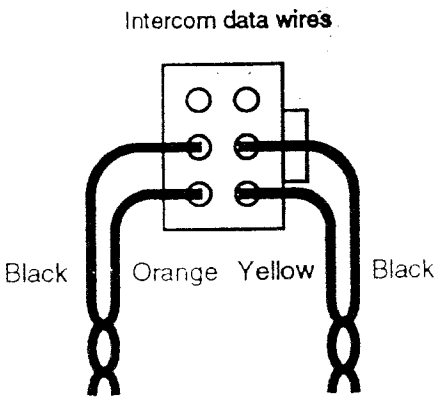


Connector breakdown for SB

J3



J2



Intercom/Reset

The intercom network consists of the following.

1) intercom master assembly
2) intercom slaves
3) physical networking

Functional System

The intercom system is controlled by the intercom/reset master box at the control tower. The face of the box displays eight small square buttons across the top and five rectangular buttons across the bottom. In addition, in the lower right hand corner is the jack in which the operators handset is connected. The intercom control panel can be seen in Diagram #1.

Talking and listening to cockpits is done through the use of a telephone hand set. Unlike a regular phone handset, however, the operator must squeeze the trigger located on the intercom handset between the earpiece and mouthpiece in order to talk.

While using a standard telephone, you need to dial a number which will connect you to the phone of the desired party. Similarly, when using the intercom system a button needs to be pushed which corresponds to the cockpit or cockpits you want to communicate with.

The small buttons across the top are used to communicate with each of the individual cockpits. If the operator desires to communicate with cockpit #1, button #1 is selected and so on.

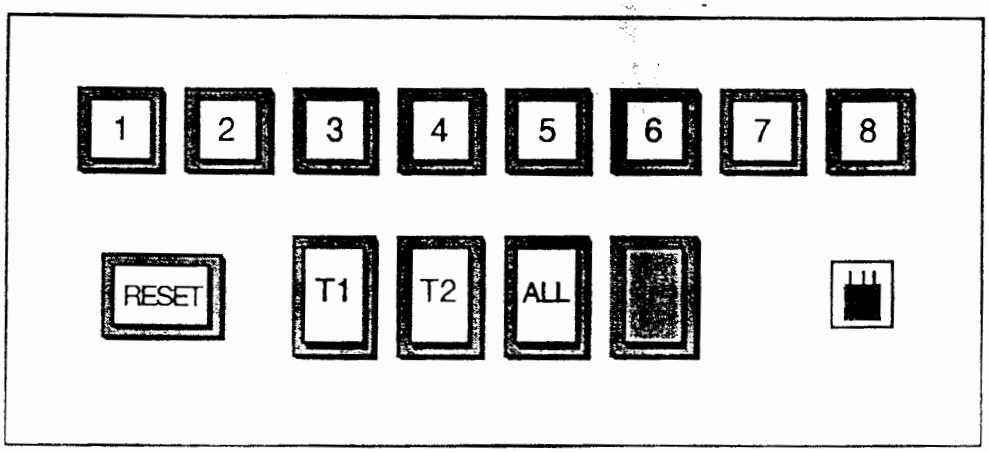
The first button on the bottom row on the far left is the reset button. It is the only button on the box which is red. Pressing this button will reset all eight cockpits and both camera ships

The next two buttons from the left are set up for team one (the first four cockpits in the daisy chain), and team two (the last four cockpits in the daisy chain).

The fourth button is to talk to all eight cockpits at once.

The fifth button is currently unprogrammed.

Figure #1



Note: It is important to keep in mind that the intercom system is software driven. This means that unless the proper software is loaded into the cockpits, the intercom system will not work.

Physical Network

The nework for the intercom/reset system is laid out in a daisy-chain topology. The network wiring starts at the control tower, from the control tower, the wiring goes to cockpit number 1. It continues from cockpit 1 to cockpit 2. This continues until the last cockpit in that set is reached. After the last cockpit, the wiring returns back to the control tower. A double shielded four conductor twisted pair is the required cable for this setup. Two of the wires are dedicated to the reset network, and the other two are for intercom.

In diagram #2 below, the typical intercom/reset network is shown. Notice the daisy chain topology. This is recognized by the thick line (representing both reset and intercom) starting at the intercom/reset master box, going to cockpit #1, continuing to cockpit #2, and so on until it goes through cockpit eight and then back where it started.

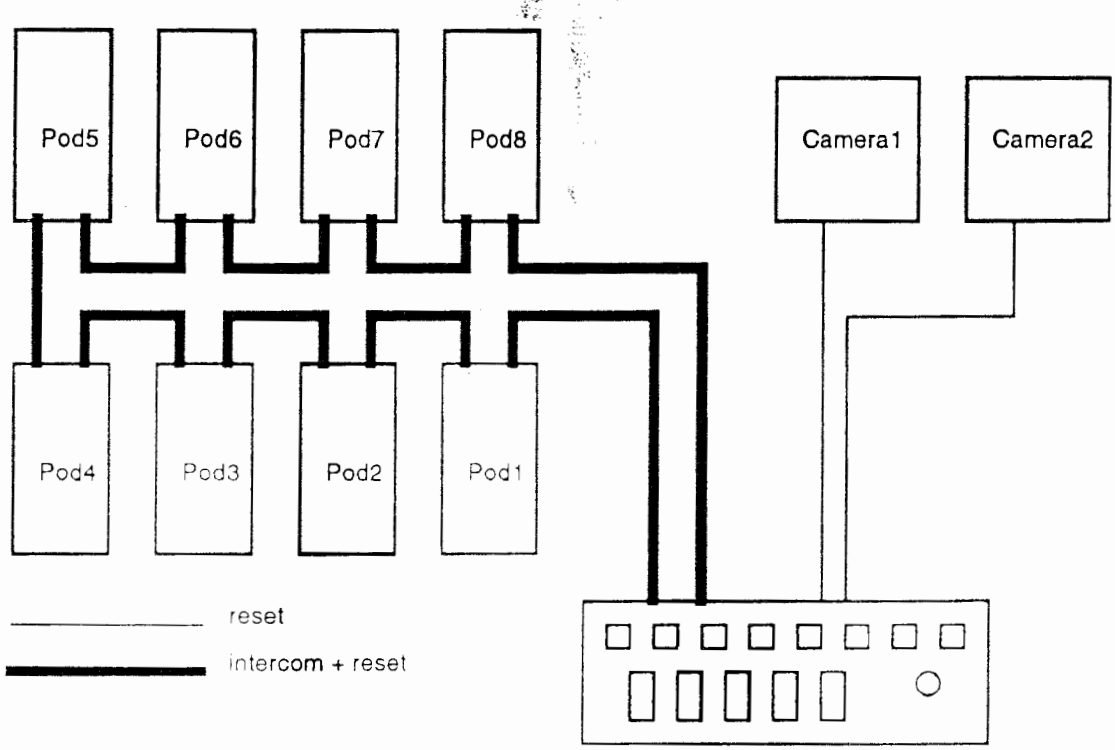
Intercom data flow

There are nine nodes on the intercom daisy chain network of an eight cockpit set. In this case, a node is defined as either a cockpit, or a master/reset box. As shown in diagram #2, the camera ships are not considered as nodes. The camera ships do not need to be on the intercom network so they are not part of the daisy chain (they are only equiped with reset lines).

Each of the cockpits come standard with a sound board. Designed into the sound board is an intercom slave. The intercom slave has several functions. It will take the digital messages received from the previous node, convert them to analog and send them to the amplifiers to play on the cockpit speakers. It will also take any analog input from the microphone interior to the cockpit, digitize it and send it to the next node. In addition the slave forwards the input from the previous node to the next node.

The intercom master is the control center for the intercom system. The master not only functions as a slave, but it has other duties as well. It can be prompted to select which cockpits to communicate with using the buttons on the front of the box (see FUNCTIONAL SYSTEM above).

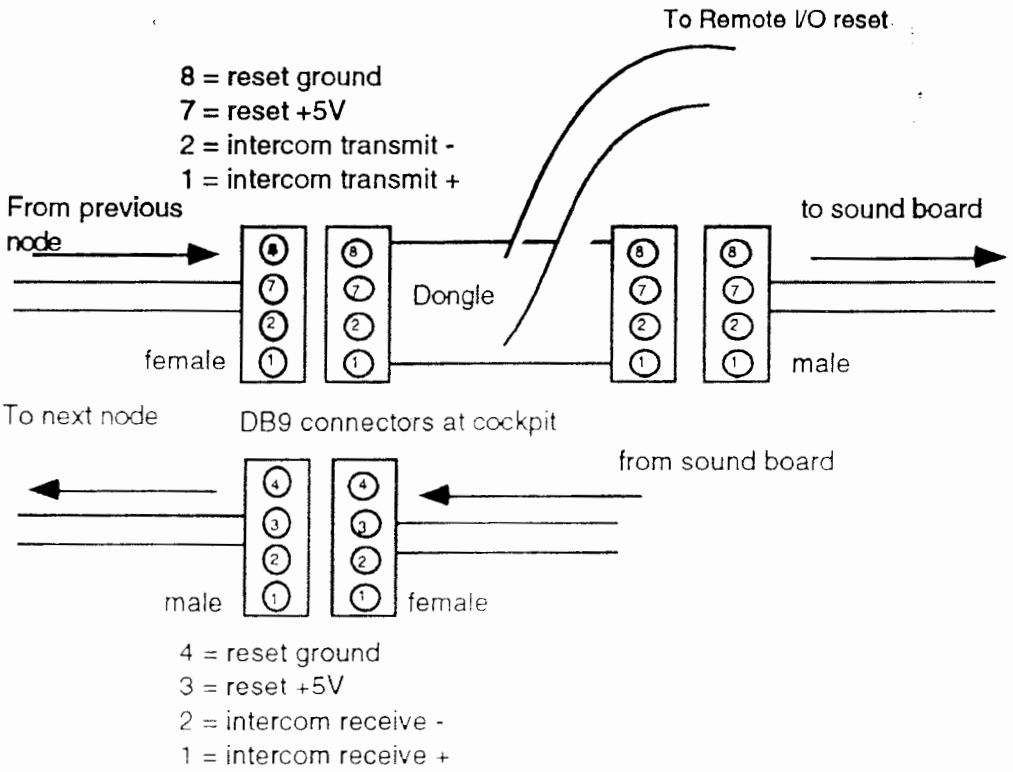
Diagram #2



Intercom/reset master box

The network chain is terminated at the top of each cockpit. One network line comes into the cockpit from the privious cockpit, and one goes out of the cockpit to the next one. The line going into the cockpit should be terimated with a free hanging female DB9 connector. Likewise, the network line exiting the cockpit should be terminated with a free hanging male DB9 connector. This is represented by diagram #3.

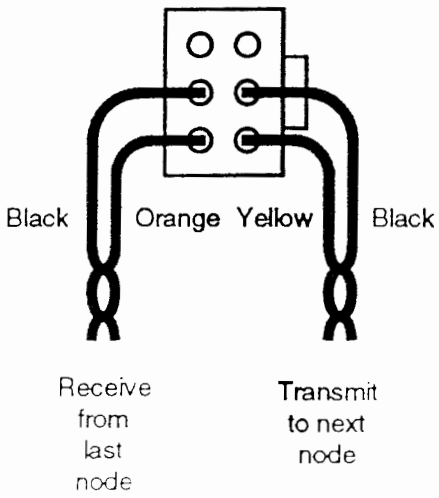
DIAGRAM #3



Once that the intercom wires enter the cockpit, they connect to the sound board at J2. As shown in the diagram below, the orange and black set of twisted wires are the receive. The yellow and black set are for transmit. Pins one and two of the free hanging DB9 female which is connected the wire harness coming from the previous cockpit, is the terminator for the orange and black pair. Pin one is the orange and pin two is the black. The yellow and black connect to the free hanging male DB9 connector which plugs in to the harness that goes to the next node. Like before, pin one is the yellow and pin two is the black.

DIAGRAM #4

Intercom data wires



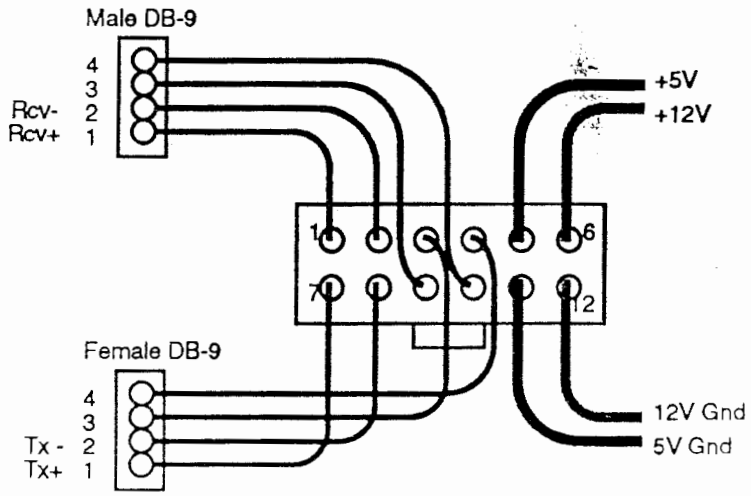
With that in mind, the forewarding chain for the intercom would look something like this.

The data originated at one node would travel through two conductors to the female DB9 at the next cockpit. The data would come screaming out of the female connector at pins one and two, squeeze through a reset dongle (shown in diagram #3), and spew into the male DB9 connector. From there it would scurry down the orange and black twisted conductors until it violated the sound board at J2. After the data is processed within the sound board, the signal exits the J2 connector like a blazing hare and bellows up the yellow and black twisted conductors. The signal then belches out of the free hanging female DB9 connector at pins, one and two, and into the free hanging male DB9 connector, at pins one and two, in route to the next node. This process is mirrored at each cockpit.

Master Box

The master box for the intercom is powered by a 5V power supply contained within. As you will see in the reset section below, and in Diagram #3 above, at the cockpits the reset wires use pins 7 and 8 on the input and pins 3 and 4 on the output. This is not so with the DB connectors at the reset box. The intercom and reset conductors use pins one through four on both DB9 connectors. This will be illustrated by the diagram #5 below.

DIAGRAM #5



This diagram illustrates the DB9 connectors and the power supply connections to the intercom master box. The large connector illustrated here is actually contained within the master box assembly.

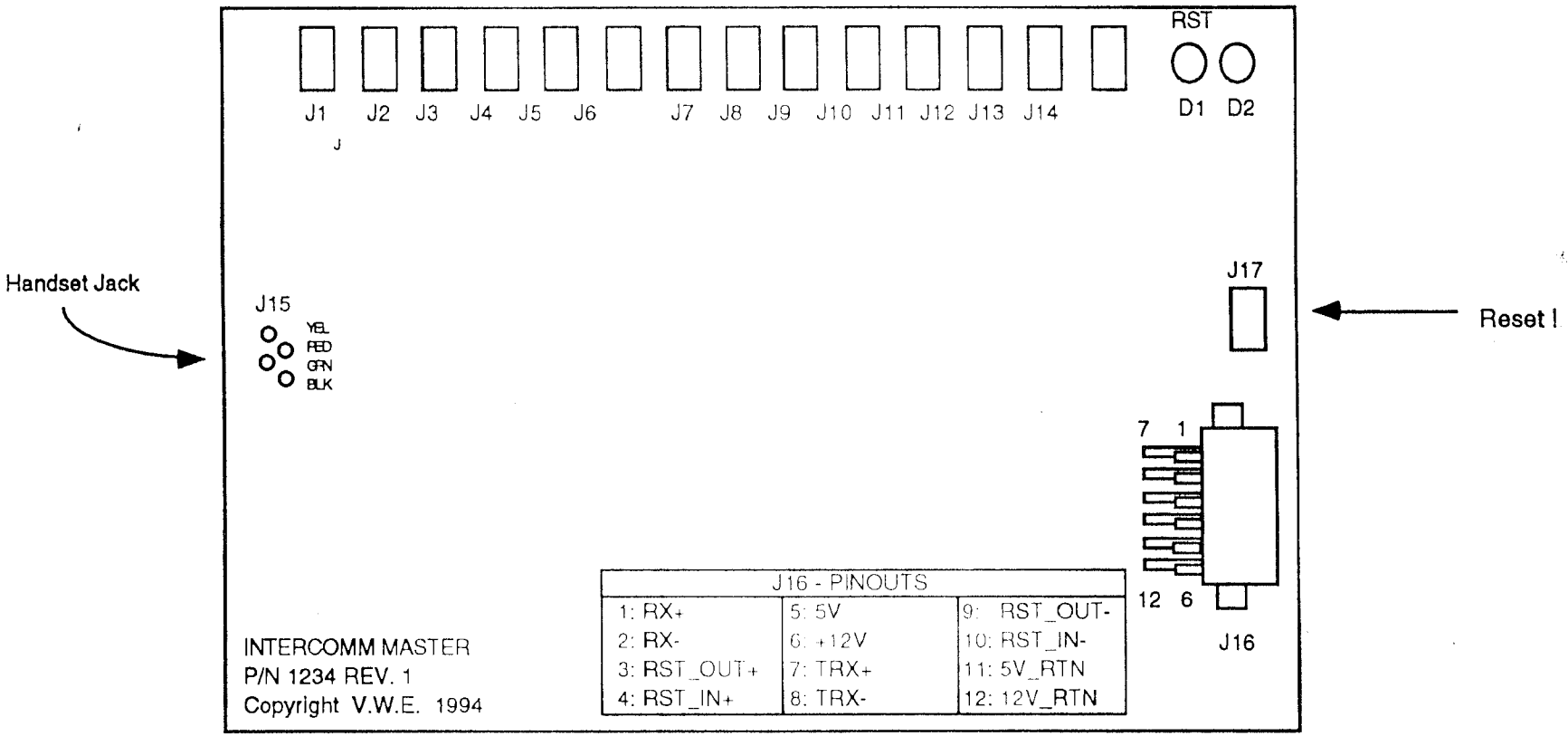
Reset

The cockpits take a 12V signal to establish a reset. The 12V power supply located within the intercom box. That same power supply supplies five volts for the intercom master to operate. The reset line travels in the same harness as the intercom line. The two sets of wires separate after the DB9 connectors upon entering the cockpit. The reset wires go through the DB9 connectors at pins 7 and 8 as shown in diagram 3 above. They continue from there to plug into a connector on the card cage backplane. The back plane distributes the reset signal for the CPU, Sound board, and Amiga.

After the wire harnesses enter the top of the cockpit for the reset, they plug into a dongle (small PC board as shown in diagram #3). This dongle has a DB9 connector on each end of it allowing the intercom signal to pass directly through it. The reset signal on the other hand also passes through the dongle, but is sent concurrently in another direction to provide reset for the Remote I/O board. After the reset signal enters the cockpit and resets all boards, it then exits the cockpit through the other set of conductors to reset the next cockpit.

For the location of the reset connection to the CPU, please see the section in the manual for Card Cage and Backplane.

Intercomm connection: Jacks J1 through J8 are for cockpits 1 through 8 respectively. J9, J10 & J11 are unused. J12 is for talking to all active cockpits. J13 & J14 are four team communication, J13 is for cockpits 1 through 4 and J14 is for cockpits 5 through 8



J16 - PINOUTS		
1: RX+	5: 5V	9: RST_OUT-
2: RX-	6: +12V	10: RST_IN-
3: RST_OUT+	7: TRX+	11: 5V_RTN
4: RST_IN+	8: TRX-	12: 12V_RTN

The Remote Input/Output Board

The Remote I/O board is the heart of the user controlled I/O in the VWE cockpit. It is here were all the signals to the displays and the controls in the cockpit are received, decoded and distributed. The board's built in diagnostics have already been reviewed in section IV. In this section the hardware connections will be reviewed.

On the next page is a diagram of the RI/O showing the relevant connections to the rest of the cockpit. The connections are explained as follows:

5 Pin 100 mil Headers: These are the connections from the optical encoders to the RI/O. These headers are numbered 1 through 5 with number 1 being closest to the centre of the board and header 5 being closest to the board corner. Header 1 is connected to the right foot pedal. Header 2 is connected tot he left foot pedal. Header 3 is connected to the vertical axis of the joystick. Header 4 is connected to the horizontal axis of the joystick. And header 5 is attached to the throttle.

26 Pin Locking Ribbon Connectors: These 6 connectors are located on the other end of the RI/O and are number 1 through 6 with connector 1 being closest to the centre of the board and connector 6 being closest to the edge. These connections attach to the weapons display panels on the cockpit. Connection 1 connects to the ribbon cable labeled 'Left Weapons Display.' Connection 2 connects to the ribbon cable labeled 'Right Weapons Display.' Connection 3 connects to the ribbon cable labeled 'Overhead.' Connection 4 connects to the ribbon cable labeled 'Intercom.' Connection 5 connects to the ribbon cable labeled 'Keypad.' And connection 6 is attached to the ribbon cable labeled 'Backname Display.'

The Joystick Digital is a DB9 male connectors which connects to the joystick and throttle signal cable from the buttons on the joystick and throttle.

The Reset Connector is a 4 pin 156 mil header which connects the RI/O to the reset chain from the communications bundle. Attached to this header is a small PC board which contains an opto-isolated switch used to trigger a reset when the cockpit is reset from the control tower.

The Serial Connection to CPU is a DB9 female which connects the RI/O to the rest of the card cage.

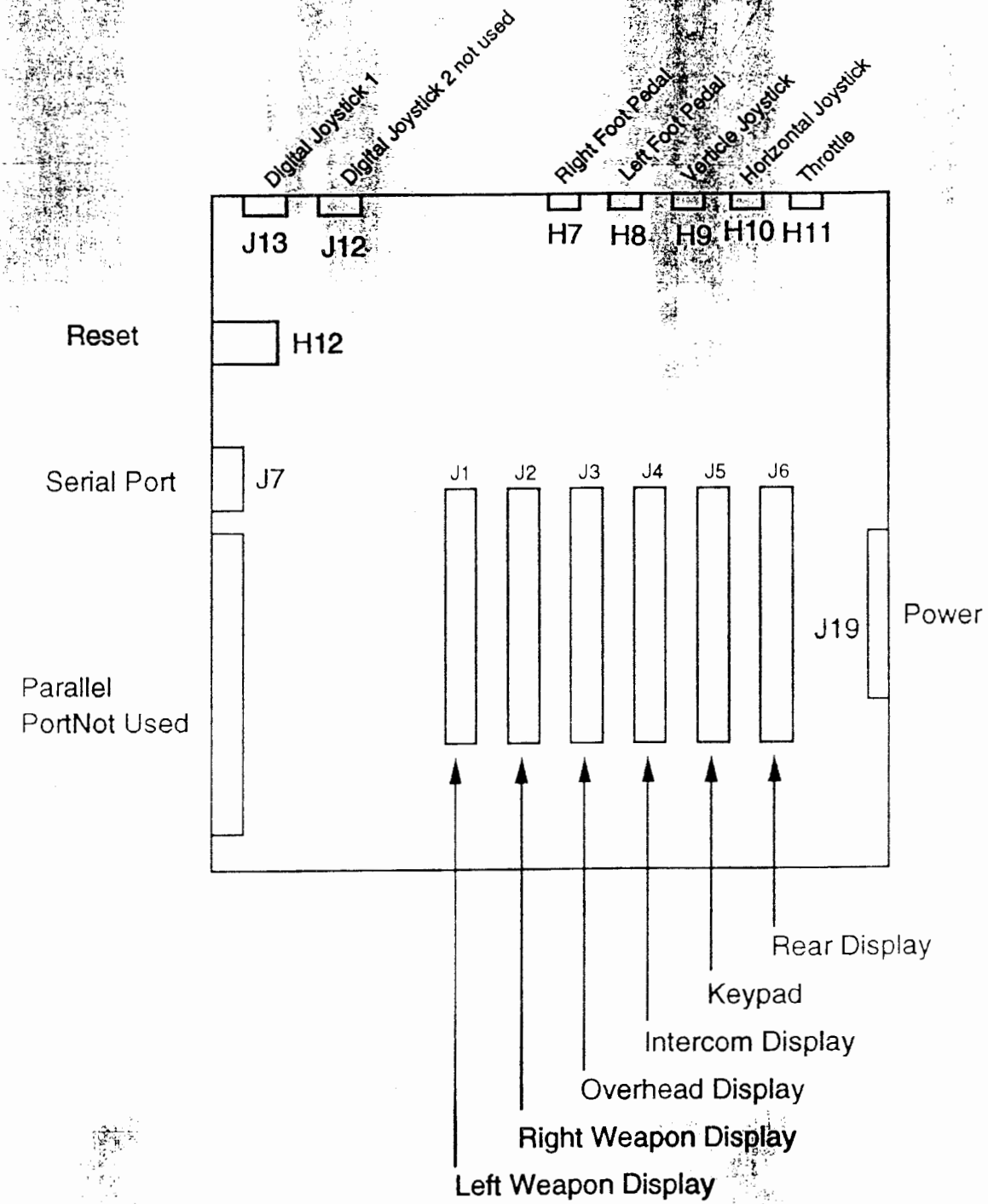
The Power Connection is self explanatory.

Remote I/O Diagnostics

All controls which can be manipulated by the user send signals from the control to the remote I/O board. This board is mounted on the inside shelf of the cockpit adjacent to the main monitor. Since many diverse signals pass through the Remote I/O, the board has many diagnostic routines programmed directly in the ROM of the board. Collectively, these commands are called 'F Codes.' These codes provide the technician the opportunity to track the performance of different aspects of the cockpit's controls during the cockpit's operation.

To initiate the remote I/O test mode type in 'A9E' on the keypad on the right hand side of the cockpit. (This key series may change in the future as the diagnostic ROMs are changed. Check with the VWE installation engineer for the version of the remote I/O

Remote I/O Board (1107) Connections



ROMs used and the accompanying test mode initiation key sequence.) When remote I/O test mode is entered, the right weapons display panel shows a menu of the specific diagnostic subroutines. Also at this time the overhead panel indicates that the cockpit has entered remote I/O test mode. Note that the cockpit controls are disengaged when the cockpit is in test mode. When test mode is exited, the cockpit controls are returned to normal and all the LED's in the cockpit are reset.

Once the cockpit is in remote I/O test mode the following keystrokes from the keypad will invoke the following diagnostic subroutines:

'F' - The test reset code. This code will result in all the displays in the cockpit to light up with the remote I/O menu or their display board number. This state is the root menu of the remote I/O test. When in a test subroutine, depressing this key will take you out of the individual test subroutines.

There are various test subroutines which are used to test various controls in the cockpit. When in the root menu, the following keystrokes will have the following effects:

'1' - The lamp test code. When this keystroke is entered all the LED segments in the cockpit are illuminated. This is used to located and confirm burnt out weapons display boards.

'2' - The throttle test code. When engaged, the value being sent out by the optical encoder mounted in the throttle is displayed on the overhead display panel. In normal operation, the throttle should register around $0000 when the throttle is in the low position (Note: Do not be worried if in the low position, the throttle registers around $FFF0. The throttle has experienced some wraparound and this should not affect the throttle much.) and $0340 when fully extended. These values can vary somewhat and still not affect the proper functioning of the cockpit.

'3' - The foot pedal display code. When engaged, the values being sent out by the optical encoders on the foot pedals are displayed on the overhead panel. The foot pedals should register around $0000 when released and $0340 when fully depressed. These values can vary somewhat and still not affect the proper functioning of the cockpit.

'C' - The joystick test code. When engaged, the values being sent out by the horizontal
and vertical axis optical encoders of the joystick are displayed on the overhead display panel. When the joystick is in the centre position, the vertical and the horizontal encoders should register around $0000. When moved to the extreme ends of the joystick throw the values should deviate by about ± $60.

'4' - The bargraph LCD test code. When engaged all segments of all the LCD display on the heat scale light up in sequence. This is used to insure a functioning heat scale.

'5' - The push-button test. When this subroutine is initiated all push button signals, but not the keypad buttons are routed through the overhead display panel. When a button is depressed, the memory address of the button is displayed on the overhead display panel and the lamp in the

button is switched on or off depending on the state the button was in when the button was depressed.

'6' - Encoder reset code. When in the throttle, foot pedal or joystick test mode, depressing this key will automatically, reset the optical encoder register for that control to zero.

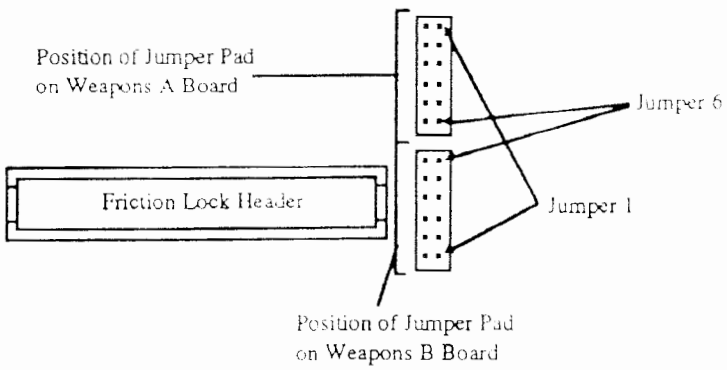
'D' - Remote I/O test exit code. When depressed while the cockpit is in the root menu, the cockpit will immediately exit test mode.

The remote I/O has proven to be a very reliable component of the cockpit. More often that not, the problem with the cockpit is due to a reset of the cockpit being done while a user control is not in the neutral position. When the remote I/O is reset, the board immediately assigns the position of the controls at $0000. If a component like a joystick has been moved to the right when the reset has occurred, the player of the next game will report the joystick not responding to the right joystick movement. Use of the F codes during games can be used to reset the controls while the game is running.

Weapons Display Boards

The numerous LED display panels in the cockpits are collectively called 'Weapons Display Boards.' There are two sorts of weapons display boards mounted inside the VWE cockpit. The Weapons Display 'A' board are the boards mounted behind the actual weapons displays in the cockpit. This board type can easily be identified by the presence of the vertical weapons recharge status bar nested between the regular alphanumeric LED displays. The second type the weapons display 'B' board does not have the weapons recharge status bar. Both the weapons display 'A' and the weapons display 'B' boards can be abbreviated as, respectively, the weapons A and weapons B board. Additionally, the weapons A boards mounted behind the keypad display have one or more sets of the mounting flanges removed. Other than this difference, the keypad display panel weapons A boards are functionally similar to the normal weapons A boards.

Both types of boards contain a large friction lock header, a 12-pin jumper pad, and four 4-pin headers. The placement of the jumper pads differ on the two boards. On the weapons A the jumper pad is mounted perpendicularly sand slightly above to the friction lock header while on the weapons B board, the jumper pad is mounted perpendicularly and to the side of the friction lock header. The connection of the jumpers on the jumper pad is used to determine the address of the board and varies on where the board is actual placed in the cockpit. The jumper pad on the weapons display 'B' board has its pins arranged so that pin pair #1 is placed closest to the friction lock header whereas on the weapons display 'A' pin pair # 1 is furthest from the friction lock header. The positions of the jumper pads is shown below:



On the weapons display panel, jumper 1 is connected on the top board, jumper 2 on the board below the top board, jumper 3 on the third board down, etc.

On the overhead display, while looking from the front of the display panel, the leftmost board has jumper 1 connected, the centre panel has jumper 2 connected, and the right board has jumper 3 connected.

On the keypad display panel the upper board has jumper 1 connected and the lower panel has jumper 2 connected.

On the weapons display boards are mounted four 4-pin headers. These connect to the various buttons and switches mounted on the panel with the weapons display boards. The exact connection needed to these 4-pin headers will be explained on the specific repair instructions.

Indications for Display Board Failure

1. The characters on the LED's are not displayed correctly.
2. All the buttons connected to the display board do not function.
3. A check on a bad button indicates the problem lies in the board and not in the button itself.

When any of these indications are found, the offending board should be replaced using the following procedure:

1. The display panel is removed from the cockpit by unscrewing the mounting screws. The grounding wire is detached by unscrewing the appropriate nut.

2. The ribbon cable is removed from the friction lock headers by twisting off the retaining clips off the ribbon cable connector. The grounding wire is unfastened from the panel by unscrewing the connecting nut.lock is placed above the ground wire lead and the nut tightened.

3. The button leads are separated from the headers on the board. Remember to detach the leads by grasping the headers and not the wires that lead to the headers in order to minimize the possibility of damage to the button.

4. The board is unfastened from the display panel by loosening the nuts and bolts which secure the board to the panel. Most of the nuts have one or two washers below them and the board is mounted on top of several spacers. Take care not to misplace these parts.

5. The board is then removed and a replacement is inserted its place. Be sure that all the spacers have been put into position.

6. Place the #6 external tooth lock washers on the bolts above the board and tighten down the nuts.

7. Reattach the switch and button jumper lead to the board jumpers. For each board the following headers are used: As you look at the overhead panel from the back, jumper 1 is the far right and jumper 3 is used on the far left. On the weapons display panels and the intercom panel, jumper 1 is the top board with the board numbers increasing as one decends. On the rear name display, as you look from the back, jumper one is the right board and jumper two is the left board.

8. Reattach ribbon cable to the panel.

9. Reattach the grounding wire. The ground wire lead is attached, then a #6 external tooth lock is placed above the ground wire lead and the nut tightened.

10. Test panel for proper operation.

11. Reattach panel to cockpit using mounting screws.

Repair and maintenance of the Illuminated Buttons In the Cockpit.

There are two types of illuminated buttons in the cockpit which the pilots can operate. The larger one measures 3/4" x 1/2" and the smaller measures 1/2" x 1/2". Both of the buttons generally function in the same manner: The switch will light up when depressed and the when depressed a second time, the light will turn off. Inside the button is contained a 5V bulb. This bulb will eventually burn out. Care must be taken to replace this bulb soon within 24 hours of the time it is reported burnt out. Negligence in doing this will result in the burnt out bulb overheating and fusing to the mounting pad. This event may damage the switch and the connected weapons display board.

Indications for Illuminated Button Failure

1. Button when depressed will not engage desired process. Probable button contact failure.
2. Button when depressed does engage desired process but, light will not illuminate. Probable button lamp burnt out.

When a button is reported nonfunctional i.e. depressing the button will not engage the desired game function the contact might be defective, the tech must determine if the problem lies in the button or in the weapons display board by:

1. Confirming that the switch is indeed not working. Sometimes the customers who complain about the switch not working have simply not engaged the advanced function rocker switch which enables the button to be used. Additionally, the problem may have been a transient one.

2. Upon confirming the button is in fact not working, the tech must determine if the problem lies in the button itself or in the weapons display board which the button is attached. This is done by removing the button from the panel it is mounted on and trying a replacement button in the old button's header.

3. To remove a button from a display panel requires the removal of the display panel from the cockpit. The display panel's mounting screws are unscrewed from the cockpit and the display panel removed. Care must be taken not to damage the ribbon cable behind the panel. The ribbon cable attached to the weapons display boards should not be removed except to facilitate in the removal of the button.

4. After the panel is removed, the button's lead is removed from the header on the appropriate board.

5. At this point a test button can be connected to the board and tested. If the test button does not work, this indicates that the problem lies in the weapons display board. The board shouldbe replaced.

6. If the test button functions properly, the old switch should be replaced. The old button is removed from the panel by pushing it out firmly from the rear.

7. A replacement button is inserted into the display panel.

8. Connect the leads from the replacement to the weapons display board.

9. Test the button for proper operation.

10. Reattach display panel to cockpit.

When a button is reported as having a burnt out lamp the following procedure is to be followed:

1. Remove the cover of the button by inserting the prongs of the cap extractor tool (NKK part # AT109) into the notches on the side of the cover and pulling the cover off.

2. The bulb is mounted on a mounting pad which is attached to a button guide which attaches to the button cover. Remove the bulb using the lamp extractor tool (NKK part # AT107) by fitting the lamp in the tool's hole and pulling.

3. Pull the bulb out through the back of the button guide. Insert a replacement bulb into the mounting pad. The mounting pad may have popped out when the bulb was removed. The pad fits into the guide by an interference fit and is easily replaced.

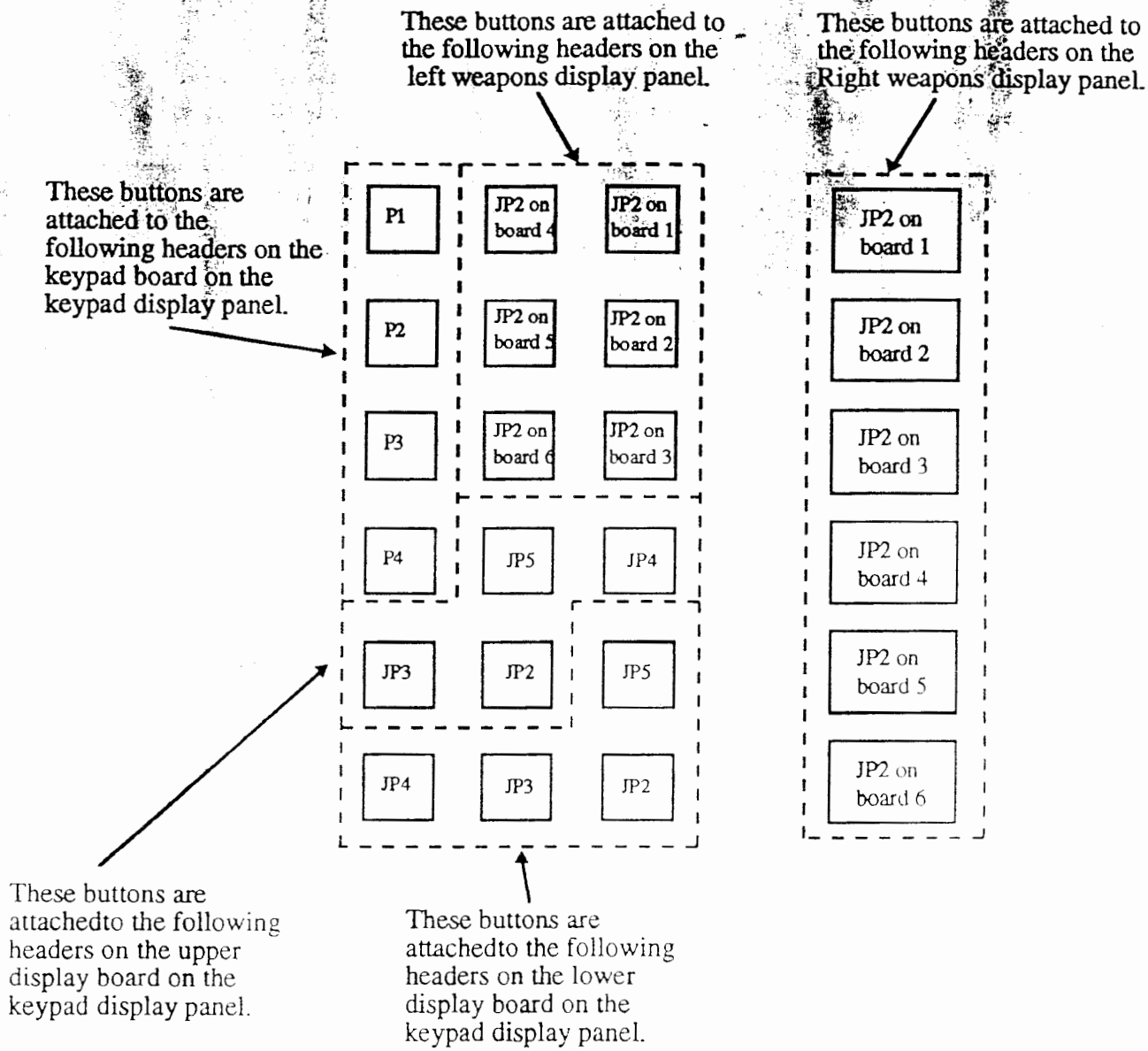
4. Reattach the button cover to the button guide. Reinsert the button guide into the button socket. Make sure that the guide and bulb leads are aligned properly with the socket. Press the button down into the socket until it clicks and functions properly.

5. Check if the button functions properly. If not, the display board has probably burnt out. Replace the affected display board.

Connection of button leads

Each button is connected to a specific display board. On the weapons display panels each button is attached to the board immediately above the button's location. The blue button is connected to the header labeled 'JP5', the red button is connected to the header labeled 'JP4', and the green button is connected to the header labeled 'JP3'.

The buttons surrounding the secondary display are wired to various boards. Below is a figure which describes the headers which every lead from the buttons surrounding the secondary screen. On the figure the different boards or panels are separated by dashed lines. The specific header which the button is attached to is written on the button illustration itself. Note that the buttons which are connected to the weapons display panel are connected to different boards. Board #1 is the topmost button the ordering continuing sequentially as one descends down the panel.


These buttons are attached to the following headers on the left weapons display panel.
These buttons are attached to the following headers on the Right weapons display panel.
These buttons are attached to the following headers on the keypad board on the keypad display panel.
P1
P2
P3
P4
JP2 on board 4
JP2 on board 1
JP2 on board 5
JP2 on board 2
JP2 on board 6
JP2 on board 3
JP5
JP4
JP3
JP2
JP5
JP4
JP3
JP2
JP2 on board 1
JP2 on board 2
JP2 on board 3
JP2 on board 4
JP2 on board 5
JP2 on board 6
These buttons are attachedto the following headers on the upper display board on the keypad display panel.
These buttons are attachedto the following headers on the lower display board on the keypad display panel.

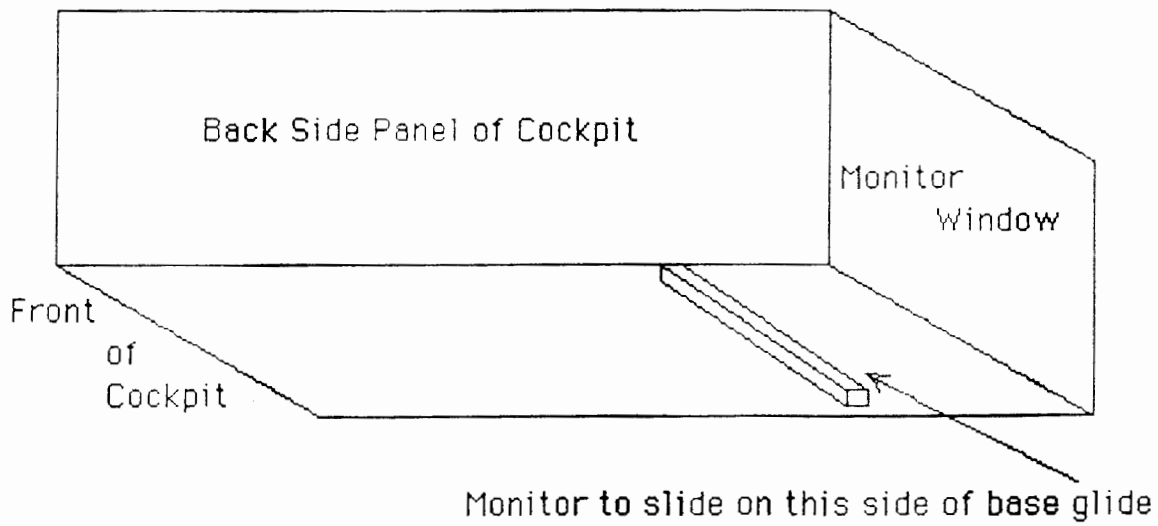
Main Screen and Secondary Monitors

In all versions of the Cockpits (2.0, 2.5, 3.0) there are two monitor types. The Main Screen 25" Monitor and the Secondary Screen 13" Monitors.

Replacement

Main Screen Monitor

1. Power down cockpit. Remove main monitor access panel.
2. Remove power cable from the right hand side upright board and disconnect cable head from the monitor jumper pad.
3. Remove screws along top rail of monitor.
4. On the 2.5 and 3.0 pods disconnect the ribbon cable from the remote I/O along the base board to prevent damage to the ribbon cable upon removal of monitor. Alternatively, covering the ribbon cable with a piece of wood in order to prevent damage to the cable during monitor removal can be done.
5. Remove the monitor by sliding the monitor out the side of the cockpit and out the main monitor access hatch.
6. When the replacement monitor is slide back into place be sure that the bottom rail of the monitor is toward the back side of the wood guide.



7. Reinsert and tighten the screws for top rail of monitor.
8. Reconnect Power and Cable Header for Monitor.
9. Reattach connections to Remote I/O
10. Return power to cockpit.

Secondary Monitor

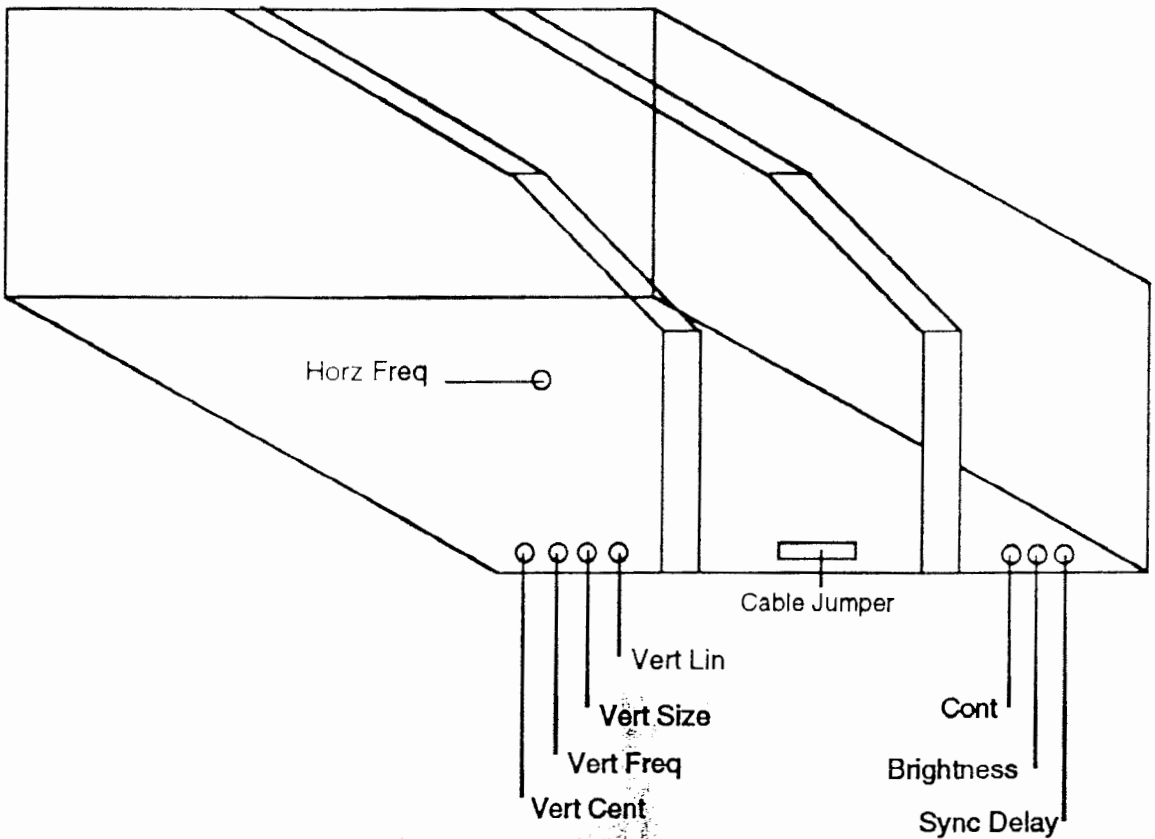
1. Power down cockpit.
2. Disconnect power cable from monitor that leads to secondary monitor transformer.
3. Remove adjustment control pod from base of cockpit.

4. Remove the screws to the base of the monitor from underneath and inside the cockpit compartment above the foot pedals. Be aware that the monitor might slide down as you remove the last screws. A second person may be needed to hold the monitor as the screws are being removed.
5. Remove the monitor by sliding it out the side panel access door.
6. Install the new secondary monitor by reversing the above steps.

Adjustments

Main Screen Monitor

After the main screen monitor has been replaced you will need to make adjustments to get the correct image on the screen. It is best to at first use the long load test screen as a initial test screen. You will need to adjust the Horizontal Freq. Pot that is located in the middle back of the base board of the monitor. **Be sure not to touch other components or the back of the monitor tube during this process as to that they may damage the monitor and can be extremely harmful to yourself.**



Adjust the horizontal freq. until the image synchronizes and stops scrolling. Adjust the vertical controls until the image is even with the edge along the top and bottom. Use the Sync Delay pot to center the image Horizontally. These adjustments are most often a matter of judgment calls. There is no set position for these adjustments so just do the best you can to get the best results. These adjustments are very important in that the customers are greatly affected by how the monitor looks and how it is set up.

Cycle the power on the cockpit again to insure that the adjustments on the horizontal frequency are not marginal.

Secondary Monitor

The adjustments for the secondary monitor are achieved by adjusting the controls that are on a PCB board attached to the back of the secondary monitor. These controls adjust the horizontal and vertical positioning of the screen as well as the color and darkness level. It is best to adjust this while a mission is in progress.

Joystick

General Descritption

The joystick used in VWE System 3.0 is an digital joystick manufactured by Happ Controls and used exclusively by VWE. The joystick vertical and horizontal axis are measured by the use of two optical encoders made by Hewlett-Packard. The three switches which act as triggers are all microswitches and are located in the joystick handle. The handlehalves are each attached to the main shaft by two T-20 safety torx head machine screws. The microswitches are mounted in place by the use of self tappting phillips head screws. All the connections to the joystick are made through a single 15 pin female molex conntector on the bottom of the joystick assembly.

Since the joystick, throttle and foot pedal assemblies are most prone to being repaired, the repair section will be presented a matrix for easy repair guidance.

Frequent Problems:

Thumb Triggers Do Not Function:	
Possible Cause	Remedy
• Wiring to Microswitch Faulty	• Inspect wiring at 15 pin molex connector and inside handle shaft using multimeter. Repair by replacing or resoldering connections and/or wires. Additonally, the common ground wire between the micro switches may have been severed.
• Mechanical Failure to Buttons	• Check for sticking of pushbuttons during operation of buttons. Make sure that the buttons return to their original position. Repair by filing down obstructions and realigning button (Happ P# 95-7031-02,3), button plunger (Happ P# 95-7041-00),and/or microswitch (Happ P# 95-4118-00).
• Switch Connections to RIO Incomple	• Inspect 15 pin connection from joystick extension and Seatpost Cable (PN 6210) to connection to Joystick/Throttle Signal Cable (PN 6371) to connection to Remote I/O Board. Replace faulty part if found.
• Remote I/O Faulty	• Check Remote I/O by comparing with a know working RIO. Replace if faulty.

Finger Trigger Does Not Function:	
Possible Cause	Remedy
• Wiring to Microswitch Faulty	• Inspect wiring at 15 pin molex connector and inside handle shaft using multimeter. Repair by replacing or resoldering connections and/or wires.

• Mechanical Failure to Trigger	• Check for sticking of trigger during operation Make sure that the trigger returns to its original position. Repair by filing down obstructions and realigning button, trigger spring and/or microswitch.
• Switch Connections to RIO Incomple	• Inspect 15 pin connection from joystick extension and Seatpost Cable (PN 6210) to connection to Joystick/Throttle Signal Cable (PN 6371) to connection to Remote I/O Board. Replace faulty part if found.
• Remote I/O Faulty	• Check Remote I/O by comparing with a know working RIO. Replace if faulty.

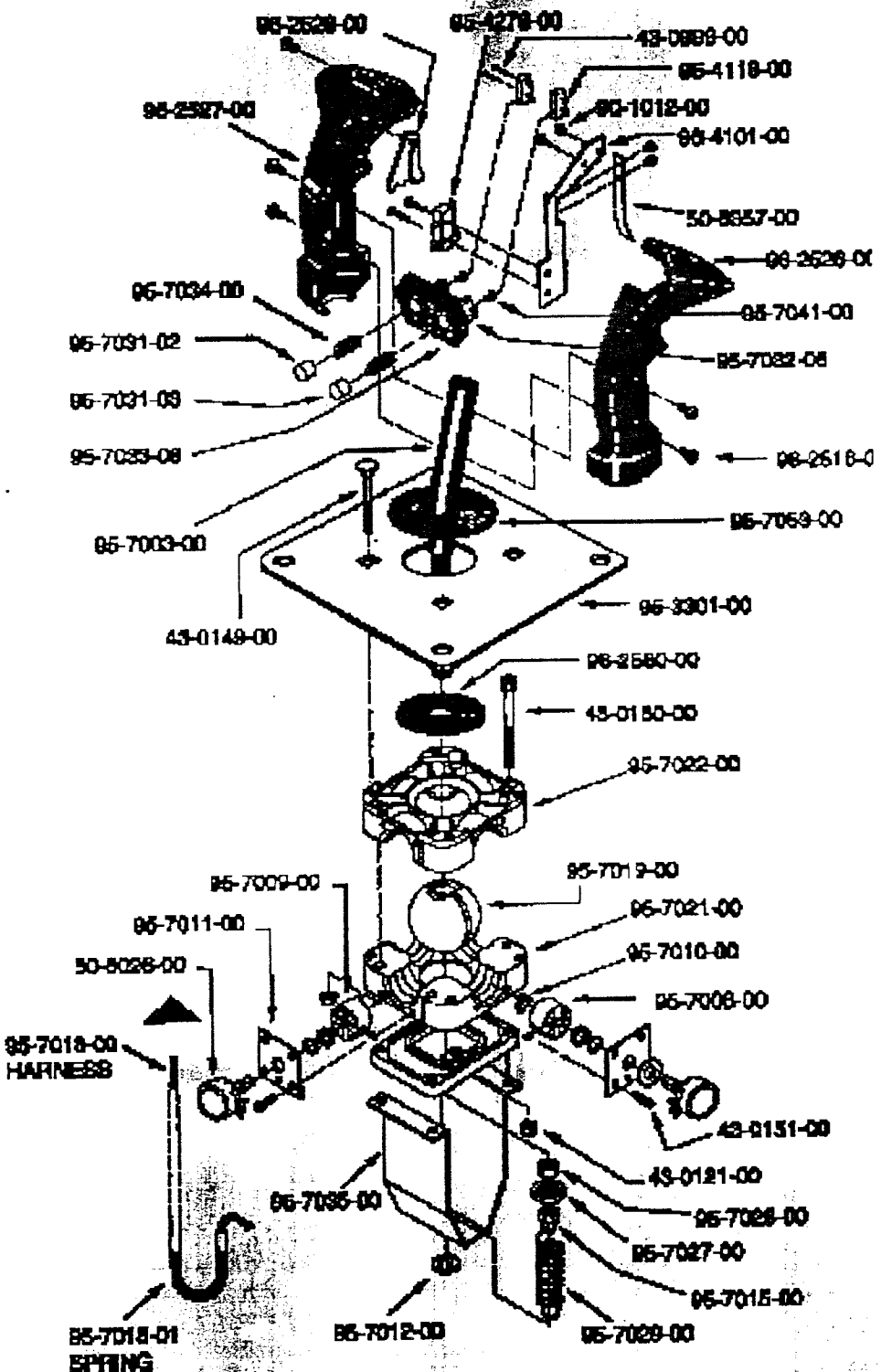
One or both axis of joystick not registering on Remote I/O Test.

Possible Cause	Remedy
• Encoder Connections to RIO Incomple	• Inspect connections from encoders to Joystick extension to 15 pin connection to Seatpost Cable (PN 6210) to connection to Joystick/Throttle Cable (PN 6370) to connection to Remote I/O Board. Replace/repair faulty part if found.
• Joystick Encoder Guide Misaligned	• Check if guide is properly meshed to the joystick main guide ball (Happ P# 95-7012-00), by removing optical encoder by unscrewing the screws on the encoder mounting plate (Happ P# 95-7011-00),. Remove encoder and check the plastic encoder guide (Happ P# 95-70009-00),for damage and proper alignment to main guide ball. Check if set screw on encoder guide is secure. Check if encoder is firmly mounted to encoder mounting plate. Repair or replace parts necessary.
• Faulty Encoder	• Swap suspected encoder with a known good encoder to confirm. Replace encoder if necessary.
• Remote I/O Faulty	• Check Remote I/O by comparing with a know working RIO. Replace if faulty.

Return Joystick to VWE for Replacement When:

- Main Shaft loose and rotaing about main shaft axis.
- Interior dust plate broken or missing.
- Handle or shaft broken or cracked.
- Advised by VWE Technical Support.

Exploded View of VWE System 3.0 Joystick with Happ Controls Part Numbers.



Throttle

General Description

The throttle used in VWE System 3.0 is an digital throtle manufactured by Happ Controls. The throttle's position is measured by an optical encoders made by Hewlett-Packard. A single microswitch is mounted in the throttle handle and the all the signal lines are enclosed in a nine pin female .062" Molex connector.

Frequent Problems:

Throttle Does Not Register

Possible Cause	Remedy
• Faulty Wiring to Encoder	• Inspect wiring at 9 pin molex connector. Ensure that the Throttle Extension Harness is properly connected to the optical encoder.
• Throttle Gears Not Meshing	• Inspect main and take-up gear on Throttle to make sure they mesh properly through entire throttle throw. Check to see if the set screw on the take up gear is tight.
• Faulty Encoder	• Check if encoder is bad by replacing the suspected encoder with a known working encoder. Replace if faulty.
• Connection to Remote I/O Faulty	• Inspect 9 pin connection from throttle extension and Seatpost Cable (PN 6210) to connection to Joystick/Throttle Cable (PN 6370)to Remote I/O Board. Replace faulty part if found.
• Remote I/O Faulty	• Check remote I/O by comparing with a known working Remote I/O. Replace if faulty.

Throttle Button Does Not Register

Possible Cause	Remedy
• Wiring From Switch to Harness Faulty	• Inspect wiring from microswitch to throttle extension cable. The button on the throttle is held in by a press fit. Exercise care in the removal of the button as not to disfigure the throttle handle.
• Broken Microswitch	• Test microswitch using Multimeter. Replace microswich.
• Connection to Remote I/O Faulty	• Inspect 9 pin connection from throttle extension and Seatpost Cable (PN 6210) to connection to Joystick/Throttle Cable (PN

	6370)to Remote I/O Board. Replace faulty part if found.
• Remote I/O Faulty	• Check remote I/O by comparing with a known working Remote I/O. Replace if faulty.

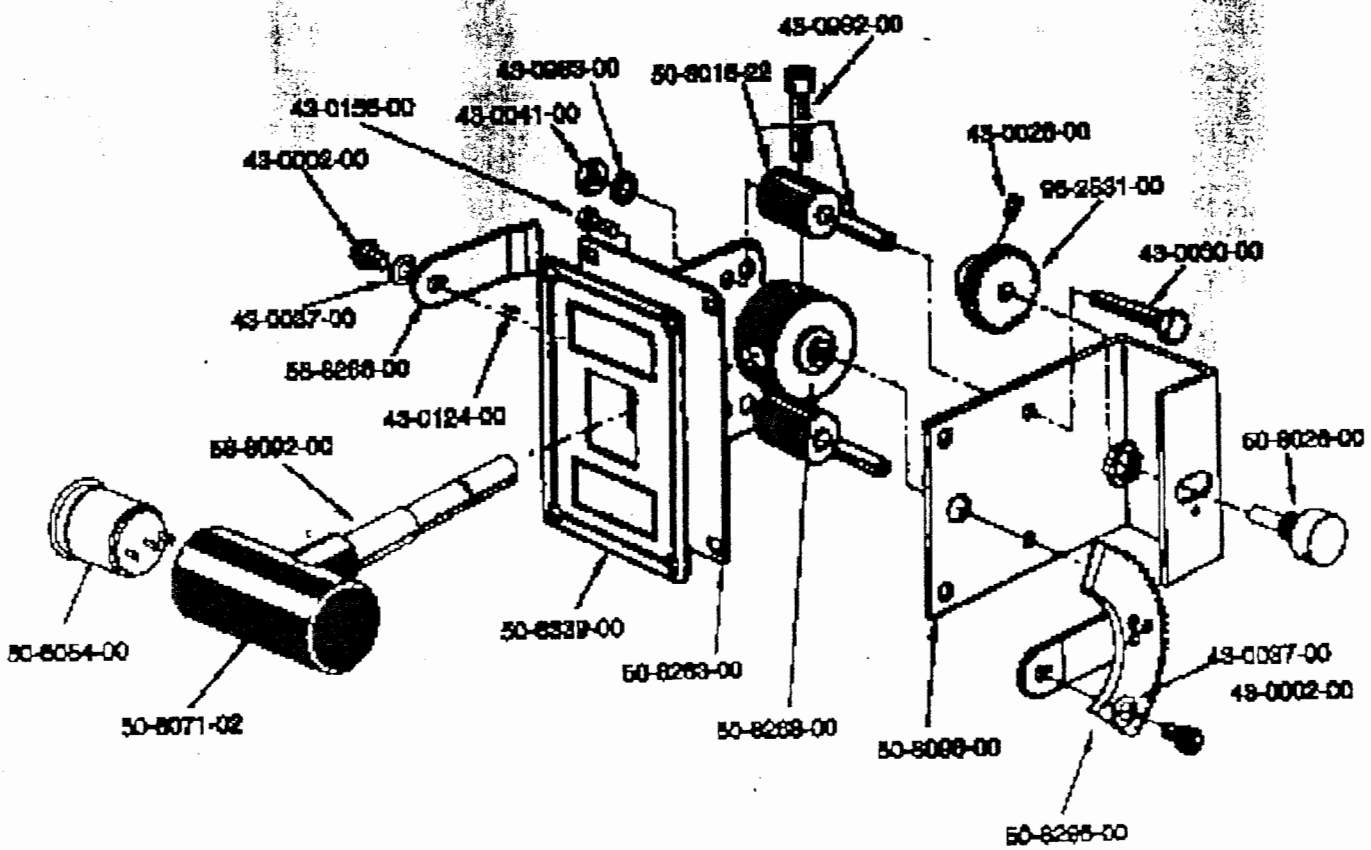
Throttle Handle is Loose

Possible Cause	Remedy
• Friction Plate Not Contacting	• The friction plate must contact the side of the throttle side assembly and provide enough friction to arrest the throttle arm. Remove the friction plate by unscrewing the machine screw. Using a pair of plier, deform the friction plate to allow for more force to be exerted on the throttle side plate.

Return Throttle to VWE When:

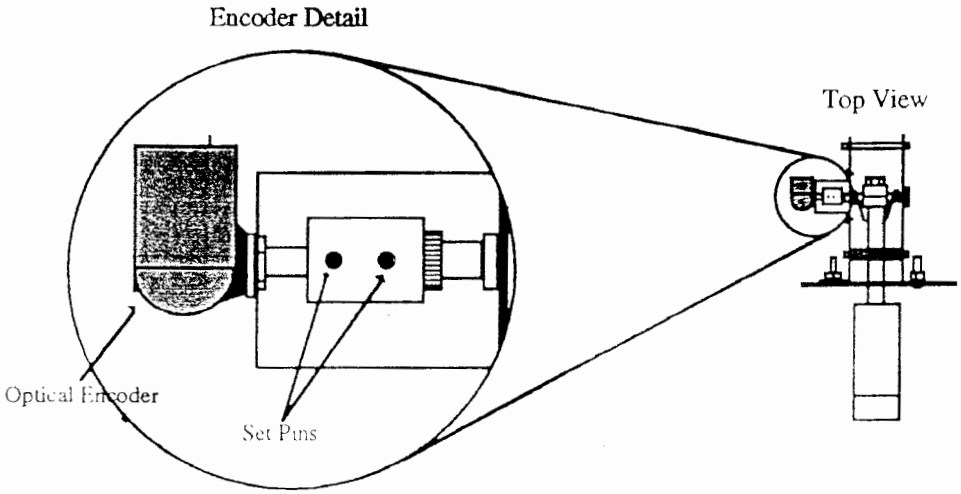
- The throttle handle is broken or smashed.
- The main throttle bearing is broken
- Advised by VWE Technical Support

Explode View of VWE System 3.0 Throttle with Happ Controls Part Numbers



Foot Pedals

Two foot pedals are mounted in the front of the cockpit's player area near the bottom of the floor. These foot pedals are secured to the cockpit by four (4) 7/16" bolts. The maintenance of these pedals usually deal with the replacement of optical encoders and slipping of the encoder sleeve. The foot pedal is illustrated below:



Indications for Malfunctioning Foot Pedal

1. The cockpit does not respond when a foot pedal is depressed.
2. A foot pedal is depressed and when released, the cockpit acts as if the pedal is still depressed.

The first thing that must be noted is that the two foot pedals are not accessed in the same manner. The right foot pedal is examined by first removing the mounting bolts that hold the foot pedal to the cockpit wall while the left foot pedal is examined by removing the access panel mounted on the left side of the cockpit.

When the cockpit seems to have a problem the first thing to check is the connection between the encoder and the remote I/O. Reset the remote I/O and see if this fixes the problem. If the reset is unsuccessful, open the small access panel on the left side of the cockpit and use a flashlight to examine the 5-pin connector attached to the encoder. Many times the vibration that the foot pedal undergoes is enough to work the connection loose.

If the problem does not lie in the connection, determine if the collar which connects the encoder to the foot pedal shaft is loose. While the foot pedal is depressed and released, observe the collar and the two shafts it connects. All three components should rotate equally. If not, tighten the set pins using an allen wrench. In a pedal which exhibits a chronic problem with the set screws loosening the screw can be secured with a thread locking adhesive such as Loctite 242.

If the problem does not lie in the collar, then the problem probably lies with the optical encoder. Remove the encoder using the following procedure:

1. Remove the foot pedal from the cockpit by unscrewing the mounting bolts. Open the access panel on the left side of the cockpit.

2. Disconnect the 5-pin connector which connects the encoder to the remote I/O board by reaching through the access panel. Remove the foot pedal assembly from the cockpit.

3. Loosen the set screw closest to the encoder using an allen wrench. Loosen the retaining nut on the encoder shaft.

4. Remove the encoder by pulling the encoder straight from pedal assembly.

5. Insert a new encoder partially into the pedal assembly. Slip the internal tooth lock washer and the retaining nut over the encoder shaft.

6. Align the encoder shaft so that the flat face of the shaft faces the set screws. Insert the encoder into the collar and tighten the set screw.

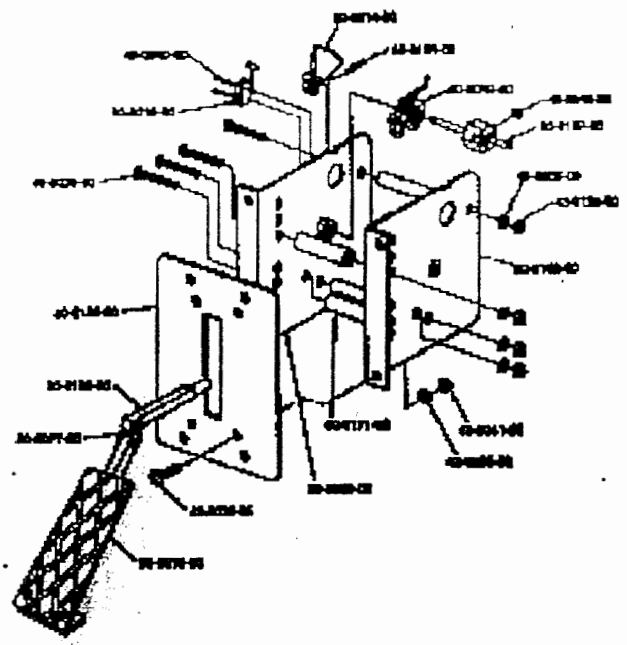
7. Tighten the retaining nut.

8. Reattach the foot pedal to the cockpit by inserting and tightening the mounting bolts.

9. Reconnect the 5-pin connector by reaching through the access panel.

10. Reset the remote I/O board and close the access panel.

Exploded View of Foot Pedal Assembly



Door Slide Rails

On the top of the 3.0 cockpit are two metal slide rails with bearings. They are to help provide the canopy with directional support and top support. The bottom rail is a plastic bearing made out of high density polyethylene which provides a secured weight holding channel for the canopy to slide on.

All three rails need to be as close to parallel as possible in order for the canopy to slide its full range of motion. If the rails are not close to parallel, the canopy will not operate smoothly.

If the rails on top are not parallel to each other, the steps to correct the problem are as follows...

1) Open the canopy completely to allow access to the rail screws closest to the cockpit seat. When the canopy is open completely, the screws on the large rail, going down into the wood above the primary monitor should be in view. Take the screws out on both rails.
2) Close the canopy completely to allow access to the rail screws closest to the box fans. Take the screws out of both rails. At this point, the canopy should be disconnected from the cockpit, and the only thing holding it on is gravity.
3) Open the canopy completely to expose the ends of the large rails. Paying close attention to the position of the canopy; so nothing will be rubbing when the canopy moves; anchor the ends (closese to the seat) of the large rails. It might be necessary to use larger screws and possibly start a new hole as opposed to using the same screw hole. Making sure that nothing is rubbing, extend the rails until the canopy is completely closed. Again, double check to see that the rails and canopy touch nothing for the complete extension. With all operating smooth, it is time to anchor the back of the rails.
4) Open the canopy almost all of the way until the all but the last screw holes in the rails still show. Once again, manipulate the position of the canopy so that it is not touching anything (ie. canopy touching cockpit), and can finish opening it fully.
5) Screw down the rail ends nearest the fans.
6) Before inserting any more screws, make sure that the canopy can open and close smoothly without any rubbing. If not, make adjustments where necessary.
7) Once the canopy can travel the entire length of the rails without rubbing, than anchor the remaining screws into the rails.

The bottom rail must be sure to bear the weight of the canopy from opening to closing. During the life of the cockpit, some settling may occur and the lower rail may need to be adjusted. The lower rail is held to the cockpit by the use of wood screws and these may be moved as the cockpit settles. Additionally, the plastic rail may need lubrication. In order not to damage the plastic rail, a silicone lubricant should be applied to the rail on a regular basis.

The biggest failures with the rails is the screws coming loose and wedging inside of the rail. The rails should be inspected almost daily to insure that the screws are tight. If any loose screws are found, they need to be fixed as soon as possible. Loose screws on rails lead to larger problems.

If a screw comes loose and works it's way out of the wood and into the rail, the rail will not slide as easily. The rail might stop working all together. As pilots get in and out of the cockpit, they tend to force the canopy open or closed. If a screw is wedged in the rail, hindering free operation, and the canopy is forced open or closed, the bearings can loose their placement and be forced out the end of the rail. No amount of lubricant will make the rail operate better as long as the screw remains an obstruction. If the screw cannot be extracted with the canopy still mounted, the rail will need to be taken off and worked on. This might involve taking the whole canopy off and reworking it. This can be done by one person, however it is recommended that two people be involved to insure that the canopy is not damaged during the process. Use the method outlined above to re-install the top rails on the canopy if it is necessary to take them off.

ROUTINE / PREVENTATIVE MAINTENANCE

The Daily Inspection

The daily inspection is one of the most important things that the on-duty tech must do. It is during this time that the tech will ascertain the operational readiness of the cockpits and other computers in the centre. This inspection is the first thing that the tech does when he arrives at the centre and from this initial inspection plans his actions for the day's shift.

Usually, as the tech enters the centre in the morning, the centre is shut down. It is his responsibility to power up the centre and to load all the necessary files from the server to the cockpits. When starting up the cockpits for the first time in the day make sure that the throttles are all the way back and that the joysticks are all centered. As the files are being loaded up, the tech should use this time to browse through any maintenance requisition forms left in the pending book and to read the manager's log to see what technical problems have occurred in his absence. After the cockpits have loaded, a test game is run by the tech to test the functioning of the cockpits and to confirm the gripes indicated on the maintenance requisition form. The need to confirm gripes is important. Sometimes a problem is of a transient nature and they may have been alleviated by the reloading of the game files or by the shutdown (total reset) of the system.

If the technician is not looking for any specific problem, the cockpit still must be checked for full operational capabilities. The following is a checklist of the things in each cockpit that must be verified as working before the day begins and how each component is to be tested:

1. The Main Screen
2. The Secondary Screen
3. Speakers
4. Joystick
5. Throttle
6. Foot Pedals
7. Weapons Display Buttons and LEDs
8. Secondary Screen Button and Other Buttons
9. Seat
10. Canopy
11. Fans
12. Microphones and Intercoms
13. External Appearances

The Main Screen Graphics: The pictures displayed on the main screen should be sharp and clear. A corrupted load may be indicated if the images are distorted.

The Secondary Screen: The checking of the functioning of the secondary screen is the same as checking the functionally of the main screen. Make sure that the images displayed on the secondary screen are sharp and clear.

Speakers: Before the game begins, no sounds should be coming from the speakers. During the game the explosions should be heard from all speakers.

Joystick: Make sure that the joystick can move the crosshairs in all directions. Also all three triggers should be working. The use of the Joystick test code from the remote I/O test mode, will help in the verification of the proper functioning of the joystick's optical encoders.

Throttle: When the throttle is in the full down position, the 'mech should be standing still with a speed of 0 KPH. Make sure that when the throttle is in the full up position, the 'mech is traveling at its rated top speed. The use of the Throttle test code from the remote I/O test mode will help in the verification of the proper functioning of the throttle's optical encoder.

Foot Pedals: When the foot pedals are functioning properly the mech should not be turning when no pressure is applied to either of the pedals. Additionally, the 'mech should turn in the direction of a depressed foot pedal when only one pedal is depressed. The rate of turning should be equal for both directions when one pedal is depressed fully and the other released. The use of the Foot pedal test code from the remote I/O test mode will help in the verification of the proper functioning of each foot pedal's optical encoder.

Weapons Display: The LEDs in the display should all be working and the lights in the weapons selection buttons turn off and on as the button is repeatedly depressed. To properly test these, the cockpit is to have the push button test mode activated. This test mode is engaged by entering the code 'A9E' on the keypad.

Secondary Screen Buttons: These button should light up when depressed and should engage their respective functions. Again the push button test mode should be activated during this test.

Seat: The seat should adjust, lock, and generally be in a serviceable condition.

Canopy: The canopy should close and open smoothly.

Fans: The fans should be operating at all times the power is engaged in the cockpits.

Microphones and Intercoms: When the intercom is used, the voice should come on over the speakers in the cockpits.

External Appearances: The general cleanliness of the cockpit should be checked over. Missing or burnt out bulbs should be replaced and any nicked or broken parts replaced or repaired.

Additionally, the reservation and ready area computer are checked out at this time. The tech should insure that the front half computers are all on the network and that the proper folders are mounted up on each computer. The printers are check to see if they are adequately supplied with paper, toner, and ribbons. The touch screens are checked to be working and in calibration. Due to the fact that most of the front end equipment is not produced by VWE, the specifics of the maintence of thse units are located in the units' user manuals.

The video distribution, remote monitors, and sound system should also be tested and verified to be working.

After the end of this inspection, the tech should then proceed with the needed repairs which include but, not restricted to, bulbs being replaced, control units re calibrated and bad boards replaced. The technician must remember the priority of his

work. Repairs that prevent the proper playing of the game take priority over any cosmetic repairs.

Probably the most important thing to be done on a daily basis is the backing up of the hard disk drives in the centre's computers. Due to the amount of data contained in the centre's computer, a hard disk crash will have very serious consequences. It cannot be stressed enough: Always perform backups on the hard drives! Nothing can destroy customer loyalty faster than finding out that their name has been lost from the database. The timely execution of backups can prevent this from happening. Additionally, it is recommended that the technical staff use seven sets of backups. One backup is made and saved for every day of the week. Each tape is named for the day the backup gets done and it will be used repeatedly of that day's backups. By doubg this way all recoveries from backups will, at the most, be 24 hours old. The use of the timer function in Retrospect will be useful if frequent backups are needed.

The Weekly Inspection / Maintenance.

In addition to the daily maintenance, the technical staff will have to perform the following procedures on a weekly basis. The staff does not personally have to perform all the tasks which follow. Instead, other workers in the Centre can be conscripted to do them while the technical staff can oversee the work being done.

These procedures are aimed to prevent any possible damage in the future. If a potential problem is addressed early enough, the major headaches which stream from the problem can be averted.

The following tasks should be done on a weekly basis:

1. Cockpits vacuumed out.
2. Cockpit screens cleaned.
3. Ready area screens cleaned.
4. Reservation computer and screens cleaned.
5. General cleanliness and serviceability of the centre physical plant.
6. The backup of the hard disk drives in theCentre's front end computers.

The use of a small man-portable vacuum cleaner is suggested when cleaning out the cockpits. A handheld dustbuster type device does not have enough power. A vacuum unit should have at least 2 h.p. to provide enough power to get all the dirt and dust out. Additionally, the vacuum should have a flexible hose with attachments to get into the hard to get areas of the cockpits. When a screen is to be cleaned, both the screen and the screen's cover plate must be wiped down with a glass cleaner. Also, to insure safety from electrical shocks, the wipe down must be done while the power to the monitor is off.

It is clearly seen that the weekly inspections deal mainly with the cleaning of the centre. The cleanliness if the centre contributes greatly with the running of the cockpits. Dust on the screens degrade the visual impact of the game while dust in the moving parts of the cockpits can interfere with the proper functioning of the footpedals and joysticks.

Monthly Inspection / Maintenance

The monthly maintenance and inspection deals mainly with preventative maintenance andsystem optimization. These tasks should not be performed by the regular operators of the system. The technical staff should be the ones who are personally tasked to do these procedures since these deal with the electronics and software of the system.

Every month the following things should be done to the centre:

1. The card cages and the interior of the card case dusted.
2. The rear of the monitors dusted.
3. Net connections and BNC connectors checked.
4. Video connections checked.
5. Safety Inspection

The dusting of the card cages is to be done with the vacuum cleaner. When dusting the card cage and cards the vacuum is set to blow out the dust, not suck it in and possibly ingest some of the electrical components. Therefore, a blower attachment for the vacuum is necessary for this procedure. The floor in the front of the pod and other sturdier parts may be done with the vacuum cleaner in the suck mode. The rear of the monitors should also be dusted in this manner. Excessive dust in the electrical components can have the dust ionize and short the system. Also a static charge may settle in the dust around the monitors, causing a static discharge. While some dust may be tolerated, excessive dust is not.

The checking of the net connections is done every month since it has been shown through experience that the BNC connectors are prone to failure and corrosion. These connectors should be checked and any potentially faulty ones replaced. Do not wait for a borderline connector to fail. Replace the connector before it does.

The connections from the cockpits to the video wall should also be checked at this time. Since the connections from the video wall and the cockpits are the same as the ones used to connect the LAN, these connections are also failure prone.

The safety inspection is done to prevent any possibilities of fire in the future. Cables and power lines are scanned for fraying. Any flammables are removed from around the power lines and the fire extinguishers are checked to see if they are charged.

Ethernet Description

The apple macintoshes are connected to each other through the use of an ethernet network. The network used is a standard 10 MBit/sec network and uses the apple ethertalk protocol. The ethernet network is laid out in a star configuration with each macintosh component at the end of each arm. The standard wire type used to carry the ethernet traffic throughout the centre is category III Unshielded Twisted Pair (UTP). Also since the wire is typically not run throughout conduit in the centres, the UTP should be plenum rated. Normally, a single hub is not sufficient to handle the number of nodes in a centre so two or more hubs are connected together by using a thin RG58A (50Ω) coax cable and terminators. In some centres, the hubs are connected by using port 12 on the hubs as connection ports and having the hubs connect using UTP. Consult the active hub's documentation for more details about stacking hubs.

Ethernet Layout

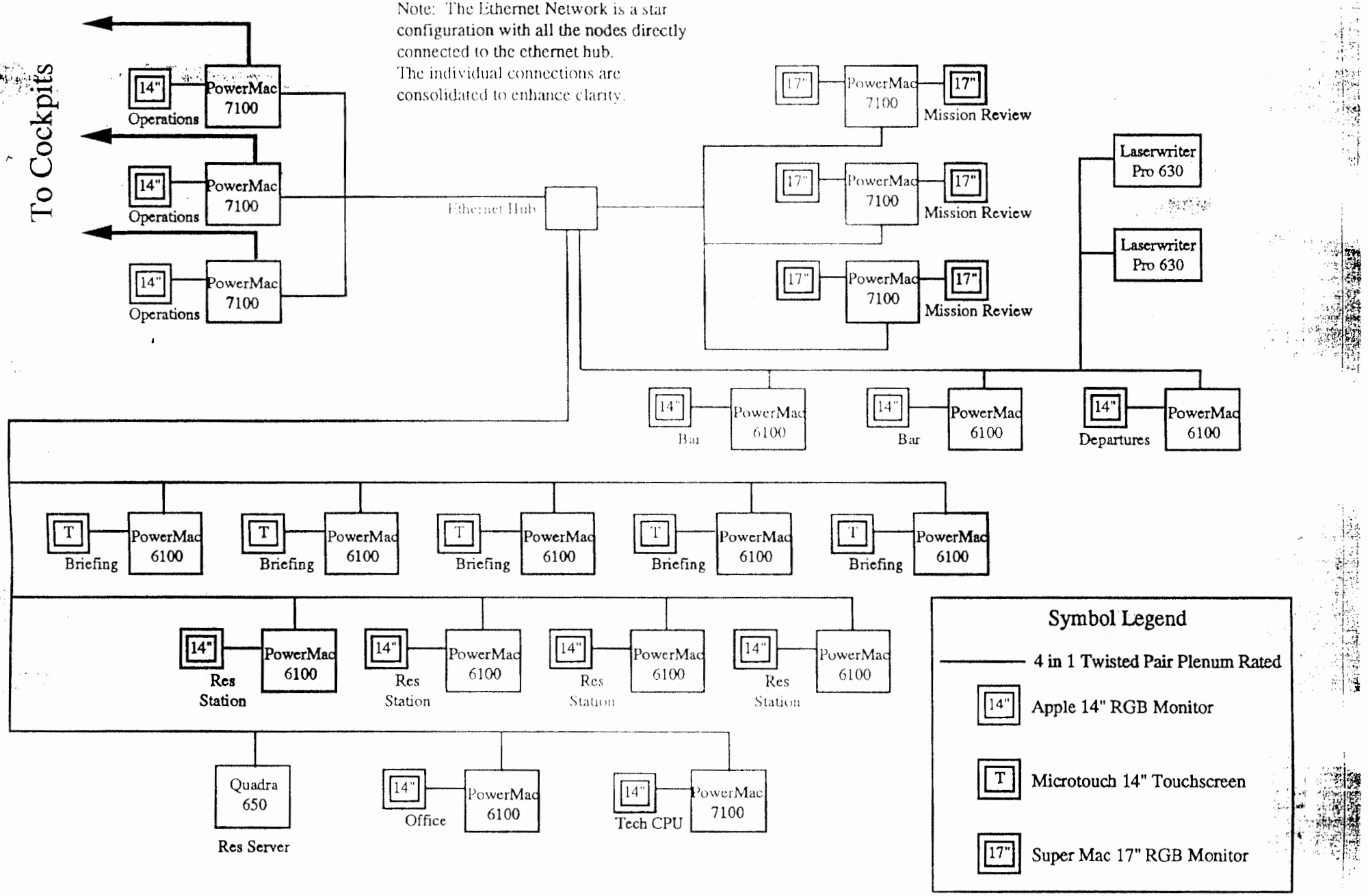
The typical layout of a centre is shown in the enclosed figure. All the Macintoshes and the laserwriters are connected to the ethernet hub. All of the nodes in the network use a ethernet transceiver (at the time of this writing, standard issue in our stores are Asanté FriendlyNet Adapters) which connect to the AAUI port of the device. The output of the transceiver is then hooked up to the network wiring of the centre. The network wiring is installed during the building of the centre and it usually terminates in a RJ45 connector. A RJ45 ethernet connection uses 4 out of the 8 connection points on the jack. The pinout is as follows:

Pin	Connection
1	TX+
2	TX-
3	RX+
4	N/C
5	N/C
6	RX-
7	N/C
8	N/C

Pin 1 is defined as leftmost pin when looking at the insertion end of the jack with the polarizing key pointing up.

Note that each node on the network returns separately to the ethernet hub. The figure has the lines consolidated for clarity. It should be noted that the ethernet network is tested by the install team and that the actual wiring of the ethernet is very stable.

An easy way to test for line integrity between the device and the hub is to create a loop test device. This is done by taking a RJ45 connector and looping a connection from pin 1 to pin 3 and pin 2 to pin 6. If you plug this device into the device end of the line you should see the line integrity light come on at the hub.


Note: The Ethernet Network is a star configuration with all the nodes directly connected to the ethernet hub. The individual connections are consolidated to enhance clarity.
To Cockpits
14" Operations
PowerMac 7100
14" Operations
PowerMac 7100
14" Operations
PowerMac 7100
Ethernet Hub
17"
PowerMac 7100
17" Mission Review
17"
PowerMac 7100
17" Mission Review
17"
PowerMac 7100
17" Mission Review
Laserwriter Pro 630
Laserwriter Pro 630
14" Bar
PowerMac 6100
14" Bar
PowerMac 6100
14" Departures
PowerMac 6100
T Briefing
PowerMac 6100
T Briefing
PowerMac 6100
T Briefing
PowerMac 6100
T Briefing
PowerMac 6100
T Briefing
PowerMac 6100
14" Res Station
PowerMac 6100
14" Res Station
PowerMac 6100
14" Res Station
PowerMac 6100
14" Res Station
PowerMac 6100
Quadra 650
Res Server
14" Office
PowerMac 6100
14" Tech CPU
PowerMac 7100
Symbol Legend
4 in 1 Twisted Pair Plenum Rated
14" Apple 14" RGB Monitor
T Microtouch 14" Touchscreen
17" Super Mac 17" RGB Monitor

The Arcnet Network

The cockpits and cameraships are communicate to each other via an arcnet network. The network is a star topology network connecting all the nodes on the network with RG62 coaxial cable. As can be seen on the side diagram, all the nodes on one side of a VWC are not directly connected via arcnet to the other nodes on different sides. In other words, each side of cockpits is an independent arcnet network.

Arcnet Layout

The layout of the arcnet network in a VWC is usually run from the Opscon Macintosh to a local arcnet hub. The arcnet hub and opscon are based in the control tower for the side. From the arcnet hub, the RG62 from the individual cockpits and cameraships are run through 4" diameter sewage pipe suspended from he ceiling of the pod bay. All lines of RG62 run through a centre are male BNC connections. Care must be taken to insure that the RG62 is not influenced by local RF interference. Generally, it is advisable to avoid any fluorescent lights or high voltage AC. A separation of about 3 feet should be sufficient separation of the arcnet lines and unshielded AC lines.

Arcnet Hub and Branching

The standard arcnet hub used in a VWC is an 8 port hub. A standard side of cockpits contains 8 cockpits, 2 cameraships and 1 control computer. The overflow of nodes requires the use of F-F-M BNC Tee connector. On three of the ports on the arcnet hub a BNC Tee will be mounted and two nodes will be attached to the tee. In order to prevent problems in line echo and termination of the arcnet hub, the cable runs on both branches of the tees should be approximately of equal length. Also of significance is that the failure of either branch of the tee will cause an incorrect termination. Care must be taken to insure that when one node on one branch of the tee is down for any reason that the other branch be plugged directly into the active hub and the tee removed. Failure to do this will result in the entire arcnet network of the side to go down.

Arcnet Node Numbering Conventions

Certain conventions towards the numbering of the nodes in a center are enforced by VWE to insure uniformity. All centers are to use the following node numbering scheme:

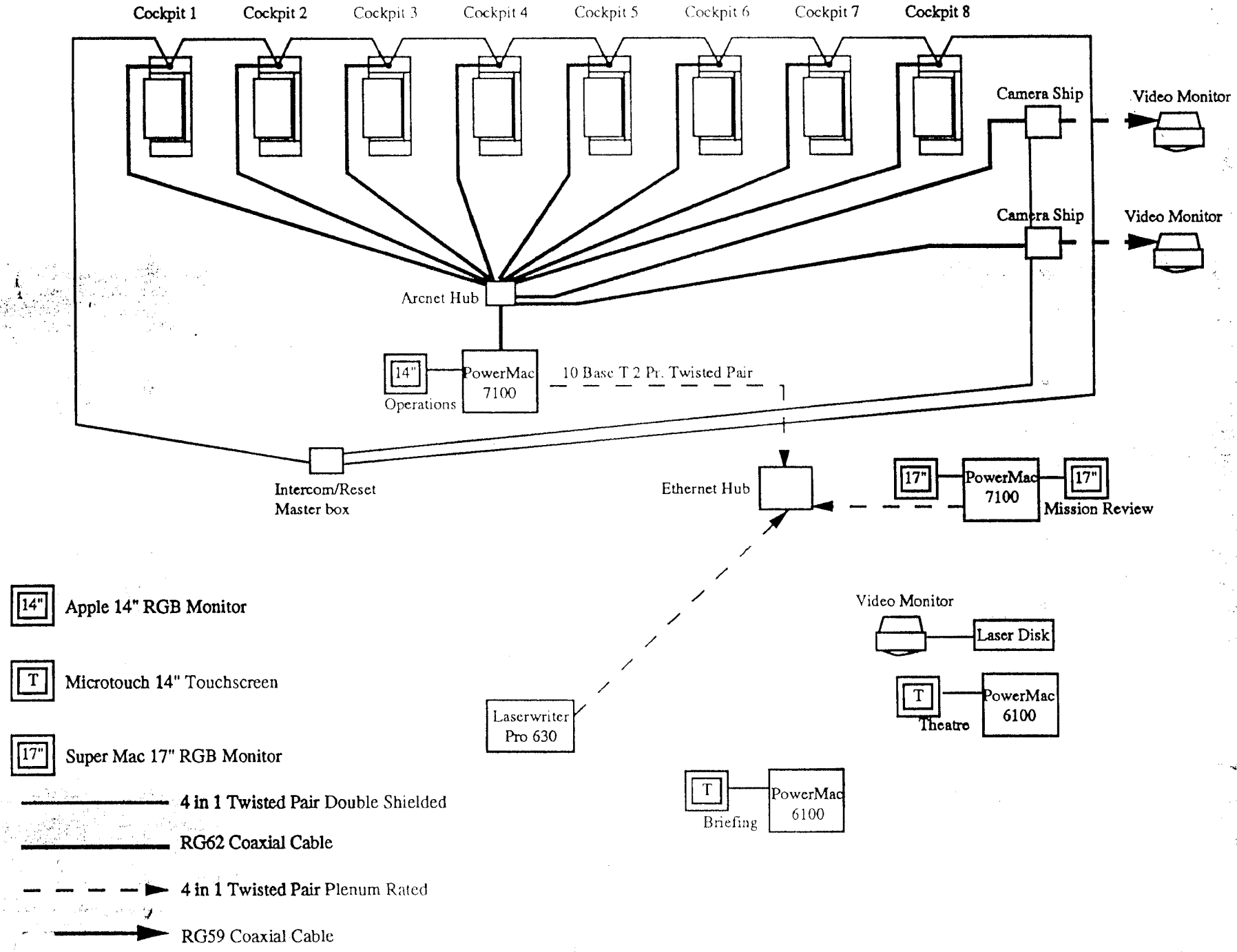
Alpha Side:	Node Name	Node Number
	Cockpit Alpha 1	11
	Cockpit Alpha 2	12
	Cockpit Alpha 3	13
	Cockpit Alpha 4	14
	Cockpit Alpha 5	15
	Cockpit Alpha 6	16
	Cockpit Alpha 7	17
	Cockpit Alpha 8	18
	Cameraship Alpha 1	19
	Cameraship Alpha 2	20
	Alpha Opscon	128-# of sides in centre
Beta Side:	Node Name	Node Number
	Cockpit Beta 1	21

	Cockpit Beta 2	22
	Cockpit Beta 3	23
	Cockpit Beta 4	24
	Cockpit Beta 5	25
	Cockpit Beta 6	26
	Cockpit Beta 7	27
	Cockpit Beta 8	28
	Cameraship Beta 1	29
	Cameraship Beta 2	30
	Beta Opscon	128-# of sides in centre+1
Gamma Side:	Node Name	Node Number
	Cockpit Gamma 1	31
	Cockpit Gamma 2	32
	Cockpit Gamma 3	33
	Cockpit Gamma 4	34
	Cockpit Gamma 5	35
	Cockpit Gamma 6	36
	Cockpit Gamma 7	37
	Cockpit Gamma 8	38
	Cameraship Gamma 1	39
	Cameraship Gamma 2	40
	Gamma Opscon	128-# of sides in centre+2.

And so on for larger centres...

The Net_Configuration File

Inside the game software folder there lies a file which the operator's console uses to determines the network setup for the side is. This file is called Net_Configuration. The path to this file is Net_Configuration:Game Files:Console Files:BT or RP. Insure that the Net_Configuration file is correctly set. More detail about this file can be found in the section which deals with the operator's console and the files it uses.


Cockpit 1
Cockpit 2
Cockpit 3
Cockpit 4
Cockpit 5
Cockpit 6
Cockpit 7
Cockpit 8
Camera Ship
Video Monitor
Camera Ship
Video Monitor
Arcnet Hub
14"
Operations
PowerMac 7100
10 Base T 2 Pr. Twisted Pair
Intercom/Reset Master box
Ethernet Hub
17"
PowerMac 7100
17"
Mission Review
Video Monitor
Laser Disk
T
Theatre
PowerMac 6100
Laserwriter Pro 630
T
Briefing
PowerMac 6100
14" Apple 14" RGB Monitor
T Microtouch 14" Touchscreen
17" Super Mac 17" RGB Monitor
4 in 1 Twisted Pair Double Shielded
RG62 Coaxial Cable
4 in 1 Twisted Pair Plenum Rated
RG59 Coaxial Cable

SiteLink Overview

SiteLink is VWE's method of linking remote sites together for the purpose of linking missions. The mechanism behind SiteLink is the intergration of the VWE hardware and software to an ISDN line for the transfer of information.

The flow of information in SiteLink will rely on one cockpit (called "the router") to be used as and interface between the modem and the local arcnet network. This cockpit will be not available for game play as will the three other cockpits in the network which will not be used. The router will be designated in the Load_Configuration file in the software package being used. This Load_Configuration file will be changed every time a side will be used for SiteLink and again when the side returns to normal play.

The goal of SiteLink is to provide an experience as much like one with the participants being at the centre itself. The adventure will be similar and the inclusion of a video phone system during the mission review will allow for post adventure interaction for the players.

Parts

The following parts are needed to use SiteLink:

1 Adtran ISU128 ISDN modem
Firmware Version ISU128, L2
1 Serial Cable (DB25 to DB9)
1 Router CPU Board

At your site you should already have the following:
1 ISDN Phone Line
1 Cockpit

The following things should be already owned by your site or purchased locally:
1 RJ45 Crimp
1 6 foot extension cord or if you can a 6 ft female 'pigtail'
4 Pair 24 AWG unshielded twisted pair wire to the length needed for the installation of the modem

The ISDN Line

The ISDN modem requires the following information to function correctly. All the information needed here can be obtained by calling the installing company of the ISDN line. All sites should have this information written down in case of emergency:

- **Line Phone numbers.** There should be two distinct phone numbers assigned to the ISDN lines. Each of these lines are 56kps lines but are accessed by dialing the first phone number and synced by the telco's switching system.
- **Line SPID's.** These are the Switching Protocol Identification Numbers. These are used by the phone company to sync up the two line of 56kbps lines to allow for a bonded 112kbps call.
- **Switcher Type.** This information is used by the Adtran ISU128 to handshake with the telco's switcher.

Running the ISDN Line to the Router Cockpit

The ISDN line is normally mounted in the pod bay and terminates in a RJ45 jack. The modem will reside in the router cockpit and the thus the ISDN line will have to be extended to the modem. The procedure to mount the modem and the ISDN line is as follows:

1. Determine the closest cockpit to the jack and designate it the router. If the cockpit is an awkward number and would disrupt customer flow please contact me and we can determine an alternate router.
2. Run a length of 4 pair Unshielded Twisted Pair (UTP or phone wire) from the jack to the cockpit using the available piping to the top of the cockpit where the arcnet and reset network connect to the cockpit. Leave approximately 2-4 ft. of extra cable at the ends of the cable. If you do not have 4 pr UTP contact me and I can arrange to send you a length.
3. Crimp a RJ45 connector to the UTP. You will only have to use the centre two conductors in the plug (pins 4 & 5) so it may be advisable to trim off the three extra pairs and crimp on the remaining two.
4. Crimp the other (cockpit) end of the UTP in a similar manner. Insure that the same wires are being used and that their polarity remains consistent with the other end.
5. Cut off the male end of the extension cord and strip the interior wires to allow for connection to the cockpit A/C terminal block. If you have a bare female pigtail this step can be skipped.
6. Insure that the cockpit is turned off at both the internal and external switch.
7. Drill an 1 1/4" hole in the cockpit on the Remote I/O shelf directly over the main isolation transformer. Keep it neat and make sure the sawdust does not get distributed into the interior of the cockpit. I'm serious about this guys! The sawdust can be a potential fire hazard!
8. Connect the pigtail to the terminal block. The black wire is neutral, the white is line and the green is the ground. Replace the cover on the terminal block.
9. Mount the RS232 to RS530 converter to the RS530 port on the modem. Using the screws provided with the modem, screw down the converter to the modem.
10. Place the modem inside the cockpit on the shelf above the Remote I/O shelf which is behind the fans. Attach the serial cable to the modem RS232 converter.
11. Run the serial cable to the CPU via the same hole which the Remote I/O cable runs down to the CPU.
12. Run the pigtail up through the newly drilled hole and plug the modem's power cable into the pigtail.
13. Connect the ISDN line to the modem by inserting the RJ45 plug into the socket labeled 'Dial' on the modem.
14. Insert the modified router CPU into the cockpit.
15. Turn power on to the cockpit and turn on the modem.
16. Check the modem and, if necessary, configure the modem. (see below)
17. Follow the procedures distributed separately for operation of SiteLink games.

Configuring the ISU128 Modem

The ISU128 is pre-configured when sent from Chicago. The method of configuring the ISU128 is done via the modem front panel. The menu system that comes with the modem is described in chapter 4 of the manual which comes with the modem. To see how to get to the various options, refer to the CONFIG Menu diagram in the manual on p. 17. If the

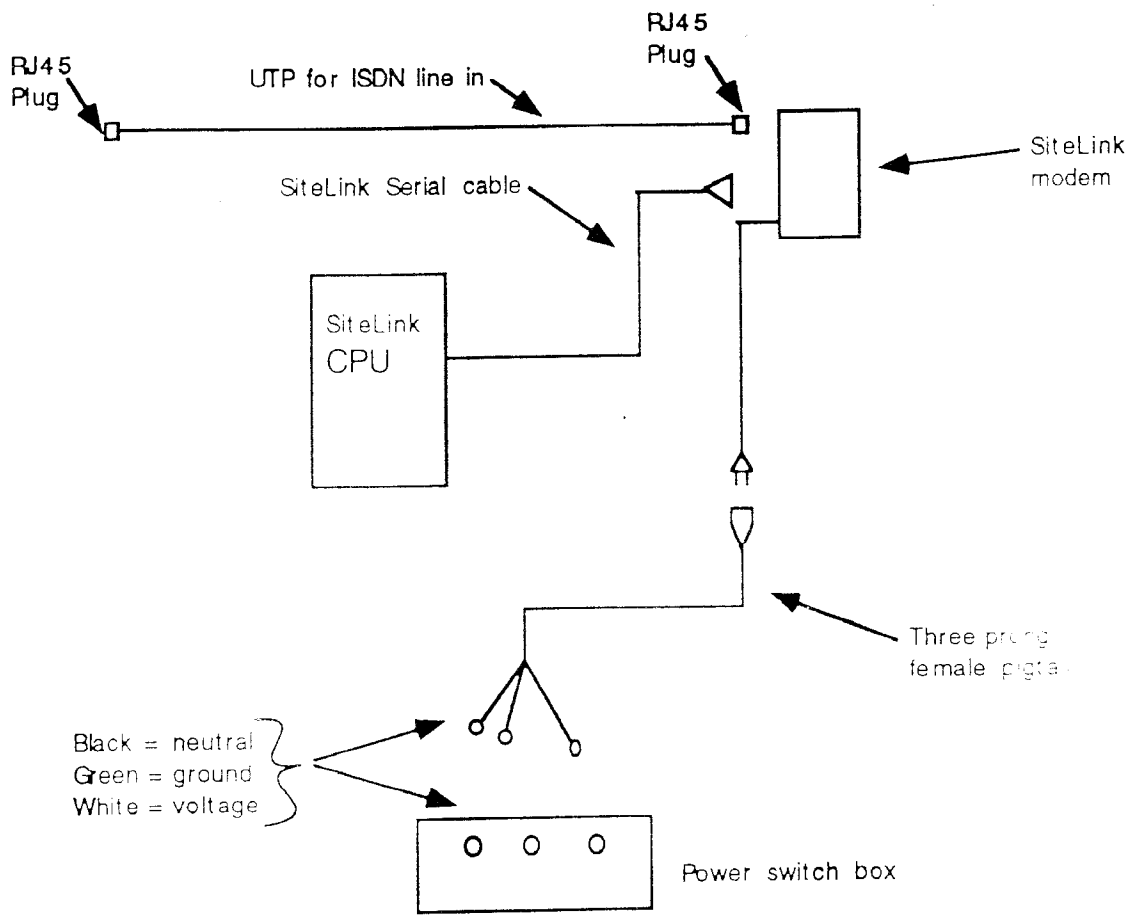
modem has forgotten the settings or needs to be modified, the following parameters should be configured into the modem:

1. Quick Set: Type 8 = Dial 115.2 asy(chnonous)
2. Switch Type: This should be set up for your local Telco switcher. Call me if this is in doubt.
3. Call Type: 3 = Data 56Kbps
4. Dial Options: 3 = AT commands
5. Auto Answering: 2 = Enabled
6. LDN1 & LDN2: These should be the telephone numbers for your ISDN line. These are to be entered without the area code prefix.
7. SPID1 & SPID2: These are entered using the format provided by your Telco.

Testing the Modem

This will be done with the help of VWE Site Service and will be done on a case by case basis depending on the timing of the lines. Stay in touch to arrange for your testing time.

SiteLink™ Block Diagram



SiteLink Procedures

Slave (receiving) side

Before you link up to another site:

1. Unhook the **Remote I/O** cable from the **CPU** Board inside the pod containing the **ADTRAN** modem (the **Router**), and plug the **ADTRAN** modem's I/O cable into the now open port.
2. Perform a full load on all of the pods and router.
   * You no longer have a start button to start your load. You should now use the **Load button** after you have selected the type of load you wish to do.
   * When the game is ready to go, the load button will become dim and the **Launch button** will now be enabled. Press this to start the game.
3. Turn on the **ADTRAN** modem.
   * After the modem is initialized (11/2 minutes) it should say "ready" in the bottom right portion of the ADTRAN's screen.

Linking up to another site:

1. From the Special pull-down menu go to **SiteLink Enable**.
   * You should see your site ID number and a diamond appear before each of the pod names on the console screen.
2. Reset pods & router and do a short load.
   * The game will not prompt you to launch after the load.
3. From the Special pull-down menu go to **SiteLink Control**.
   * This screen will show you the linking up status of the modems, and will disappear as soon as the two consoles are in sync.
4. You may now enter your pilot names, and vehicle info in the top 4 cockpit areas on the console screen.
5. Press the **Ready** button when you are prepared. If not, you may type in the message box if you are having a problem.

Master (initiating) side

Before you link up to another site:

1. Unhook the **Remote I/O** cable from the **CPU** Board inside the pod containing the **ADTRAN** modem (the **Router**), and plug the ADTRAN modem's I/O cable into the now open port.
2. Perform a full load on all of the pods and router.
   * You no longer have a start button to start your load. You should now use the **Load button** after you have selected the type of load you wish to do.
   * When the game is ready to go, the load button will become dim and the **Launch button** will now be enabled. Press this to start the game.
3. Turn on the **ADTRAN** modem.
   * After the modem is initialized (11/2 minutes) it should say "ready" in the bottom right portion of the ADTRAN's screen.

Linking up to another site:

1. From the Special pull-down menu go to **SiteLink Enable.**
   * You should see your site ID number and a diamond appear before each of the pod names on the console screen.

2. Reset pods & router and do a short load.
    * The game will not prompt you to launch after the load.
3. From the Special pull-down menu go to **SiteLink Control.**
4. Highlight the site you want to connect to and press the dial button.
    * You will see time-out and syncing up messages.
    * After you are successfully linked, you will have the console screen appear with both site's pod info.
5. You may now enter your pilot names, and vehicle info.
6. Once you receive the ready message from the slaved console, go to the special pull down menu and go to **SiteLink Preview.** This will synchronize all of the vehicle info
7. If you have received confirmation that the other side is ready, confirm that you are ready too, and that you are starting. You may do this by using the chat box.
8. After you have set the scenario, press the **Load** button.
    * Aside from loading the game, it will also synchronize the vehicle information. Even though the information is being automatically synced, you should still sync it through SiteLink Preview just in case there is any information placed incorrectly.
9. Press the **Launch** Button to start the game.

After the game

1. You may start up another game as soon as you are ready
    * You do not have to do any sort of short load between games. If you do for some reason need to do a short or long load, you should disconnect prior to doing so.

Returning to non-SiteLink play

1. Select SiteLink Control from the special pull-down menu.
2. Press the **Hang Up button** if it is dark
3. Make sure that the **On-Line box** does not have an "x" in it. If it does, click on it to disable it.
4. From the Special pull-down menu, select SiteLink Enable.
    * This should return your console screen back to regular play
5. Turn off your router from your console screen.
6. Turn off Adtran modem.
7. Unhook the **ADTRAN** modem's I/O cable from the **CPU Board** inside the pod containing the **ADTRAN** modem (the **Router**), and plug the **Remote I/O** cable into the now open port.

New features

1. **Message box**
    * You may tab down to this box and type messages in it to the other operator. Messages will appear as they are typed, in the other operator's **Response** section.
2. **Response** Section
    * This is where you receive messages from the other console.
3. **Chat button**
    * If you press the chat button, a beep will occur on the other end and a time will appear in the response section signifying the time the message was sent. This feature is useful in getting the other operators to pay attention to your sent messages.
4. **Ready button**

* This will send a message to the other operator's response section, signifying that you are ready to start game play.

5. **Not Ready button**
   * This will send a message to the other operator's response section, signifying that you are not ready to start game play.
6. **Load button**
   * This will initiate the load sequence for both consoles
7. **Launch button**
   *This will start the game for both consoles

Things to take note of

Any site can be the master or the slave. It should be decided before hand who will be the master, who will synchronize the information, and who should initiate the SiteLink connection. Preferably, this should be the same person so we can have a uniformed procedure. The reason I mention this is because once you are connected, either site can take control over the synchronization of vehicles and game scenario.

Please use the message box. Simply because it is always important to keep the lines of communication flowing. Also for the fact that we plan to phase out verbal phone calls between sites before linking, and this would be a good time to practice getting used to the message box.

RMA REQUEST PROCEDURES

In the event that an item sustaining the normal operation of the center should fail, it is the responsibility of the Site Technician to correct the problem. The VWE Support teams responsibility is to provide solutions, advice, software and hardware upgrades, parts and expertise for Site Technicians in the capacity to sustain the normal operations of the Virtual World Sites. VWE Technical Support acts as a consultant, trainer, and supplier to the Site Technicians. One of the tools that Support uses to help accomplish this is the RMA system.

The RMA (Return Material Authorization) system has been developed to help streamline service and support. Used properly, it will also provide a valuable trail for tracking inventory and logging certain part failures. The following text outlines the sequence of events which should take place upon the failure of a component which is beyond the capacity of the local Site Technician to solve.

A) Component Failure in Field

A failure requiring an RMA is described as any situation in which a component or a sub-components becomes defective to a point which is beyond the capacity of the Site Technician to repair due to either lack of replacement parts or expertise.

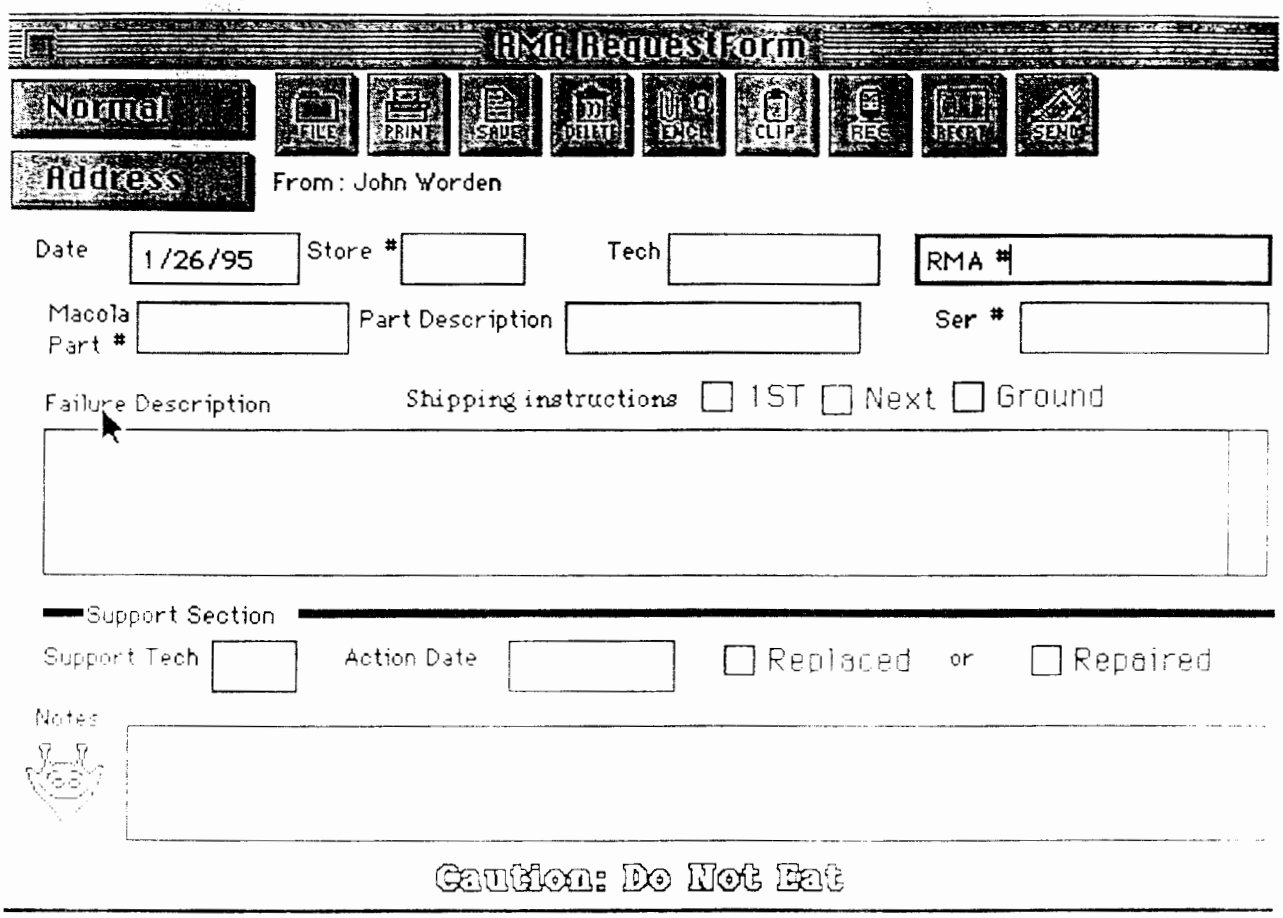
A component is defined as a part or sub-part of any cockpit, computer, or other equipment vital to the normal operation of the Site which is not a third party component.

Third party components are items which have been purchased by VWE through a vender which distributes brand name merchandise. These would include such items as computers, laser disc players, and TV's, etc. Third party components carry their own manufacturers warranty and need to be repaired locally through their own authorized dealer if possible. It is always possible for VWE to have spare third party components to loan out to centres. Call VWE Tech Support to check on availability. Additionally, VWE will have invoices for most purchased thrid party items and con provide copies of these to verify warrantied repairs.

B) Site Technician Sends E-mail to Support requesting RMA.

Upon component failure the Site Technician should send, via e-mail, a request for an RMA number. The request must contain the date, store number, Technician name, part description, serial number (if applicable), and detailed description of the part failure. Do not fill in the RMA number section at this time. This is to be filled in by Support only. Please see Diagram #1 below,

DIAGRAM #1



1) The request should be E-mailed to address "VWE Support"

The request for RMA should be e-mailed to the address "VWE Support". Special requests can be e-mailed to certain Site service engineers, however, the RMA process should go to only the quick mail address of "VWE Support". This is to eliminate confusion and/or possible order duplication.

The VWE Support mail will be checked daily and throughout the day to insure complete and thorough support. A call to Tech Support may also be concudted to check on the progress of an RMA.

C) Support views E-mail and either...

A designated support Technician will view the RMA request e-mail and react in one of two ways.

1) Calls back with a solution, or...

If after viewing the RMA request e-mail; the support Technician is unsure of the most practical solution to subscribe; he/she will consult the other support Technicians. If a solution is found which involves only directing the Site Technician, then Support will call and relay their findings. Otherwise, an RMA number will need to be issued and the item in question will need to be returned. The number will be issued as follows.

2) Issues RMA number via E-mail as below

When a practical solution cannot be reached among all Technicians involved, the Support Technician will need to issue an RMA number.

The RMA number given out by the Support Technician consists of eleven digits. As in the example below, the first three digits represent the store number. The next six represent the date of issuance of the RMA number. The date format is as follows: (yy/mm/dd). Finally the last two digits represent each actual item which was issued an RMA number that day for that Site. As an example, "0,1" would be given to the first RMA number issued to that store for that day. The digits "12" would represent the twelfth item to be issued an RMA number for that Site that day.

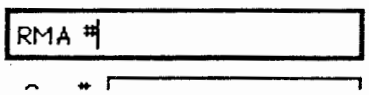
The second RMA number issued on March 12, 1994 for store number 005 would look like the following:

(A) (B) (C) (D)(E)
005/94/03/12/02

(A) Store (Site) number
(B) Year
(C) Month
(D) Day
(E) RMA issuance number per store per day

Once the RMA number has been determined, it will need to be entered into the proper field in the RMA e-mail. Obviously this is the field with "RMA#" already entered into it. Also one of the boxes indicating the preferred method for shipping must also be selected. The e-mail can then be returned to the center. (See diagrams #2 and #3)

DIAGRAM #2



Likewise to the above, proper packing slips should be included in the shipping container to insure accurate quantities. A blank packing slip is included in this package.

3) Shipping

Shipping should be sent as per the checked box on the RMA e-mail (See diagram #3 above). It is more crucial for some parts to be turned over quicker than others. For example, a shortage of CPU boards might require fixing the defective board from the Site and sending it back. In this case it should be shipped from the center "next day air". This will be determined by the Support Technicians.

G) Technician saves the RMA E-mail in Quckmail folder

After printing the e-mail and attaching it to the defective good, it should be saved in a special designated folder holding all RMA e-mails. VWE Support recommends that this be a Quickmail folder labeled "RMAs" to help standardize Site Service.

H) Support receives DG with RMA printout on it

Again, since the item received from a Site has the e-mail print out attached to it, it can immediately be identified by Site, date, item, failure, and the Site Technician.

If the proper packing list is enclosed, the Support Technician will know how many of which items should be expected within that shipment.

I) Support checks off the entrant in the "Expected Service Log"

As the defective good arrives from a Site, the proper fields in the "Expected Service Log" will need to be entered. This only requires the date being entered into the last field for reference.

J) Support repairs or selects replacement for DG

When the defective good can be easily fixed, Support should repair the defective item and ship it back. Otherwise, a suitable replacement should be selected and shipped in its place.

L) Support Completes the "Support" section of RMA E-mail

After the defective good has been either replaced or repaired, the Support team must fill out the bottom portion of the e-mail and once again send it to the Site Technician. Information added on the return RMA e-mail will include weather it was replaced or repaired, who the support Technician was, the date of action, and a description of the action taken or other notes (see diagram #5 below).

DIAGRAM #5

Support Section

Support Tech [ ] Action Date [ ] ☐ Replaced or ☐ Repaired

Notes

Caution: Do Not Eat

M) Support adds identifier code to the end of the RMA number

Besides the information which was stated above which will go out on the returned e-mail, the RMA number will also be modified with an additional identifier code. The code will present itself as three digits added onto the end of the RMA number. This code will be selected by our Support Technicians, and will represent the item in question, and whether it was replaced, or repaired. This modifier will help Support identify exactly what parts were defective from which Sites, in which year, in which month, and whether they were repaired or replaced. All of this information will be available through just the file name.

Using this method, we can determine at a glance how many 3.0 sound boards were sent back from Dallas during 1994; for example.

Adding the identifiers on to the RMA number after the item in question has been replaced or repaired will allow both Site and Support Technicians the ability to determine if an RMA is still open or closed. If there are still only eleven digits, it is still open. If the identifier digits were added, it has been closed.

The format for the RMA number with identifiers is as below.

New RMA Number Format

ex: AAA/AA/AA/AA/AA/B/CC

- A - Original RMA number
- B - R = Replaced, F = Fixed
- C - System and part identifier (See RMA Identifier sheet attached.)

N)Support sends the RMA E-mail back to the Site

With the new modifiers in place on the RMA number, Support can now send the e-mail to the Site so the Technician there knows to expect a repaired or replaced item.

O)Site Technician copies Revised form into Folder and deletes old copy

The Site Technician can now copy the revised RMA e-mail into the same folder that he/she had filed the original into. When the repaired or replaced good arrives, the Site Technician should delete the RMA e-mail which doesn't contain the identifiers in the file name.

P)Support prints and attaches revised RMA Form to new goods

The proper paperwork must accompany the shipment back to the Site so the Technician can match the parts back up with the RMA. The Support Technicians must print the RMA e-mail which has the identifiers in the name and include it with the proper packing slips in the shipment to the center.

Q)Support Ships the new goods back to the Site

With the proper paperwork included, the Support Technician ships the replaced or repaired component back to the Site. The shipping method should be carefully selected depending on how urgent that the Site needs the part. For example, if the product is a joystick, and the Site has two spares, it is not urgent. If the Site has no spares, however, the shipping is more urgent and the product should be sent likewise.

R)Support copies revised RMA into desk top folder deleting old one

The final step for support is to copy the revised RMA with the modifier digits into the folder with the original. When the RMA is closed, delete the original.

In Summanry.

Below is the entire RMA procedure

A) Component fails
B) Site Request RMA
C) Support issues RMA
D) Site attaches printout of RMA to defective good
E) Site ships defective good
F) Support receives defective good
G) Support sends back repaired or replaced good

EXAMPLE PACKING LIST

Shipment #01

Date:
From:

To: VWE Chicago
1100 W. Cermak
Suite B404
Chicago, IL 60608

Site#XXX

Included in this shipment are:

Quantity	Description	Serial #	Double Check

EXPECTED SERVICE LOG

Date	Time	RMA #	Part Description	Failure	In

Identifier numbers

System 2.0 = 1 , 2.5 = 2, 3.0 = 3 System number is first				
4 = 2.0 and 2.5 only,5 = 2.5 and 3.0, 6 = all systems,				
Component	**System**	**Part number**	**Identifier**	
cpu	2.00	10-1101-01	11	Note: cpu = 1
cpu	2.50	10-1101-03	21	
cpu	3.00	10-1231-01	31	
amiga	2.00	10-1106-00	12	amiga = 2
amiga	2.50	10-1106-01	22	
amiga	3.00	10-1206-01	32	
I/O board	2.00	10-1104-01	13	I/O baord = 3
Sound board	3.00	10-1203-00	34	sound board = 4
backplane	2.00	10-1105-01	15	backplane - 5
backplane	2.50	10-1105-02	25	
backplane	3.00	10-1204-00	35	
remote I/O	2.00	10-1107-00	16	remote I/O = 6
remote I/O	2.5,3.0	10-1107-01	56	
joystick	all	01-2200-03	67	joystick = 7
throttle	all	01-2300-03	68	throttle = 8
Foot pedal	all	01-2100-03	69	foot fedal = 9
arose	all	10-1110-02	6A	arose = A
scan converter	2.00	N/A	1B	scan converter = B
scan converter	2.50	10-1113-26	2B	
scan converter	3.00	10-1213-01	3B	
intercom master	2.50	101113-01	2C	intercom master = C
intercom master	3.00	10-1234-01	3C	
intercom slave	2.50	101112-02	2D	intercom slave = D
primary screen 25"	all	02-1025-03	6E	primary screen = E
secondary screen 13"	all	02-1013-03	6F	secondary screen = F
amplifier board	2.0,2.5	10-1114-01	4G	amplifier board = G
keypad	2.00	10-1007-01	1H	keypad = H
keypad	2.5,3.0	10-1007-02	5H	
Weapons A	2.00	10-1026-01	1I	I = weapons A
Weapons A	2.5,3.0	10-1220-00	5I	
Weapons B	2.00	10-1006-01	1J	J = weapons B
Weapons B	2.5,3.0	10-1221-00	5J	
5V switching supply	all	01-2011-03	6K	5V = K
12V switching supply	all	01-2012-03	6L	12V = L
12 V linear supply	all	01-2013-04	6M	12V linear = M
Cockpit isolation transformer	all	01-2003-03	6N	cockpit transformer = N
Main Screen iso transformer	all	01-2001-03	6O	Main Screen Trans = O
Secondary screen transformer	all	01-2002-03	6P	Secondary Screen trans = P

Centre Contacts

Centre Information

Phone #:

Office Phone #:

Tech Phone #:

Shipping Address:

Type of Cockpits:

Station	Computer	RAM	O/S	HD
Example:				
Res Server	PPC 8100/80	24MB	7.5	1000 MB

VWE Information

VWE Tech Support Phone #: (312) 243-6515

Primary Support Contact: Jose Corpuz
Primary Support Contact Pager #: 1 (800) 800-7759
Primary Support Contact Office #: (312) 633-9884
Primary Support Contact Home #: (312) 643-4205

Secondary Support Contact: John Worden
Secondary Support Contact Pager #:
Secondary Support Contact Office #:
Secondary Support Contact Home #:

Reservation Support Contact: Doug Chandler
Reservation Support Contact Pager #: 1 (800) 800-7759
Reservaton Support Contact Office #: (312) 633-9885
Reservation Support Contact Home #:

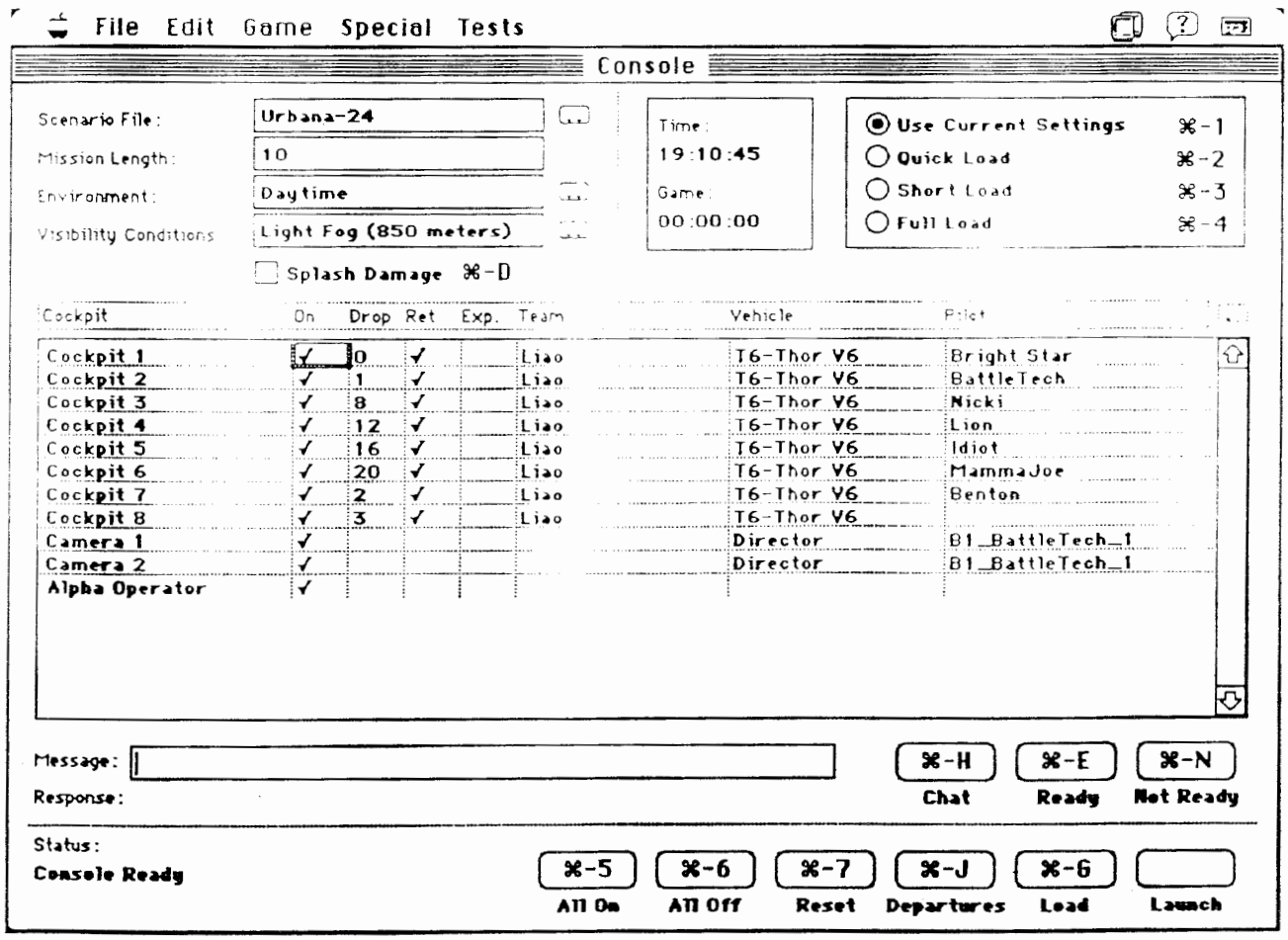
Operator's Console Description

Note: This document is extremely time-sensitive. Refer to installation notes with your version of the operator's console for changes in features and utilization of the operator's console (OpsCon)

The Operator's Console is the program running on the control tower Macintosh. The console controls the A/ROSE card in the Macintosh and is the method by which the operator inputs the game parameters to the cockpits. This program also contains the gateway to connect with the Res system to find the player information for the next mission. Additionally, the OpsCon contains the controlling software which can control the ISDN modem used for SiteLink™ games. Inherent in the OpsCon are several tests which can be done by the operator to check on the state of the cockpits and to diagnose problems in the system.

Normal OpsCon Operation

The OpsCon is illustrated below.



The top line is the normal pull-down menu bar present in all Macintosh applications. The operations of the OpsCon revolve around the use of the different types of loads.

The cockpits all process their worlds independently of each other; therefore, each of the cockpits must be loaded with the entire game software. The game software contains the code which controls the renderer, the logic, the communications, the drivers, and the user interface that the cockpit uses. There are three types of loads used with the cockpits:

The Full Load: The full load is the load which loads all the game and graphics information into the cockpits. When a cockpit is powered up, it reads the BIOS on the CPU EPROM and is set to a ready state. It is this state which shows the operator that the cockpit is prepared to take in the relevant game code. The cockpit state which describes the cockpit running from the BIOS is called the 'reset state.' The reset state can also be induced by pressing the side's reset button. The full load takes about 1 min 45 seconds per cockpit and is normally done only once a day or when the cockpit is changed over to run another game. In addition to the game and graphics files being loaded into the cockpit, game parameters are loaded into the side and the game can be run immediately after performing a full load. This load is also used to treat serious problems with game execution.

The Short Load: The short load is the load which only loads a gamecode file into the cockpits. This file is the overseer file for all of the cockpit software. Also loaded into the cockpits are the game parameters. This allows a normal game to be launched from a short load. Short loads can be done only when the cockpits are in the reset state. The duration of a short load is about 40 seconds per cockpit. The primary use of the short load is to recover from minor problems with game execution.

The Current Settings Load: This load just loads in the current game parameters. This is the normal load used by the system in between games. This load does not install any software into the cockpits and this load cannot be done when the cockpits are in the reset state. This load will take about 5 seconds per cockpit. It is performed

After a load is performed, the operator launches the game and the cockpits begin processing the game. The control Macintosh is then free to take in the game parameters for the next game.

Description of the OpsCon Interface

The general operation of the OpsCon is consistent with Macintosh O/S philosophy. All the normal user manipulable fields are accessible by both keyboard and mouse. The user manipulable fields are listed below:

The upper left hand side of the OpsCon contains the fields which determine the environment. While the cursor is in a specific field, the operator can press Apple-I to see the available choices for the field. Double clicking on the desired input will select it and the choice is entered in the data field. Alternatively, he can press the list icon () beside the field to see his choices. The operator does not have to type in the whole parameter he desires, since the OpsCon will read the contents in the field and attempt to match it to an acceptable option. e.g. typing in "d" and pressing return in the environment field will return a "Daytime" parameter from the console. If the console cannot match the operator's entry with an acceptable entry, it will beep and bring up the list of available choices.

Scenario File: This field determines the general scenario. Usually, this field refers to the map used for this game.

Mission Length: This field contains the length of time for this game in minutes. The games are normally 10 minutes in length, but other circumstances can change the game length.

Environment: This field contains the time of day the scenario is going to simulate.

Visibility Conditions: This field determines the visibility distance which the game will simulate.

Splash Damage: This is a software switch which activates certain advanced features in the game.

The upper right-hand side of the OpsCon contains the push buttons which determine the type of load to be used for this game. When a load is chosen that requires the cockpits to be in a reset state, the console will display a dialog box reminding the user that the cockpits must be reset. The type of load is selected by clicking on the appropriate button next to the type of load desired. The keyboard shortcuts to select the type of load are displayed next to the load also.

Between the environment fields and the load selection area is a clock and timer. The clock on top is for the operator's reference. This clock is synchronized to the Macintoshes internal clock. The game timer below the clock displays the time elapsed in the game that's currently in the cockpits.

In the middle third of the OpsCon lies the player matrix. This is where the player information is input. The operator may freely move about this matrix by clicking to the desired area on the grid with the mouse or by using the arrow keys on the keyboard. The grid is divided into the following columns:

The first column is the cockpit label. This field is not user manipulable.

The second column is a checkbox which determines if the cockpit is to be active for the next game. This box may be ticked by either clicking on the box with the mouse or pressing a non-arrow key on the keyboard.

The third column is the drop zone selection field. The drop zone is the place in the computer-generated world where you appear initially and when you reincarnate during the game.

The fourth column contains the checkbox to determine if the player is allowed to return to the game after his vehicle was destroyed. If this box is not checked, the player will only have one vehicle to play with during the allotted time. If that vehicle is destroyed, the player will not come back.

The fifth column is the experienced checkbox. This is checked to activate several advanced features for this player.

The sixth column is the team selection box. This box works similarly to the environment selection box and this selects the team/color for the player.

The seventh column is the vehicle selection box. This box works similarly to the environment selection box and this selects the type of vehicle the player will use for his game.

The eighth column is the pilot callsign box. This is where the pilot's name is input. If the console is hooked up to the reservation system and the mission has been selected from the reservation system, then this column will have been filled. Additionally, the list feature will work using the game data from the reservation system. The camera ships use this field to determine the script to be used by them for this game.

Beneath the player matrix is the SiteLink™ communication box. By using this area of the console, the operators who are running a SiteLink™ game can send messages to each other in a chatbox-like method. This section will be explained in more detail later.

At the bottom section of the OpsCon are the short-cut and control buttons. These buttons are used by the operator to perform repetitive tasks and to control the game. All the buttons have their keyboard shortcuts printed on them or they may be manipulated by clicking on them with the mouse. The buttons are as follows:

Apple-5 is the All On button. Pressing this button will turn on all the cockpits and cameraships.

Apple-6 is the All Off button. Pressing this button will turn off all cockpits and cameraships. The Operator's console will be left on.

Apple-7 is the Console Reset button: Pressing this button will reset the player matrix. This will turn on all cockpits, place all the cockpits in the first eight drop zones, turn on return, turn off experienced, set the team to the first team on the team list, set the vehicles to the first vehicle on the vehicle list and place the callsign Pilot 1-8 in the callsign box.

Apple-J is the Departures call button. Pressing this will bring up the departures screen.

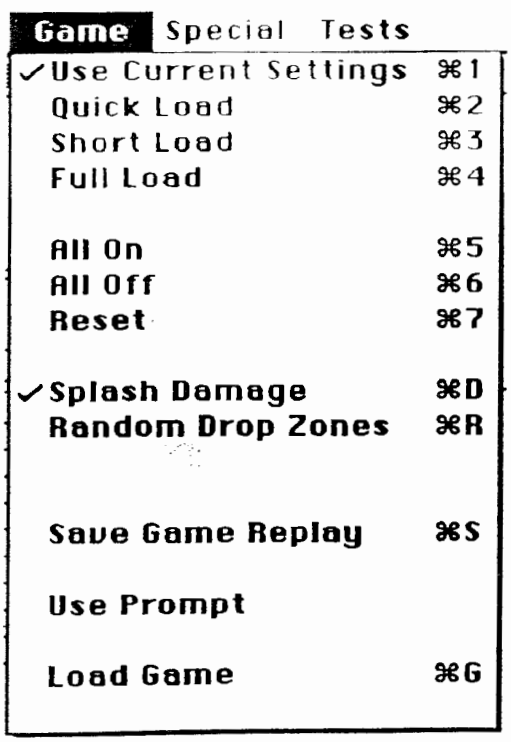
Apple-G is the Load button. Pressing this button will initiate the load selected on in the load selection area to be executed. When the load is done, the Launch button will be illuminated.

Apple-U is the Launch button. Pressing this button will launch (begin) the loaded game.

Other Console Features

The Game Pulldown Menu

The game pulldown menu on the top menu bar is illustrated below. This pulldown menu reproduces several controls which control the games outlined above. The selections which are unique to this menu are described below:



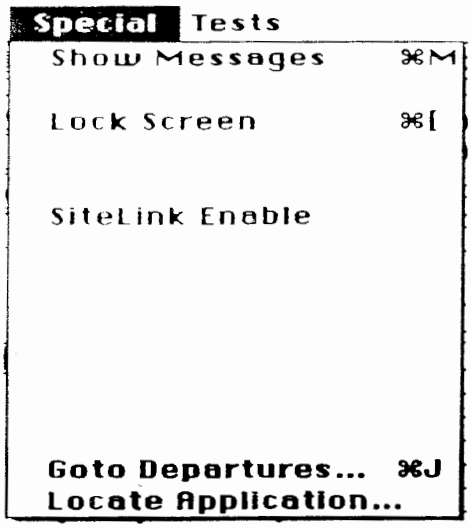
Random Drop Zones: The random drop zones randomizes the drop zones where the players appear. It this selection is chosen, the players are randomly distributed amongst the first X number of drop zones where X represents the number of players in the game. This selection can also be selected by pressing Apple-R on the keyboard.

Stop Game: The Stop Game selection will stop a game currently in progress. The game will stop and the mission review spool file will be saved on the mission review computer. This selection is available only in the pulldown menu. Games may only be stopped after the players have completed the elevator ride to the playing area. Stopping the game prior to the completion of the elevator ride will cause problems in program execution and will necessitate the use of a short load for the next game.

Use Prompt: This selection is used mainly as a test feature. If the use prompt is checked, the game requires the operator to launch the game. If it is not checked, the game is launched immediately after the load is done. This feature is intended to be used only by authorized personnel.

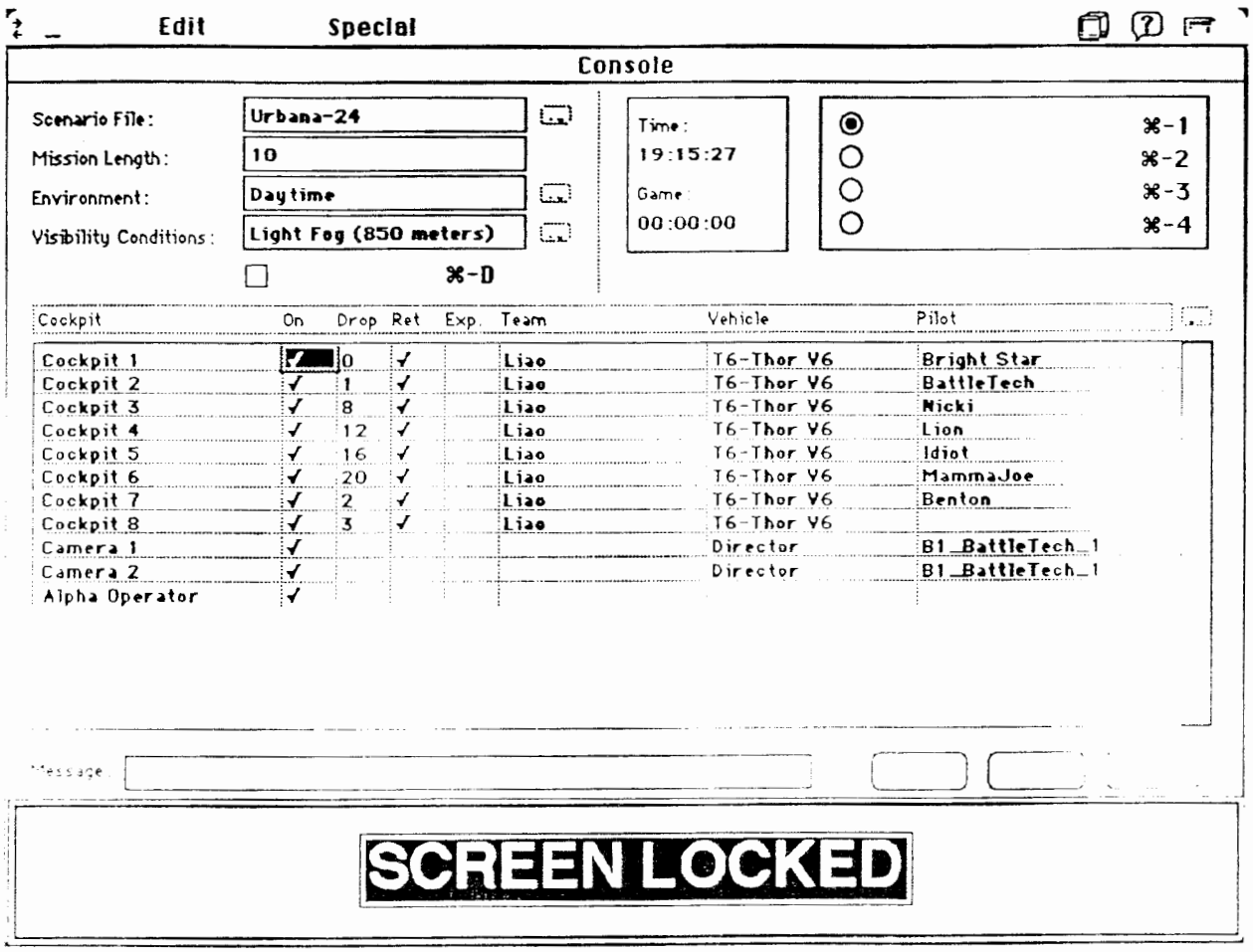
The Special Pulldown Menu

Under the Special Pulldown Menu are choices which are lesser-used functions of the OpsCon. The special pulldown menu is illustrated below.



Show Messages: This selection is normally not changed. It allows the operator to monitor the loads in progress. When a load is initiated, a dialog box pops up. As each file is loaded in the cockpit, the dialog box will report which cockpit is being loaded, which files are being loaded into that cockpit, what memory address the file is being loaded into and how much time has elapsed from the beginning of the load when this file is loaded. Additionally, there is a button which can be pushed to stop the load. Pushing this button will halt the current load, but doing so will necessitate the use of a short load for the next game.

Lock Screen: This selection (keyboard shortcut: Apple-[ )will lock the operator's console until the unlock screen command is given. The locked screen looks like this:



and the bottom line will display what has been typed in by anyone who has touched the keyboard. To unlock the console the operator chooses the Unlock Screen command.

Unlock Screen: This selection (keyboard shortcut: Apple-]) will unlock the operator's console after the operator has locked the screen.

SiteLink™ Enable*. This selection will switch the console to SiteLink™ mode. In order to run SiteLink™ games, SiteLink™ must be enabled on both consoles.

SiteLink™ Control*. This selection (keyboard shortcut: Apple-K) will bring up the SiteLink™ control screen. This function will not work if SiteLink™ has not been enabled for the console.

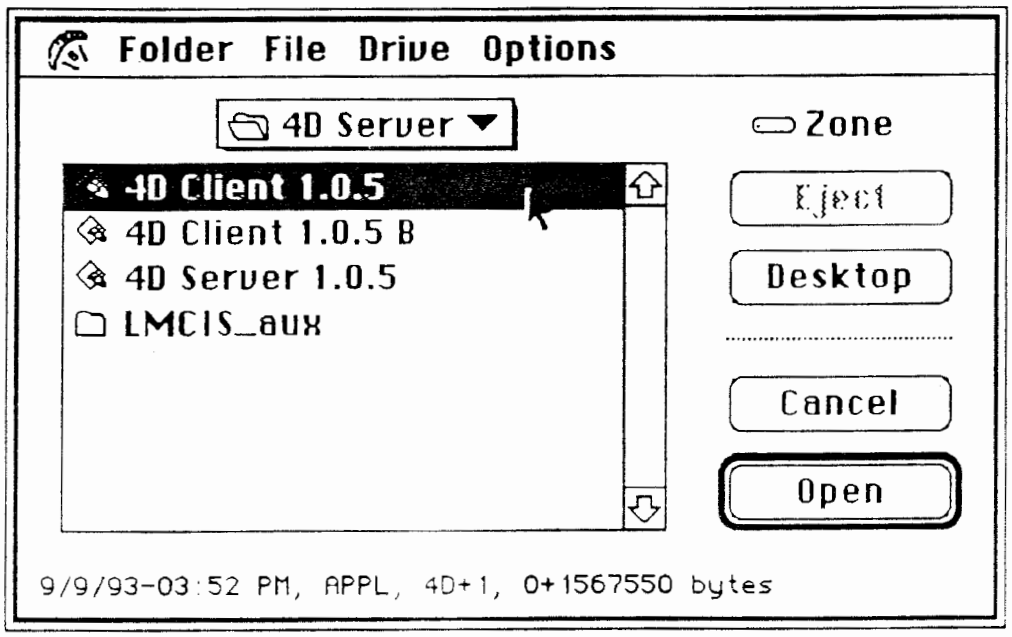
SiteLink™ Sync*. This selection (keyboard shortcut: Apple-K) will force the two consoles to sync up and exchange player information for a SiteLink™ game.

Send Chat*. This selection (keyboard shortcut: Apple-H) will send the message string typed in the chat box to the other console in a SiteLink™ game along with a time stamp and an audible beep. This will also clear the chat box.

Send Ready*: This selection (keyboard shortcut: Apple-E) is a shortcut which sends to the other console in a SiteLink™ game that your console is ready to start a SiteLink™ game.

Send Not Ready*: This selection (keyboard shortcut: Apple-N) is a shortcut which sends to the other console in a SiteLink™ game that your console is not ready to start a SiteLink™ game.

Locate Application: This selection is used to locate the 4D Client that will be used by the departures station. It will display a standard file dialog box. Select 4D Client from where the technician has installed it. After selecting 4D Client, push the "Open" button.



This configuration is performed only once after the installation of a new console. It is not necessary to perform the configuration again.

Commercial Software Provided to Centres

Below is a list of all commercial software VWE provides to the centres during an installation. All other software is not to be installed into the system without VWE approval.

Microsoft Office
Pagemaker 5.0
AppleTalk Remote Access
Quickmail
4D Server
4D Client
Norton Utilities
RAM Doubler (for SiteLink Kiosk)
CD-ROM Toolkit
Stuffit Lite ($25 shareware fee must be paid by site)
ZTerm
QM Remote

Copies of the software above are to be used only on the machines where they have been installed copying or distributing of software without liscense is priracy and is illegal. This will not be tolerated.

ADD Destroying w/ software license

Minimum Tool List for Centre Technicians

Quantity	Item
1	Makita cordless drill
1	1/4" Hex bit
1	7/16" Hex bit
1	Drill Bits
1	Coax stripper
1	Coax crimping tool
1	RJ45 Crimp
1	.062" pin Pusher
1	.093" Pin Pusher
1	Mini-Fit Jr. Pin Pusher
1	DB9 terminal crimper
1	Digital Multimeter
1	7/16" Socket
1	Socket Ratchet
1 set	Monitor Screwdrivers
1 set	Allen Wrenches
1	Flashlight
1	Small hammer
1	Soldering Iron
1	Needlenose Pliers
1	Wire cutters
1 set	Hexdrivers
1	IC Puller
1 set	Crescent Wrenches
1	Flush cutters
1 set	Phillips scredriver
1 set	Flathead screwdriver
1	X-acto knife
1	Desoldering tool
1 set	Jeweler's screwdriver
1	Wire stripper
1 kit	RJ45 Crimping Kit

Heat and Power Requirements

Approximate Heat Rejection Rates for VWE Equipment

There is an assumption that most of the power inputted into the equipment is rejected as heat. For the cockpits this is a reasonable assumption.

Cockpits: 120V * 3.5A = 420 Watts (Normal operations.)
Peak power consumption (Approx. 5% of duty cycle) = 700 Watts
Weighted power consumption = 0.95*420 + 0.05*700 = 434 Watts

Cameraships: 120V*2.0A = 240 Watts (Non-fluctuating)

Macintosh (Generic): 120V * 2.0A = 240 Watts
Used in operations Computer, Reservations, Briefing, and Theatres.
Also used in Reservation master computer which is never shutdown.

Macintosh (Mission Review): 120V * 3.0A = 360 Watts
Used only in Mission Debriefing.

Audio/Video Distribution System: 140 Watts

Intercom System (1 per 8 cockpits): 25 Watts

All the equipment in the pod bay are turned on approximately 0800 hrs. in the morning and turned off at about 0030 to 0230 hrs. the next morning. Fluctuations in heat rejection of the equipment are very few. It is a safe assumption that the heat rejection rate of all the equipment is a constant. Heat and power consumption of other equipment (monitors, bar, cooking) can be made using standard assumptions.

The cockpits require an environment of about 50% humidity and will degrade in performance in temperatures greater in 80 degrees F.

Power considerations:

All cockpits and computer equipment in pod bay and rest of store is to be common grounded. Normal precautions against power surges and drops should be taken e.g. no motors, heaters, etc. on computer circuitry.

Power Ratings

Cockpit: Rated for 18 amps with a normal draw of about 3-3.5 amps..

Macintoshes: Rated for 4 amps with a normal draw of about 1-2.0 amps.

Macintosh Monitors: Rated for 1.6 amps with a normal draw of about 1 amp.

Laser Disk Player: Rated at 0.33 amps.

Intercom/Reset System: Rated for 3 amps with a normal draw of about 0.3 amps.

Audio/Video Distribution System: Normal draw of about .7 amps

The rest of the electrical equipment in the store are stock items. None of which draw more than 1.5 amps.

Trouble Shooting Tips

This is nothing more than a guide to help with quick and proven methods of quickly troubleshooting a problem with the center technical end of things. Below will be tips and hints to help in this regard. These are things that have been tried and proven from the experience of the Chicago Support Staff.

Joysticks

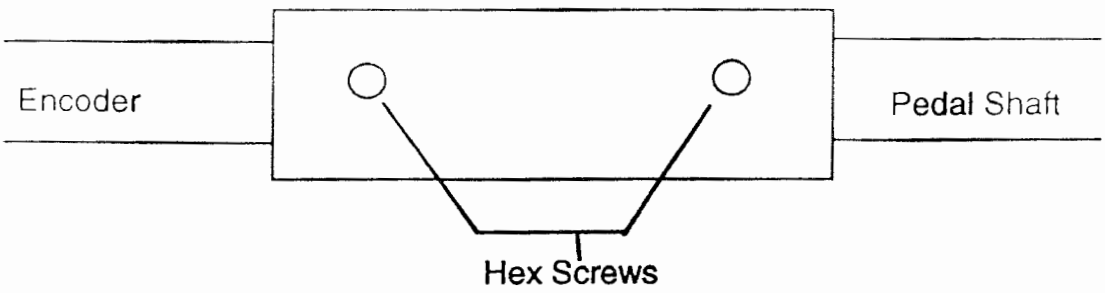
The most common problems with joysticks is the ground wire between the two thumb buttons and the Knob that connects to the horizontal and vertical encoders.

Ground Wire: The most common symptom of a ground wire problem is that the triggers are intermittent or do not respond. If it is a thumb trigger then open the handle and check the ground jumper between the thumb trigger micro switches. If it is a problem with all three triggers then check the ground wire from the Molex connector to the connection of the finger trigger micro switch.

Encoder Knob: The most common symptom of a loose or broken encoder knob is that the Hex Count during the Joystick Diag Test stops counting sometime during the movement of the joystick. If you have a joystick that has a constant drift problem and if the Hex Count stops counting for part or all of the movement of the joystick, this is the first thing you should check. Usually the problem is nothing more than the hex screw in the knob is loose and needs to be tightened.

Foot Pedals

The most common problem with the foot pedals is the sleeve between the encoder and the shaft that connects to the foot pedal. If during the foot pedal Diag. test the Hex Count stops or the numbers to not stay within the nor then check the hex screws on the sleeve. There are two of them so be sure to check them both.



Warning: When checking the foot pedal on the far side of the access (Right Foot Pedal) do this by unscrewing the foot pedal and pulling it out through the cockpit. Do not try reaching around and behind the Secondary Monitor. **This Can Result In Severe Injury!**

Weapons A and B Boards

One of the most common failures of Weapon A and B Boards is either a button not responding or button responding but not lighting up. The easiest way to trouble shoot a weapon A or B board with out taking the time to replace the board is to find the lead of the

button that is giving you the problem and use one of the other jumpers and swap button leads. If the problem follows the button then the problem is the button or leads. If the problem starts occurring to the swapped button then the problem is more likely with the board. This will define without a doubt if it is the button or the board. Also as a side note check to make sure that the wires going to the lead are inserted all the way.

LCD Display (Heat Bar)

These are easy to troubleshoot in that either the LCD display is working or it is not. However occasionally a single bar may be flicker in and out consistently weather in operation or not. It has been found that if you remove the ground wire from the LCD assembly this will stop. This has been attributed to a grounding loop somewhere in the cockpit.

Ethernet Connections

Troubleshooting the Ethernet can be a problem due to it can be software setting or a hardware problem. The best place to start is to check the friendly net adapter. The adapter has a light to check for continuity or network connection.

If the light is on then check the software settings on the computer. The Files to check are the following: Under control panels Network, File Sharing, and Chooser. Under Network be sure that Ether Talk is enabled. Under Chooser be sure that Appletalk is Active. Under File Sharing be sure that it is started. If these all check out then check the section below as if the light was out. Sometimes the continuity gives a false light due to part of the connection is there but not enough for communication purposes.

If the light is out on the friendly net adapter then check the RJ45 plug at the adapter and at the 10T Hub. If you wiggle the RJ45 connector at either end and the continuity light flickers in or out or comes on and stays on you might have to re-terminate the connector to make sure of stability.

Also refer to **Ethernet** section of manual.

The following are common troubleshooting guides for various cockpit failures

Cockpit not waking up.

Reset the cockpits, again.

Ensure that the cockpit is not going through a test sequence.

Check all arcnet connections.
Connections are: arcnet Hub, top of the cockpit and the CPU board.

Check the 5VDC power to the CPU.

Recycle cockpit power.

Power the cockpit down and reseat the chips on the CPU and then reseat the CPU.

Replace the CPU, ensuring the Node number is correct.

Repeat the process from the beginning.

No Sound

Reset and short load

Reset the individual cockpit and short load

Check 5VDC power supply

Power down cockpit and reseat the chips on the sound board and then reseat the sound board

Reset the individual cockpit and full load

Replace sound board ensuring that the Node is correct for intercoms

Check 12VDC Linear

No Secondary Monitor

Short Load

Full Load

Check connections from the Amiga board to the secondary monitor

Check to insure the monitor guns are firing
Check power to the secondary monitor
Disconnecting the power and using a multimeter to complete the circuit and give you a reading
Check power to the isolation transformer

Check the 12VDC power supply

Reseat the chips on the Amiga and seat the Amiga board

Replace the Amiga Board

No Primary Monitor

Short Load

Full Load

Check connections from the CPU board to the primary monitor

Check to insure the monitor guns are firing
Check power to the primary monitor
Disconnecting the power and using a multimeter to complete the circuit and give you a reading
Check power to the isolation transformer

Check the 5VDC power supply

Reseat the chips on the CPU and seat the CPU board

Replace the CPU

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	COCKPIT VERSION 3.0 ASSEMBLED & TESTED	TBA	1
	Cockpit Rear System III Assembled	00-0002-03	1
	Cockpit Reae -System III Shell	02-5001-03	1
	Screw, 8-32 x 1 1/2 Hexhead	80-0008-03	25
	Cable, Right Wooofer Extension	40-6221-03	1
	Cable, Left Woofer Extension	40-6222-03	1
	Cable, RIght Rear Extension	40-6223-03	1
	Cable, Left Rear Extension	40-6224-03	1
	Speaker, 5.5" Sub-Woofer	51-8900-04	4
	Speaker, 4" Full range	51-8900-05	2
	Speaker Grill, Small	N/A	2
	Scre, #8 x 1/2 Ind,Hexhead	80-0008-00	14
	Speaker Grill, Large	N/A	1
	Seat, Cockpit	02-3000-00	1
	Screw, 1/4-20 x 3/4 Trim, Hex	80-0050-00	4
	Nut, 5/16-18 x 1/2 Hex Steel	83-0012-00	4
	Screw, #6 x 5/8 Phillips, Flat Steel	80-0006-05	8
	Brace, Steel Corner, Zinc Plated	84-5100-00	2
	Radio Button Assembly	01-3900-03	
	Radio Button Assembly		1
	Sheet Metal, Radio Button, Assy	51-3216-00	1
	Blue Button Assembly	??	1
	Button, Square, Blue, No Imprint	51-3922-03	1
	Wire Harness	??	1
	Red Button Assembly	??	1
	Button, Square, Red, No Imprint	51-3921-03	1
	Wire Harness	??	1
	Green Button Assembly	??	1
	Button, Square, Green, No Imprint	51-3920-03	1
	Wire Harness	??	1
	Screw, 6-32 x 3/8 M/S Hexwash	800-0006-01	1
	Nut, #6-32 x 5/16	83-0006-00	1
	Washer, #6 Locktooth	81-0006-01	1
	Screw, 8-32 x 3/8 Hexwash, Black	80-0008-02	4
	Wire Harness, Single Bundle	40-6210-03	1
	Wire Harness, 6 Speaker Quad	40-6220-03	1
	Cable, Back Name Display	40-6230-03	1
	Joystick Assembly	01-2200-03	1

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Joystick w/o Optical Encoder	50-2200-03	1
	Enocoder, Optical	51-8500-00	2
	Wire Harness, Joystick Ext.	40-2250-03	1
	Terminal, Female .062"	42-1000-00	4
	Nut, 6-32 x 5/16 x 7/74 Hex Steel	83-0006-01	1
	Screw, 6-32 x 1/2 Phillips Steel	80-0006-03	1
	Screw, 1/4-20 x 3/4 Trim, Hex	80-0050-00	4
	Washer, 1/4-20	81-0020-00	4
Throttle Assembly		01-2300-03	1
	Throttle w/o Optical Encoder	50-2300-03	1
	Enocoder, Optical	51-8500-00	1
	Cable, Throttle Extension	40-2350-03	1
	Screw, 8-32 x 3/4, Trim Hex Steel	80-0008-01	4
	Washer, #8 .17 x 3/8 x .032 Steel	81-0008-00	4
Display Assembly, Back Name		01-3800-03	1
	Sheet Metal, Back Name Display	51-3218-00	1
	Filter, Red, Acrylic, Name Plate	51-3318-00	1
	Board, Weapon Display Type B	12-1221-00	2
	Screw, #6-32 x 3/4 Hex Head, Blk	80-0006-02	8
	Nut, #6-32 x 5/16	83-0012-00	8
	Spacer, #6 x 3/8 Steel	82-0006-01	8
	Screw, 8-32 x 3/8 Hex Wash, Blk	80-0008-02	4
	Rivets, Decorative	51-9900-00	54
	Base, Anchor, Ribbon Cable	84-0001-01	11
	Ties, Dennison 8" Wire	84-0010-00	11
	Screw, #6 x 5/8 Phillips, Flat Steel	80-0006-05	11
	Cover, Anchor, Ribbon Cable	84-0001-02	8
	Ties, Dennison 8" Wire	84-0010-00	8
	Screw, #6 x 1/2 Phil. Pan. M/S Type A	80-0006-06	16
	Screw, #8 x 1 1/4 P/H, S/M	80-0008-04	10
Cockpit Front System III Assembled		00-0001-03	1
Cockpit Front Shell - System III		02-5000-03	1
	Screw, 8-32 x 1 1/2 Hexhead	80-0008-03	8
	Dongle Assembly, Anti-Static	01-1233-03	1
	Fan, Cockpit Front	51-9953-00	4

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Speaker, 4" Full range	51-8900-05	2
	Cable, Extension, Left Front	40-6361-03	1
	Cable, Extension, Right Front	40-6362-03	1
	SPEAKER GRILL	????	2
	Screw, 8-32 x 3/8 Hexwash, Black	80-0008-02	8
	Base, Anchor, Ribbon Cable	84-0001-01	25
	Screw, #6 x 5/8 Phillips, Flat Steel	80-0006-05	25
	Ties, Dennison 8" Wire	84-0010-00	25

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Shock Mount, FS100-ST	84-5000-00	8
	Washer, #4 1/8 x 9/32 x 1/4 Steel	81-0004-00	8
	Screw, #4-40 x 1/2 Phil. Pan. Stl. M/S	80-0004-00	8
	Spacer, #4 x 3/16, Steel	82-0004-00	8
	Screw, #6 x 1/2 Phil. Pan. M/S Type A	80-0006-06	16
	Card Cage Assembly w/ Backplane	01-6100-03	1
	Board, Backplane Sys. III Rev. 0	10-1204-00	1
	Rail, Guide, Long	60-0007-00	6
	Rail, Guide, Short	60-0008-00	6
	Screw, Back Plane Mounting	80-9201-00	18
	Washer, Back Plane Mounting	81-1000-00	18
	Panel, Side, Card Cage	60-0001-00	2
	Rails, Front Mount	60-0002-00	8
	Rail, Horizontal Center	60-0004-00	1
	Cover, Subrack, 84 HP Wide	60-0003-00	2
	SCREWS	???	
	WASHERS	???	
	Insert, Threaded 84HP	60-0006-00	2
	Screw, Counter Sunk #8 x 2.5	80-9202-00	4
	Screw, 2.5 x 10 Cheese Head	80-9203-00	8
	Screw, #12 x 1/2"	80-9204-00	16
	Strip, Insulating	60-0009-00	1
	Screw, Collar	80-9201-0	10
	Washer, Back Plane Mounting	81-0010-00	10
	Board, CPU Assembled, Rev. 1	10-1231-01	1
	Panel, Front, CPU Board (Opt.)	20-4101-00	1
	Screw, Collar	80-9201-00	4
	Sleeve, Collar Screw	82-1000-00	2
	Mounting Block, Ejector Handle	20-4151-01	4
	SCREW, 2.5 x 8 RAISED COUNTER	CC6182	2
	Screw, 2.5 x 10 Cheese Head 2110-426	20-9203-00	4
	Handle, Ejector Kit	20808-135	2
	Board, Amiga Rev. 1 Assembled	10-1206-01	1
	Panel, Front for Amiga Board Schroff #3	20-4102-00	1
	Cable, Amiga Video	40-6993-03	1
	Insulator, Mylar .0075, 10" x 14.4"	51-1206-00	1
	Board, Amiga 500 Mother, Rev. 6A	20-8500-06	1
	OR		
	AMIGA MOTHERBOARD, COMPUTER	VAR A500 R8	1
	Screw, 6-32 x 1/2" Phil. SH. M/S Fedscr	80-0006-03	5

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Spacer, 1/8 x 1/4 x 3/16, nylon	82-0010-00	5
	#6-32 X 3/16,FLAT,CAD-NICK,NUT	NUT 8006	5
	Board, Scan Convertor, Rev. 1 Assembly	10-1213-01	0
	Board, Sound, Rev. 2 Sys. III Bare	12-1203-02	1
	Panel, Front for Sound Baord Schroff	20-4103-00	1
	Weapons Display Assy, Left	01-330-03	1
	Sheet Metal, Left/Right Weapon Display F	51-3200-03	1
	Bezel, For Right/Left Weapons Display	51-7000-01	6
	Board, Display	12-1408-00	6
	Screw, #6-32 X 3/4 Hex Head M/S, Blk F	80-006-02	24
	Nut, #6-32 x 5/16 Fedscr12307	83-0006-00	24
	Washer, #6 LockTooth Fedscr #1322	81-0006-01	24
	Spacer, #6 7/32 X 1/2 steel Fedscr #91	82-0006-00	24
	RED BUTTON SUB-ASSEMBLY	SG 3203	6
	Button, Rectangle, Red, No Imprint, No	51-3203-03	6
	WIRE HARNESS	N/A	6
	GREEN BUTTON SUB-ASSEMBLY	SG 3204	6
	Button, Rectangle, Green, No Imprint, N	51-3205-03	6
	WIRE HARNESS	N/A	6
	BLUE BUTTON SUB-ASSEMBLY	SG 3205	6
	Button, Rectangle, Blue, No Imprint, Nc	51-3204-03	6
	WIRE HARNESS	N/A	6
	#8X3/8,HEXWSH,IND.,TYPE-A-ZP,MS	SCR NJ-00005	6
	Weapons Display Assy, Right	01-3200-03	1
	Sheet Metal, Left/Right Weapon Display F	51-3200-03	1
	Bezel, For Right/Left Weapons Display	51-7000-01	6
	Video Selector Assembly	01-3500-03	1
	Sheet Metal, Video Selector Lenc-Smith	51-3204-00	1
	NO. 1 YELLOW BUTTON ASSEMBLY	SG 3502	1
	Button, Rectangle, Yellow "1", No Harr	51-3502-03	1
	WIRE HARNESS	N/A	1
	NO.2 YELLOW BUTTON ASSEMBLY	SG 3503	1
	Button, Rectangle, Yellow "2", No Harr	51-3503-03	1
	WIRE HARNESS	N/A	1
	NO. 3 YELLOW BUTTON ASSEMBLY	SG 3504	1
	Button, Rectangle, Yellow "3", No Harr	51-3504-03	1
	WIRE HARNESS	N/A	1

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	NO. 4 YELLOW BUTTON ASSEMBLY	SG 3505	1
	Button, Rectangle, Yellow "4", No Harr	51-3505-03	1
	WIRE HARNESS	N/A	1
	NO. 5 YELLOW BUTTON ASSEMBLY	SG 3506	1
	Button, Rectangle, Yellow "5", No Harr	51-3506-03	1
	WIRE HARNESS	N/A	1
	NO. 6 YELLOW BUTTON ASSEMBLY	SG 3507	1
	Button, Rectangle, Yellow "6", No Harr	51-3507-03	1
	WIRE HARNESS	N/A	1
	Screw, 6-32 X 3/8 M/S Hesxwashed Blac	80-0006-01	1
	Nut, 6-32 X 5/16 X7/74 Hex Steel	83-0006-01	1
	Washer, #6 LockTooth Fedscr #1322	81-0006-01	1
	Screw, 8-32 x 3/8 Hexwash, IND M/S Bla	80-0008-02	4
	GROUND WIRE (GREEN)		1
ADVANCED FEATURE PANEL ASSEMBLY		SUB 3600	1
	Sheet Metal, Advanced Feature Lenc-Sm	51-3205-00	1
	L/R-38 RED BUTTON ASSEMBLY	SG 3602	1
	Button, Square, Red "->", No Harness	51-3602-03	1
	WIRE HARNESS W/ 38" LEAD	N/A	1
	L/R-24 RED BUTTON ASSEMBLY	SG 3603	1
	Button, Square, Red "<-", No Harness	51-3603-03	1
	WIRE HARNESS W/ 24" LEAD	N/A	1
	U/D-32 RED BUTTON ASSEMBLY	SG 3604	1
	Button, Square, Red "^", No Harness	51-3604-03	1
	WIRE HARNESS W/ 32" LEAD	N/A	1
	U/D-24 RED BUTTON ASSEMBLY	SG 3605	1
	Button, Square, Red "V", No Harness	51-3605-03	1
	WIRE HARNESS W/ 24" LEAD	N/A	1
	"DOT" RED BUTTON ASSEMBLY	SG 3606	1
	Button, Square, Red ".", No Harness	51-3606-03	1
	WIRE HARNESS	N/A	1
	NO. 1 RED BUTTON ASSEMBLY, SQUARE	SG 3607	1
	Button, Square, Red "1", No Harness	51-3607-03	1
	WIRE HARNESS	N/A	1
	NO. 2 RED BUTTON ASSEMBLY, SQUARE	SG 3608	1
	Button, Square, Red "2", No Harness	51-3608-03	1
	WIRE HARNESS	N/A	1
	NO. 3 RED BUTTON ASSEMBLY, SQUARE	SG 3609	1
	Button, Square, Red "3", No Harness	51-3609-03	1
	WIRE HARNESS	N/A	1
	"A" YELLOW BUTTON ASSEMBLY	SG 3610	1
	Button, Square, Yellow "A", No Harnes	51-3610-03	1
	WIRE HARNESS	N/A	1

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	"B" YELLOW BUTTON ASSEMBLY	SG 3611	1
	Button, Square, Yellow "B", No Harnes	51-3611-03	1
	WIRE HARNESS	N/A	1
	"C" YELLOW BUTTON ASSEMBLY	SG 3612	1
	Button, Square, Yellow "C", No Harnes	51-3612-03	1
	WIRE HARNESS	N/A	1
	"D" YELLOW BUTTON ASSEMBLY	SG 3613	1
	Button, Square, Yellow "D", No Harnes	51-3613-03	1
	WIRE HARNESS	N/A	1
	"1" BLUE BUTTON ASSEMBLY	SG 3614	1
	Button, Square, Blue "1", No Harness	51-3617-03	1
	WIRE HARNESS	N/A	1
	"2" BLUE BUTTON ASSEMBLY	SG 3615	1
	Button, Square, Blue "2", No Harness	51-3618-03	1
	WIRE HARNESS	N/A	1
	"3" BLUE BUTTON ASSEMBLY	SG 3616	1
	Button, Square, Blue "3", No Harness	51-3619-03	1
	WIRE HARNESS	N/A	1
	"1" GREEN BUTTON ASSEMBLY	SG 3617	1
	Button, Square, Green "1", No Harness	51-3614-03	1
	WIRE HARNESS	N/A	1
	"2" GREEN BUTTON ASSEMBLY	SG 3618	1
	Button, Square, Green "2", No Harness	51-3615-03	1
	WIRE HARNESS	N/A	1
	"3" GREEN BUTTON ASSEMBLY	SG 3619	1
	Button, Square, Green "3", No Harness	51-3616-03	1
	WIRE HARNESS	N/A	1
	Screw, 6-32 X 3/8 M/S Hesxwashed Blac	80-0006-01	1
	Nut, 6-32 X 5/16 X7/74 Hex Steel	83-0006-01	1
	Washer, #6 LockTooth Fedscr #1322	81-0006-01	1
	Screw, 8-32 x 3/8 Hexwash, IND M/S Bla	80-0008-02	4
	GROUND WIRE (GREEN)	N/A	1
KEYPAD ASSEMBLED & TESTED			1
Keypad Assembly		01-3700-03	1
	Sheet Metal, Keypad Assy, Lenc-Smith #	51-3202-00	1
	RED FILTER	SM 3702	1
	Board, Keypad Assembled 2.0	10-1007-01	1
	Screw, 4-40 X5/8 Hex Socket Fedscr #5	80-0004-02	4
	Nut, 4-40 X3/16 Hex Steel	83-0004-00	4
LCD ASSEMBLED & TESTED			1
LCD Display Assembly		01-3400-03	1

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Sheet Metal, LCD, Lenc-Smith #NQ-0003	51-3203-00	1
	Filter, Red Acrylic, LCD	51-3403-03	1
	Board, LCD Rev. 1 Assembled	10-1012-01	1
	Board, LCD Rev. 1 w/o Socketed Parts	11-1012-01	1
	Screw, #6-32 x 3/4 HexHead M/S, Blk F	80-0006-02	4
	Spacer, #6 X 3/8 Steel	82-0006-01	4
	Plate, Mounting, IEM, LCD Backlight	51-3403-03	1
	Fixture, Light, LCD Backlight Newark #LS	51-3401-03	2
	Bulb, LCD Backlight Newark #ML/1893	51-3402-03	2
	Screw, 6-32 X 3/8 M/S Hexswash Black	80-0006-01	2
	Nut, #6-32 x 5/16 Fedscr #12307	83-0006-00	1
	WIRE	N/A	
	Cable, Extension, LCD Backlight	040-6521-03	1
	Screw, 6-32 X 1/4 Hex X 1" Standoff, F	80-0006-00	4
	Screw, 8-32 X 3/8 Hexswash, IND M/S Bl	80-0008-00	4
FOOT PEDDLE ASSEMBLED & TESTED			2
Foot Pedal Assembly w/ Encoder		01-2100-03	1
	Foot Pedal w/ Encoder	50-2101-03	1
	Encoder, Optical Hewlitt Packard #HEDS	51-8500-00	1
	Screw, 1/4-20 X 3/4 Trim, Hex C/P Fed	80-0050-00	8
	Washer, 1/4-20 Fedscr #1413	81-0020-00	8
MICROPHONE ASSEMBLED & TESTED			1
Microphone Assembly		01-4500-03	1
	Microphone	51-2401-03	1
	HOUSING	N/A	1
	Wire Harness, Ext., Microphone - Termina	40-6422-03	1
	Screw, #6 X 5/8 Phil, Flat Stl W.S Brassy	80-0006-05	2
OVERHEAD DISPLAY ASSEMBLED & TESTED			1
Overhead Message Display Assy		01-3100-03	1
	Sheet Metal, Overhead Lenc-Smith #NQ-	51-3206-00	1
	Filter, Red Acrylic, Rocker Panel, L/S #HE	51-3306-00	1
TESTED DISPLAY BOARD TYPE B			3
Board, Weapons Display Type B Assemble		10-1221-01	3
	Board, Weapons Display Type B 2.0	10-1006-01	1
	Screw, #6-32 X 3/4 Hex Head M/S, Blk F	80-0006-02	12
	Nut, #6-32 x 5/16 Fedscr 12307	83-0006-00	12
	Washer, #6 LockTooth Fedscr #1322	81-0006-01	12
	Spacer, #6 x 3/8 Steel	82-0006-01	12

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Switch, Rocker, w/4" Extension	50-3103-03	6
	Screw, 8-32 x 3/8 HexWash, IND M/S Bla	80-0008-02	4
	Monitor, 25" Main Screen	02-1025-03	1
	Connector, Plug, .084, 6-POS 94V-0	45-2006-01	1
	Screw, 1/4-20 x 3/4 Trim, Hex C/P Feds	80-0050-00	3
MAIN SCREEN ISOLATION XFMR ASSEMBLY			1
	Transformer Assembly, Main	01-2003-03	1
	Terminal, Female .093, 14-20 AWG Mol	42-3000-00	2
	Terminal, Male .084, 14-20 AWG Molex	42-2000-01	2
	Screw, #10 x 3/4 Phil. Stl Type A W/S F	80-0010-00	3
	Monitor, 13", Secondary Screen	02-1013-03	1
	Screw, 1/4-20 x 3/4 Trim, Hex C/P Fed	80-0050-00	2
	Washer, 1/4-20 Fedscr #1413	81-0020-00	2
SECONDARY SCREEN ISOLATION XFMR ASSEMBLY			1
	Monitor, Secondary Screen Sys I	02-1013-01	1
	Cable, Power to 13" Monitor Isolation Tra	40-6470-03	1
	Cable, Small, Isolation Xfmr to 13" Monito	40-6490-03	1
	Screw, #10 x 3/4 Phil. Stl Type A W/S F	80-0010-00	4
Power Supply Assembly, 5v Switching, 20+ An		01-2011-03	1
	Cover Set, Power Supply Marshall Ind. #N	50-2011-03	1
	Power Supply, Switching, 5v 20+ Amp	50-2010-03	1
	Screw, #6 x 5/8 Phil. Flat Stl W/S Brass,	80-0006-05	2
Surge Capacitor Assembly		01-4000-03	1
	Capacitor Assembly, Surge 16V3C	30-4509-09	1
	Cable, Power to Surge Capacitor	40-6533-03	1
Power Supply Assembly, 12v Switching, 7+ An		01-2012-03	1
	Cover Set, Power Supply Marshall Ind. #N	50-2011-03	1
	Power Supply, 12v Mod. F15-15-A (R/B	50-2013-13	1
	Screw, #6 x 5/8 Phil, Flat Stl W/S Brass,	80-0006-05	2
Power Supply Assembly, 12v Linear, 10+ Amp		01-2013-03	1
	Power Supply, 12v Linear, 10+ Amps	50-2013-03	1
	Cable, Power to 12v Linear Power Supply	40-6532-03	1
	Cable, Power to 12v Power Supply	40-6531-03	1
	Screw, #10 x 3/4 Phil. Stl Type A W/S F	80-0010-00	4
Transformer Assembly, Main		01-2003-03	1

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Transformer, Main Cockpit Power Isolatio	50-2003-03	1
	2-PC Terminal, Female .125 Molex #18-1	42-4000-00	1
	2-PC Terminal, Male Molex #18-12-2602	42-4000-01	1
	Screw, #10 x 3/4 Phil. Stl Type A W/S F	80-0010-00	4
Switch Box Assy (Junction Box, Line Cord, Co		01-6610-03	1
	Cover Plate Subassy w/ON/Off Swit	40-6602-03	1
	3/8" ROMEX CONNECTOR	SWI 6610	1
	CABLE	CON 650-DC2	1
	Cord, Line, SVT for Switch Box Ass	51-9950-00	1
			1
Power Box Assebmly		01-6600-03	1
	POWER BOX CABLE		1
	3/8" ROMEX CONNECTOR		1
			1
	Screw, #10 x 3/4 Phil. Stl Type A W/S F	80-0010-00	4
Board, Remote I/O, Rev.1 Assembled		10-1107-01	1
Board, Remote I/O, Rev. 1, Assembled, Not Po		11-107-01	1
	Screw, #6 x 3.4 HexWash, Type A W/S,	80-0006-07	4
	Spacer, #6 7/32 x 1/2 steel Fedscr #91	82-0006-00	4
	Cable, Ribbon, Left Weapons Display	40-6310-03	1
	Cable, Ribbon, Right Weapons Display	40-6320-03	1
	Cable, Ribbon, Overhead Display	40-6330-03	1
	Cable, Ribbon, Intercom	40-6340-03	1
	Cable, Ribbon, Keyboard	40-6350-03	1
	Cable, Speaker, Front	40-6360-03	1
	Cable, Joystick/Throttle Digital Signal Fr	40-6371-03	1
	Cable, Ribbon, Back Name Display Front	40-6380-03	1
	Cable, Left Foot Pedal Optical Sign	40-6390-03	1
	Cable, Right Foot Pedal Optical Signal	40-6400-03	1
	Cable, Microphone Front	40-6420-03	1
	Cable, Remote I/O Serial	40-6430-03	1
	Cable, Remote I/O Power Belford #6440	40-6440-03	1
	Cab.e, Com Bundle Network Video	40-6450-03	1
	Cable, Comm., Bundle Main Video	40-6451-03	1
	Cable, Comm. Bundle Intercom/Reset	40-6453-03	1
	Cable, Power to 25" Monitor Isolation Tra	40-6460-03	1
	Cable, Isolation Transformer to 25" Moni	40-6480-03	1
	Cabel, Main Screen Video Signal	40-6500-03	1
	Cable, Small, Secondary Screen Video Sig	40-6510-03	1

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Cable, LCD Backlight Power	40-6520-03	1
	Cable, Extension, LCD Backlight	40-6521-03	1
	Cable, Power to 5v Power Supply	40-6530-03	1
	Cable, Power to Fans	40-6535-03	1
	Cable, 5v Power to Card Cage 6540	45-6540-03	1
	Cable, 12v Power to Card Cage	40-6550-03	1
	POWER BOX CABLE	??	1
	Cable, Sound Board Push Button Inputs 6	40-6620-03	1
	Rivets, Decorative	51-9900-00	30
	Connector, Ring Ends 22 - 16 AWG Mole	84-1001-00	25
	Screw, #6 x 5/8 Phil, Flat Stl W/S Brass,	80-0006-05	25
	GROUNDING WIRES	N/A	10
	CONNECTOR, RING ENDS,22-16 AWG	CON 2216	18
	Screw, #6 x 5/8 Phil, Flat Stl W/S Brass,	80-0006-05	2
	Base, Anchor, Ribbon Cable FBC12-510-(	84-0001-01	6
	#6-32X5/8,T/S,PAN.STL,TYPE-A	SCR 42113	12
	Cover, Anchor, Ribbon Cable (HOLDER) #	84-0001-02	6
	Ties, Dennison 8" Wire	84-0010-00	6
	Ties, Dennison 8" Wire	84-0010-00	10
	Intercomm Master Assembly	01-5000-03	1
	Housing Assembly, Intercomm	51-9551-00	1
	Board, Intercomm Master Circuit	10-1234-00	0
	Board, AROSE Rev. 2	10-1110-02	1
	Dongle Assembly, Anti-Static	01-1233-03	1
	CAMERA SHIP		
	Card Cage Assebmly w/Backplane Sys.	01-6100-03	1
	Board, CPU Assembled, Rev. 1 Sys. III	10-1231-01	1
	Board, Amiga Rev. 1 Assembled	10-1206-01	1
	Board, Sound Assembled	10-1203-00	1
	Power Supply, 12v Linear, 10+ Amps	01-2013-03	1
	Power Supply Assembly, 5v Switching,	01-2011-03	1
	Cable, Power to 5v Power Supply	40-6530-03	1
	Cable, Power to 12v Power Supply	40-6531-03	1
	Cable, 5v Power to Card Cage 6540	40-6540-03	1

ASSEMBLY SUB-ASSY	COMPONENTS	PART NUMBER	QTY
	Cable, 12v Power to Caed Cage	40-6550-03	1