THE LAN/ROVER (tm)

MANAGEMENT GUIDE

T H E   L A N / R O V E R (tm)

M A N A G E M E N T   G U I D E

T A B L E   O F   C O N T E N T S

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MANUAL "B" - MANAGEMENT GUIDE
===

- PN 385 -

THE ADEVCO LAN/Rover
Local Area Network System

MANAGEMENT GUIDE PREFACE

WELCOME

We hope that you find the ADEVCO LAN/Rover(tm)* system will meet your office needs. We have made every effort to develop an integrated networking system that will operate efficiently under demanding conditions. It has been designed to provide the management benefits of an automated office for a reasonable price.

With the LAN/Rover(tm), users can do remotely over the network almost anything that they can do locally on a stand-alone computer. Every other computer attached to the network becomes part of one user's computer, as theirs becomes part of every other user's.

Users can share the files stored on the disk drive of another station. They can send and receive electronic mail, and "flash" messages onto the screen of other users. They can also "log on" to the drive of another machine and run a program when that is necessary. They may also use any printer connected to any computer on the network. In many ways, the power of each computer is increased to the cumulative power of all computers attached to the network.

The LAN/Rover system is made up of these parts:

- LAN/Rover network interface circuit board.
- LAN/Rover connecting cables and hardware.
- LAN/Rover User Manual, Warranty & Sales Agreement.
- LAN/Scape operating system software.
- LAN/Rover network support software.

The LAN/Rover system utilizes the LAN/Scape(tm) network operating software developed by Centram Systems, Inc. The software commands are clear, lean and powerful.

Also included on a separate diskette are software utilities from the public domain which have been selected and modified to extend the usefullness of the network.

The hardware included in the LAN/Rover is manufactured and tested to exacting standards by ADEVCO, Inc. It has just been developed to be the simplest, least cost and highest performance local area network system now available for select CP/M computers.

If you are an experienced CP/M user, it should take less than an hour to learn the operation of the network. However, it is important for all users, advanced and novice alike, to have a good understanding of the CP/M operating system and the applications software **before** attempting to use the LAN/Rover.

The extraordinary power of the LAN/Rover and LAN/Scape software requires careful management. In offices with sensitive or extremely valuable data, security and office procedures should be planned before using the LAN/Rover system. Consider using professional help to assist in the ideal design and layout of your networking system, or if extreme security is demanded.

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THE LAN/ROVER GUIDES
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The ADEVCO LAN/Rover Manuals are made up of the following:

USER GUIDE, MANUAL "A" - Contains all the most frequently used functions of The LAN/Rover network. It is recommended that each user have a copy of this section.

MANAGEMENT GUIDE, MANUAL "B" - Details the planning, set-up, testing, software configuration and management of the network. This section should only be made available to those responsible for network management.

TECHNICAL GUIDE, MANUAL "C" - Contains step by step instructions for installing and wiring the ADEVCO network interface circuit board into a micro-computer, instructions to wire an office for the LAN/Rover, a guide on office management of a network, and a problem solving section.

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CONVENTIONS
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This manual, except where otherwise marked, uses the following conventions to describe "dialogues" between the computer and user:

- Dialogues are always indented.

- A computer response is shown without notation as it will appear on your computer screen.

- If several options may be entered in response to a computer prompt, the description of what you are to enter is enclosed by "greater" and "less than" symbols.

- (Return) means type the carriage RETURN key on the keyboard.

- (CTRL) <KEY> means to press the indicated key while holding down the control key labelled "CTRL".

EXAMPLE:

PRINTER <Station Number>   (Return)

Note that after entering the command "PRINTER" you are to enter a number to correspond with a station number on the net, such as:

PRINTER 5   (Return)

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Installation Process:
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The LAN/Rover installation process should follow these steps:

1. Install the ADEVCO Network Interface circuit board into each computer.

2. Set-up initial software configuration.

3. Run preliminary tests.

4. Wire on-site location for network.

5. Configure software for office needs.

Steps one through four are detailed in the Technical Guide (Guide C), along with some notes about specific applications software, relevant to step five.

NETWORK ORGANIZATION

A local area network is a very powerful office management tool. As such it is important to set time aside to manage the network for the most efficient, secure and reliable use.

Networks which are small or used for dedicated tasks may not need a manager. In this case the most knowledgable user must have a good grasp of the entire documentation.

For most installations it is important to appoint one office member as the "network manager." This person should be familiar with MANUALS, "A", USER GUIDE and "B" MANAGEMENT GUIDE. In addition, the manager should review MANUAL "C", TECHNICAL GUIDE, especially regarding software use & problem solving.

In this documentation, a computer with networking capability is referred to as a "workstation" or a "station"; the machine which a person uses to gain access to other files, printers and operators through the network.

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PLANNING THE NETWORK
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Just as each business office has its own style, no single LAN/Rover network system configuration will meet every need, so customization will usually be necessary. In the complex office with vital security requirements, careful planning will be needed to set up the system.

If your office has few security requirements, there are short cuts which can shorten your set up time. See the following Section B.3, of this manual.

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QUICK SET-UP FOR OFFICES
- NO SECURITY REQUIREMENTS
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If you are using your LAN/Rover(tm) in an office in which all employees will have equal access to the network, you need not enable the security provisions of the network as described below.

All you really need to do is "sign on" in the manner described below in Section C.4, SOFTWARE. You can keep the same password that comes with the distribution copy of the software (TEST) or set the password as a blank carriage return <RETURN>. You will only need to assign each station a station number, described below under the **MANAGER.COM** network management program, Section B.3.

SECURITY PROVISIONS

Before you can establish a secure network in your office, consider how the network will be used by answering:

How many workstations will there be?
Where will the workstations be located?
How many users will each station have?
Who will be using each station?
What programs will each user need?
Where will these programs be stored?
Where will data files be stored?
Who needs access to data files?
Who will update data files?

Once you have answered these questions, you can begin the task of setting up the network. Since the LAN/Rover uses a true "bus topology", it is easy to change the physical layout of the net even after you have installed it. However, the results of unplanned data management can be far reaching, and many problems can be avoided by taking the time to set things up correctly in the beginning.

ACTIVITY TABLE

A good first step is to create an ACTIVITY TABLE with the major activities you plan to do with your network listed along the left, and the names or categories of employees to be operating the computers listed on the top.

FOR EXAMPLE:

	NETWORK OPERATORS			
FUNCTION	George	Susan	Credit-Manager	Accountant
Wordproc. :	y	y	y	y	:
Accounts :	n	y	n	y	:
Database :	y	y	y	n	:
Schedules :	y	y	y	n	:

In this example, there are four employees and four categories of activities. Only one employee has unrestricted access to all activities: Susan, who is also the network manager.

The credit manager needs access to the master database, while the accountant, an outside consultant, does not. Nor does she need access to the schedules of employees.

Develop a table like the one above for your office. Make it as complete as possible, but don't worry if there are areas to be changed in the future. The LAN/Rover system can be easily modified.

Discussed here are the tools you will use in planning your network to provide the kind of management and security that you need:
  - Station numbers,
  - USER numbers and passwords,
  - Privileges,
  - File attributes and
  - Disk drive access.

STATION NUMBERS

Each station connected must have a unique station number, or "address" in order to send and receive data. Any address may be used from 00 to FF. Two different systems of numbering are described in section B.3, MANAGEMENT.

USER NUMBERS

CP/M allows you to create up to sixteen "user areas" or directories on a single disk. Applications programs may be organized on a disk by placing them in designated user areas.

When signing into The LAN, the network operator is first asked for their user number. The USER NUMBER denotes the USER AREA in which the operator will enter the network.

Users performing many tasks will need to change user areas. Other users may be restricted to a single user area, blocking access to the files belonging to others.

If the software to be used is not in the ideal location for your networking needs, it is easy to place files in the desired USER AREA by using the CP/M command **PIP** (See your computer dealer or manual, or the CP/M manual), or to use the ADEVCO supplied program, **MAKE.COM**.

Some files will be used by everyone on the network. These include the "system" files in user area 0, which are used to tell the computer how to operate in the networking environment. They may also include programs that are of general interest such as file management utilities.

PRIVILEGE LEVELS

Privilege levels can determine users' access to files in the system. Certain privilege levels allow users to change their USER number and have the full range over the network. See Section B.3, MANAGEMENT and A.2, Network USE.

FILE ATTRIBUTES

Access to files may be limited in three additional ways by the setting of "file attributes."

1. a file may be designated **EXCLUSIVE** for Local access.

2. files can be designated **LOCKABLE.** This prevents two users from accessing the file at the same time.

3. files may also be designated **READ ONLY.** This prevents users from overwriting an important piece of common data.

These file attribute options are detailed in Section B.3, ORGANIZATION in the discussion of "PRIVILEGE LEVELS."

DISK DRIVE ACCESS

One of the most basic levels of security is whether a user may access a remote disk drive to read or write data. This is accomplished through the **MANAGER.COM**, Section B.3.

Then the network manager may provide access to various disk drives through the MAP instructions detailed in Section B.3, ACCESS.
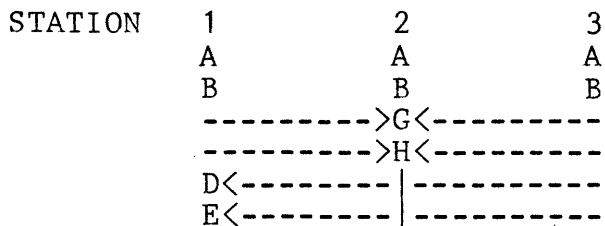
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PLANNING EXAMPLE
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Here is an example of how The LAN/Rover might be configured with a three station system. FILES FOR THIS SET-UP ARE INCLUDED on the LAN/Rover master diskettes. Information on station numbering and assigning names to the the disk drives for remote access is found in Section B.3, ACCESS.

With three stations on the network;

- Workstation #1 is a computer with hard-disk, and can access station #2 only.

- Workstation #2 is a 2-floppy computer, and can access station #1 only.

- Workstation #3 is a single floppy computer and can access stations #1 & #2.

```
STATION    1             2             3
           A             A             A
           B             B             B
           --------->G<---------
           --------->H<---------
           D<-------- | ----------
           E<-------- | ----------
```

Stations #1 & #3 may access the A: & B: drives of #2 as if they were the G: & H: drives on their local computer.

Stations #2 & #3 may access the A: & B: drives of #1 as if they were the D: & E: drives on their local computer.

This example suggests one possible set-up. Your needs will vary, and you may easily modify the LAN/Scape configuration to suit your needs. Now assume the following:

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DISK ALLOCATION TABLE
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A disk drive allocation table can show the station number, the names of the disk drives of each computer (the physical name,) the logical to physical disk drive MAP commands required by the LAN software, and the names of the disk drives available remotely to each user.

----- Disk Drive Access Allocation Table ----

Station#	PHYSICAL Name of LOCAL Drive	LOCAL MAP	LOGICAL Name for REMOTE Access
==========	================	===========	==================
1 (MOD 10)	A	A:=A:Local	D
	B	B:=B:Local	E
	C	C:=C:Local	
		G:=A:02	
		H:=B:02	
2	A	A:=A:Local	G
	B	B:=B:Local	H
		D:=A:01	
		E:=B:01	
3	A	A:=A:Local	
	B	B:=B:Local	
		D:=A:01	
		E:=B:01	
		G:=A:02	
		H:=B:02	

Setting up this type of table is discussed further in Section B.3, NETWORK ACCESS.

MANAGEMENT TIME

There are various estimates of how much management time is required to maximize the benefits of a network. One reliable estimate suggests about 20 minutes per day per network workstation. A network with 10 workstations could require over 3 hours of management per day. A network of 24 users might require a full-time manager! While this may seem to be a lot of time, the benefits from office automation and increased productivity make this a wise investment.

The following sections of this management guide are designed to lead a network manager through all the necessary tasks.

Section B.2   NETWORK MANAGEMENT

Section B.3   REMOTE ACCESS

NETWORK MANAGEMENT

The key to successful network management is often to assign one person with the responsibility of the tasks which need to be managed.

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MANAGEMENT TASKS
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Network management is made up of the following tasks:

1. Determining the number of stations to be used on the network, their location, and assigning each station number.

2. Determining the number of users per station, which users need to use the special functions of the network, which disk drives need to be accessed, and which stations require remote printing.

3. Preparing working diskettes for each workstation on the network, including:

A. Selecting the applications programs which are to be used at each workstation.

B. Determining the USER AREA in which each program must reside and assuring the programs are so located.

C. Assuring that the selected applications programs for each user are available at each workstation along with the appropriate LAN programs for that computer model.

D. Assigning unique station numbers to each computer on the net.

E. Determining levels of network security, including the user numbers and passwords to be used by each operator of the network.

F. Assuring that a unique labelled working diskette is prepared for each station, and that the prepared working diskettes stay with the workstation.

4. Testing the network to assure proper operation. See Manual "C", Section 4, SOFTWARE.

5. Maintaining the working diskettes of each workstation.

6. Resolving the cause of problems which may arise. See Manual "C", Section 6, PROBLEM SOLVING.
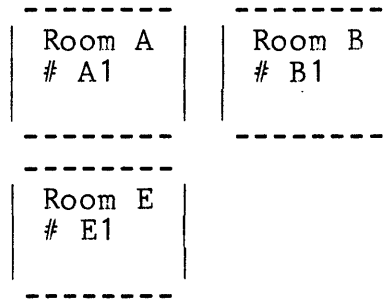
A.   Identifying symptoms of network problems.

B.   Identifying whether a problem arises from operator error and network misuse (including inefficient program use) or from hardware faults.

C. Diagnosing potential causes of problems.

D. Taking action to correct the problem.

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ORGANIZING THE NETWORK
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A good start can be made by drawing a simple lay-out of your network by room and station number. Each station number must be unique, and it is easy to assign each room a letter and each station a number in that room. for example let's say we have three rooms. Room A might be accounting, room B Sales, and room E engineering, with three workstations to be networked. So a simple floorplan might look like this:

```
 --------        --------
| Room A |      | Room B |
| # A1   |      | # B1   |
|        |      |        |
 --------        --------
 --------
| Room E |
| # E1   |
|        |
 --------
```

And a disk access table might look like this:

```
----------------------------
STATION   A1        B1        E1
Local     A         A         A
Drives    B         B         B
------
Remote        --------->G<---------
Disk          --------->H<---------
Drive     D<--------|----------
Access    E<--------|----------
```

Where Stations #A1 & #E1 may access the A: & B: drives of #B1 as if they were the G: & H: drives on their local computer.

And Stations #B1 & #E1 may access the A: & B: drives of #A1 as if they were the D: & E: drives on their local computer.

The next step is to decide where the software you plan to use will actually reside, and a simple QUEUE CARD can help.

Sample QUEUE CARD   (MANAGER)

STATION	Local Drive	Remote Name	Disk Contents
A1 (accounting)	A B	D E	Accounting & Spread sheets
B1 (sales)	A B	G H	Data management, WP Client & order files
E1 (engineering)	A B		Programming

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APPLICATIONS PROGRAMS
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Applications programs may be on the Local station, where they will be used, or located on a single station and accessed remotely by other users. It is most efficient to have them located on the station where they will be used the most.

NOTE: If a "disk intensive" program is used, it should be on your local station and not used over the network.

More than one copy of a single program may be used on different machines, stored in different user areas, accessible by different USER numbers. Review the software licenses for your application programs to make sure that they legally can be used in the multi-user environment without the purchase of additional copies.

To achieve the best network response, you will need to do some experimenting after reviewing Manual "C", Section 4, Applications Software.

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DATA AND TEXT FILES
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Files may be kept on any station and be accessed by any other station. Larger files will be located where the most disk space is available, as in a data base file on a hard disk computer.

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TASK ALLOCATION CHART
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	George	Susan	Credit-Manager	Accountant	
Wordproc. :	y*	y	y	n	:
Books :	n	y	n	y*	:
Database :	n	y*	y	n	:
Schedules :	y*	y	y	n	:

     In the chart above, the "*" represents the physical location of the software. Remember, the LAN/Rover(tm) can transfer files and programs between any stations of the net. Therefore, anyone "privileged" can get the files and programs from another user's station and copy them to their local drives.

     Now that you know on which machines the software will reside, we must decide which USER numbers and privileges will give each employee the correct access to the network. First of all, we want to set up Susan as the network manager. Remember, the network manager always has all privileges. Assign the network manager USER number 0.

     The easiest way to do this is to have Susan's system disk in the B: drive of a 2-floppy computer (or the floppy of a hard disk computer.

     If Susan were setting up her own station on a hard disk computer, the working copy of the LAN system disk would be on the A: drive.

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THE MANAGER PROGRAM
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     The software distribution disk has all stations set up with full privileges for user number 0, with the password TEST. Sign on to the network as described above. Then enter:

     MANAGER   (Return)

You will then be shown the following screen:

    The LAN Manager Utility

This program assigns Station Addresses, Passwords and Privileges for each User in each station. This information is stored in secure encrypted form in the LAN/Scape system program **SIGN.COM**.

You may modify the system program either locally or over the LAN/Rover by using **MAP** command to give access to the remote disk drive, and by using this option to change drives. The program **SIGN.COM** for the station that you are changing must be present on the drive which you specify.

While a manager may modify a remote station's set up, this could create confusion to network users and is best done Locally at the manager's station.

The MANAGER management utility should be kept separate from the rest of the office software, in a secure place, accessable only to the designated manager.

The **MANAGER.COM** menu:

D   Change Drive, Current Drive is A:

A   Assign Station Address

P   Examine or modify Passwords / Privileges

E   Exit this program

Which?

In our example, Susan's system disk is in the C: drive of a hard disk computer. Now change the Current drive to C: by entering:

    D

The screen responds:

    Change System on Drive:

and you respond:

    C

You will now be shown the menu screen once again, and the Current Drive will be shown to be C:.

Note that the above commands DO NOT require a <Return>.

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CHANGING STATION NUMBERS
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How many workstations will there be?
Where will the workstations be?

Each station connected must have a unique station number, or "address" in order to send and receive data. The LAN/Scape allows any address to be used from 00 to FF, and at least two different systems of station numbering are possible.

For small networks, a linear 1-99 numbering system works well. The first station can be # 1, another 2, the next 3 and so on. Similarly the first could be numbered 10, the second 20, the next 30 and so on.

The system in the earlier examples designated building areas (or task areas) by letters from A to F. Using the M (Modify) option, assign the appropriate user number then using no password. The system will then ask the manager if she wants to de-assign the password.

When you are ready to initialize the disks of the other machines on the net, load your co-worker's working diskettes on your floppy drive, or log onto thir A:drive if they have a model 10. Follow the procedures for the MANAGER program as described above. Enter the appropriate passwords and privileges for each worker. In our example the final screen will look like this:

User #	Password	Change User	Change Attrib	Change Read	Remote Write	Remote	Manager
0	Detroit		Y	Y	Y	Y	Y (Susan)
1	Berkeley		Y				(George)
2	Bombay		Y		Y	Y	(CredMan)
3	Harrisburg						(Account)
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

M -   Modify Password & Privileges
S -   Save changes
Q -   Quit, abandon changes

Note that not every station must have the same parameters. Operators on different stations may have different passwords to sign on the same USER number but they may have different privileges.

You can create temporary passwords to allow a user to enter data to a database to which he or she would ordinarily not have access. At the end of the work day, you can kill the temporary password by simply running **MANAGER** for that user's station again. You may want to do it over the net rather than locally on your floppy drive.

As a final security measure, you will erase all copies of the **MANAGER** program except that on your own drive. You will be able to do this over the network after you have learned to MAP your drives in the next section.

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FILE ATTRIBUTES
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If a user has been granted the privilege of setting file attributes, as described above, they use the **SETA.COM** program as detailed in the user guide. This program allows files to have the following network attributes.

First, a file may have an **EXCLUSIVE** attribute. Only the station on which such a file resides may have access to that file. No remote stations may gain access to that file. This technique of protection gives the greatest immunity to outside tampering, and is the default of the MAILBOX file to assure mail privacy.

Second, files can have the **LOCKABLE** attribute. This will prevent two users from accessing the file at the same time. When a user opens a "LOCKABLE" file, other users are automatically "locked out" of that file. When the user is through with that file and it is properly closed, it becomes available to anyone on the network. This file protection is used as an office management procedure to protect data integrity rather than as a security measure.

Third, files may have a **READ ONLY** attribute. This can prevent users from overwriting an important piece of common data.

These file attribute options and their use are detailed in the user manual "A".

NETWORK ACCESS

Now that you have established the basics of the network structure and security, it's time to set up access to the net. This system has a number of powerful features to provide this access. The most important questions are:

Where will the programs and files be stored?
Which station will have access to them?

==================
DISK DRIVE ACCESS
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In CP/M, a computer may address up to 16 disk drives using a single letter name, from A: to P:. For any computer there can only be one A: drive.

One of the most basic levels of security is whether a user may access a remote disk drive to read or write data. This is accomplished through the **MANAGER.COM**, Section B.2.

Further, the network manager may limit a users disk access through the MAP instructions placed in the **LANSTART.SUB** initialization file. See page 7 of this section.

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MAP: DISK DRIVE ASSIGNMENTS
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An ancient philosopher once said "Without a map the Captain of a ship would not know to which port he was sailing."

WHERE ARE YOUR DISK DRIVES?

To a user attached to a dozen other computers over the network, each of which has two or three drives, this is an important question.

If you assign a user the appropriate privilege, they will be able to access the disk drives of other stations. In order to do this, each machine must be "told" where the other drives are. This is normally done just after sign on, through a procedure called **MAP.**

To understand the use of the MAP command it is helpful to discuss a few concepts:

LOCAL & REMOTE

The disk drives and any other attached devices on the computer are considered "LOCAL" to a user.

Other computers on the network, their disk drives and devices are considered "REMOTE" to the same user.

The drives of both local and remote stations have an "address" which is the drive name and the station number. As is seen when typing MAP when first signing on, the Local disk drives are then referred to as: "A:local" and "B:local". The A: drive on a station #4 is referred to as "A:04". The B: drive would be "B:04".

PHYSICAL & LOGICAL

The above mentioned "address" describes the PHYSICAL location of a disk drive. "A:local" is the PHYSICAL location of the A: drive on your local station. "A:04" is the PHYSICAL location of the A: drive of a station number "04".

To use the disk drives of remote computers on the network, it is necessary to give a LOGICAL name which represents the PHYSICAL location of each disk drive. This process we call MAPPING.

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```
SETTING UP A MAP
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In the management section PLANNING THE NETWORK, there is a table showing a disk drive allocation MAP. Here's how to set up that MAP on the network.

Up to 16 disk drives in any combination of both LOCAL and REMOTE may be made accessable to any one station at a time through the MAP command using LOGICAL names from A: to P:. The disk drives will then act as if they're attached to that computer.

To demonstrate, once a user sucessfully signs on to the network, the network MAP may be displayed by typing:

        MAP   (Return)

The screen will show:

```
Logical name: = Physical drive

            A:=  A:LOCAL
            B:=  B:LOCAL
            C:=  C:LOCAL   (and on the KAYPRO 10)
```

*** WARNING ***

THE MAP PROCESS REQUIRES ACCURACY. TAKE CARE TO MAP ONLY TO "TRULY" ACCESSIBLE DISK DRIVES! Any user attempting to access a remote file from a MAP with a non-existing remote physical drive can "bomb" the remote user back to the CP/M prompt.

EXAMPLE: If your MAP is:

                         MAP D:=D:03

        There is no D: physical drive on most computers. So in this case the logical drive D: is set to the non-existing physical disk D: of station #03.

        If you tried to access a file on your D: drive and station #03 was on the network, the user on station #03 will be "bombed" back to the A0> prompt of the LAN CP/M.

        This is the same response as "stand-alone" CP/M, and the problem is caused by a CP/M ROM call, and is not amenable to software change.

CAUTION: DO NOT USE SPECIAL CHARACTERS IN AN ADDRESS ("@", "=", "_", "<", "."). Using special characters in addresses can result in erratic MAPping.

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MAP STRATEGIES
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        To MAP drives to be accessed, first decide on the logic of how drives should be named.

        One method is to MAP each station to access the same remote disk drive using the same LOGICAL name (A:=P:), as follows:

	Station #1	Station #2	Station #3
PHYSICAL drive (Local use)	A	A	A
LOGICAL name (Remote use)	D	G	J
LOCAL MAP	A:=A:Local G:=A:2 J:=A:3	A:=A:Local D:=A:1 J:=A:3	A:=A:Local G:=A:2 D:=A:1

        In this MAP, each computer has its own A:drive and B: drive accessed Locally as A: or B:. Further every other computer on the network accesses the same PHYSICAL drive by the same LOGICAL name.

Every remote station accesses the A:drive of station #1 as their D:drive.

Every remote station accesses the A:drive of station #2 as their G:drive.

Every remote station accesses the A:drive of station #1 as their J:drive.

Another technique is to MAP all stations to access every disk drive, both LOCAL and REMOTE by the same LOGICAL name, as follows:

	Station #1	Station #2	Station #3
PHYSICAL drive	A	A	A
LOGICAL name	A	D	G
LOCAL MAP	D:=A:02 G:=A:03 A:=A:Local	D:=A:LOCAL G:=A:03 A:=A:1	G:=A:LOCAL D:=A:02 A:=A:1

In this MAP, the PHYSICAL A:drive of station #1 will be accessed as the A:drive by every computer on the net. The PHYSICAL A:drive of station #2 will be accessed as the D:drive by every computer. And the PHYSICAL A:drive of station #3 will be accessed as the G:drive by any computer.

This technique can create excessive network traffic unless used carefully. And as the MAP function is being done, the A:drive should be the LAST drive to be MAPped.

NOTE: To optimize network performance it is generally advisable not to log an A: drive on to a remote drive to run programs such as WordStar.

Just which technique you use is up to you. there is no "right" way, so use the one which is easiest for you to remember.

After you have completed your disk drive assignments, you should check to be sure the system is working correctly. Take a directory of each of the drives that you have MAPPED. Use the DIR directory command to read the directory of remote Drive D:

DIR D: (Return)

Then try the directory program DD.COM. This will report the size of all files on the requested disk, and the size of all valid remote disks that have been accessed since the last WARM BOOT.

If that is working correctly, try loading the same program that is located on a remote drive by entering:

D:DD   (Return)

Note that this is the same standard CP/M format except now.you will be able to access up to 16 disk drives.

Now check your work to this point by getting a directory from all the drives you have mapped on the network.

==
THE AUTOMATIC MAP: SETTING UP THE LANSTART FILE
==

To avoid mapping the disk drives every time you sign on, a SUBMIT file may be written to automatically MAP all drives.

If you are not familiar with the use of the CP/M program called SUBMIT.COM, read the CP/M manual or turn to your computer dealer. If you are familiar with SUBMIT, follow the instructions below.

To use the auto-mapping feature, the files **LANEX.COM** and **LANSTART.SUB** must be on the working diskette in the A: disk drive of the computer. **LANEX.COM** functions similarly to SUBMIT.COM, but is RAM-based and much faster. This program is included on the "B" LAN/Scape master diskette. If you must use the SUBMIT.COM program, rename **LANEX.COM** to something else, then rename SUBMIT.COM to **LANEX.COM.**

Three short submit files included on the LAN/Scape distribution disk have the names **LANSTART.NO1, LANSTART.NO2** and **LANSTART.NO3.** These files may be viewed using the CP/M TYPE command. To use these files, on station #1, simply rename the file as follows: REN LANSTART.SUB=LANSTART.NO1. On station #2 do the same using LANSTART.NO2 and on the third station by using LANSTART.NO3.

You may create a file named **LANSTART.SUB** using the WordStar "non-document", and include only the specific MAP commands as described below. Refer to your CP/M documentation for specific SUBMIT details.

After the user logs on to the network with the LAN/Scape programs on the A: drive, the LAN program expects to find **SIGN.COM, LANEX.COM** and a file named **LANSTART.SUB** on the same drive.

If you would like the system to automatically check your mailbox (see MAIL, below) or let the other stations know that you are on line (see FLASH, below), you may include these commands in your SUBMIT file.

If you always wish to run a specific program every time that you sign on the network, you may include the name of that program as the last entry in the **LANSTART.SUB** file.

Here is an example of a **LANSTART.SUB** file with all these options.

```
MAP  G:=A:02
MAP  H:=B:02
MAP  J:=A:10
MAP  K:=B:10
MAP  L:=C:10
FLASH ALL  Hi  There  Station 1 is on-line !!
MAIL /R *
MAP
WS
```

===========
UN-MAPPING
===========

If it is desirable to limit the access of a station after signing on, **LANSTART.SUB** file can use the MAP command of a workstation to un-MAP the unneeded disk drives by this command:

MAP E:=   (Return)

This command will unMAP the E:drive.

=========
REMAPPING
=========

As mentioned earlier, with CP/M a user is limited to accessing up to 16 disk drives named A: through P:. However more drives may be accessed, or different combinations of disk drives may be made accessable by re-MAPping your LAN/Rover system.

Before changing a disk drive MAP, you should check to be sure the system is working correctly. Take a directory of each of the drives that are assigned. If there is a D: drive, use the DIR command to read the directory as follows:

DIR D: (Return)

If you decide that it is unlikely that you will need information from drive F: now mapped to drive A: at station 4. Simply remap drive F: by entering:

MAP F:=A:18   (Return)

You now have the drive you want. You still are
restricted to 16 machines at a time, but you can reMAP to any
other 16 disk drives at will. Any alphanumeric address other
than a valid station number (00-FF) will result in the mapping
of a drive locally.

=================
AUTOMATIC RE-MAP
=================

You can also make files of specific disk drive
assignments and "automatically" MAP and re-MAP disk drives for
your needs.

All disk drive MAP configurations must use the file
extension .SUB. For instance an engineering department could
have a MAP in the file ENGINE.SUB and the accounting
department could have another called ACCOUNT.SUB.

Both files could be on the A:drive of the LAN working
diskette, and the system may be dynamically reMAPped at any
time by entering:

LANEX ENGINE	(Return)

or:

| **LANEX ACCOUNT** | (Return) |

==================
REMOTE DRIVE A:
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THE A: and B: drives of one computer may be MAPPED to
another. This is not generally advisable because it increases
network traffic.

In some cases a specific program, such as a complex
accounting program requires that it be located on an A: or B:
drive of a hard disk drive. If that were on a remote model 10
KAYPRO numbered station #10, you may **MAP** the drives like this:

MAP A:=A:10	(Return)
MAP B:=B:10	(Return)

This results in the mapping of your A: and B: drives
to station 10. As soon as you're done it is good practice to
re-MAP your A: and B: drives back to LOCAL.

The MAP of an A: or B: drive to a remote station may
be done automatically using the LANEX program together with the
LANSTART file.

If SUBMIT is used, special care is required in the
order of execution. For instance, to **MAP** the A: drive to a
remote station, the MAP A:=A:<station #> would have to be the
final command in the .SUB file.

=================
MAPPING TO LOCAL
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Having LOCAL drives MAPPED remotely, (A:=A:2, B:=B:2) can significantly increase the data traffic over the network, and can slow down response time. When you are finished using this, re-MAP you drives to LOCAL as follows:

MAP A:=A:LOCAL	(Return)
MAP B:=B:LOCAL	(Return)

====================================
REMOTE PRINTING ON THE LAN/Rover
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The ideal network should print out to any printer attached to any workstation on the network. It should also print from inside an applications program as if the information were being printed locally.

The LAN/Scape software will accurately print out during remote disk accesses, and works with software spoolers.

However software spoolers usually require considerable disk storage. They can cause intensive disk use and thereby possibly severly reduce network performance.

It is recommended that a hardware buffer or intelligent spooler be installed on the printers which are to be used with the network. By accepting data as quickly as the computer can send it to the buffer, the workstation is "freed-up" from the printing task quicker, therby reducing possible contention and delays on the network.

There are at least three ways to print out files while connected to the LAN/Rover:

1. PRINTING LOCAL FILES
2. PRINTING REMOTE FILES
3. USING A REMOTE PRINTER

PRINTING SUPERVISION

A printer needs attention; the right type of paper loaded, a full ribbon and correct print wheel installed. It also needs attention to the forms or tractor feeder for alignment. For these reasons it is recommended that one person be responsible for the printed products of an office.

This person will control and monitor the printer attached to THEIR Station, say #1.

PRINTING LOCAL FILES

The LAN/Rover system can print out any files locally as a stand-alone computer might. Files which have been transferred from a remote station to the printer supervisor's disk drive can be printed out at any time.

For example, network users can save their files directly on a disk drive of Station #1, or using the PIP command transfer their files to a disk drive on Station #1. These files would be printed at the discretion of the operator of Station #1.

PRINTING REMOTE FILES

A printer may also print out files from any remote disk drive over the network.

EXAMPLE: Station #1 (with a printer) will print a file from the B: drive of Station #3. Station #1 will MAP drive B:03 to D: by using the LAN command, MAP D:=B:3. To print a file, the operator on Station #1 just prints D:FILENAME.EXT from their applications program.

USING A REMOTE PRINTER

The network will allow an operator to print a file directly from an applications program to any parallel printer attached to any other station on the network. The following requirements must be met to use this option:

1. The correct LAN software must be on both the printing station (initiating the printing) and the printer station (with the printer attached).

2. The initiating station must set the print output to go to the printer station.

3. Once a "print job" is started, it must be finished by releasing the printer.

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```
REMOTE PRINTING SOFTWARE
```
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The station initiating the printing and the station with the printer attached both must have the LAN remote printer programs installed.

These programs are:

              LAN.COM   (main LAN/Rover program)
              PRINTER.COM

NOTE: The remote printing versions of LAN programs take an additional 1k of usable memory, reducing the usable program area. If your applications programs require maximum TPA and you do NOT need remote printing, use the non-remote printing LAN programs, **LANLP.COM.**

PRINTER CONFIGURATION

Whether printing is done locally or remotely over the LAN/Rover, the applications program on the station which initiates the printing must be configured for the destination printer. A user must always be aware that to print successfully to a remote printer over the network, the LOCAL applications software must be configured for that REMOTE printer.

PRINTER: REMOTE ASSIGNMENT

Prior to starting remote printing, the user to initiate the printing must tell their station to print out on the remote station with the printer attached, as follows:

PRINTER <Station #>   (Return)

Example:

PRINTER 3   (Return)

This will set a station's programs to print files out at the printer attached to station #3.

To reassign the printing function back to the local station from a remote, the local station operator need only type:

PRINTER L   (Return)

```
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```
REMOTE PRINTING OPERATIONS
```
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```

Not all applications programs handle printing by the same method and some programs will work better than others using the remote printing option. Experiment with your programs to develop reliable procedures.

Remote printing has been made as transparent as possible: A "CTRL P" command is recognized just as in CP/M and screen responses which would be printed normally in CP/M will print normally on the assigned remote printer.

A station set for remote printing initiates a request to use a printer attached to another station.

If the selected printer is NOT available, the user will be given a message:

Printer busy; (T)ry again, (D)ump or (A)bort.

Entering a "T" will cause the sending station to try again to print.

Entering a "D" will cause the print output to be dumped for five seconds, which allows time to terminate the print job from the applications program and empties the remote printing buffer.

Entering an "A" will cause a Warm Boot of the system. The applications program will be aborted and any transient data will be lost.

If the printer is available, the printing station reserves the printer for a short period of time.

Now the sending station transfers the information over the network to the printer station where it is printed. All data is sent over the network in "packets" which are 128 characters long.

The last packet is usually a partial one, and the sending station will hold this last packet (awaiting more data) until it is told that the print job is complete.

When the transmission is complete, the user OR the applications program of the sending station must RELEASE the printer.

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RELEASING THE PRINTER
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Releasing the printer accomplishes two functions:

1. Prints out the final partial packet of data from the sending station. **Sending a form feed will force the final packet to be sent, but will not release the printer.**

2. Releases the printer reservation time.

NOTE: **Local printing may be done at any time without releasing the printer.**

Releasing the printer may be accomplished as follows:

A. Execute a Warm Boot.

I N D E X