Sailor

Sailor

INSTRUKTIONSBOG FOR
SAILOR **H 1240**

INSTRUCTION BOOK FOR
SAILOR

INSTRUKTIONSBUCH FÜR
SAILOR

INSTRUCTIONS POUR
SAILOR

INSTRUCCIONES PARA
SAILOR

A/S S. P. RADIO · AALBORG · DENMARK

SAILOR

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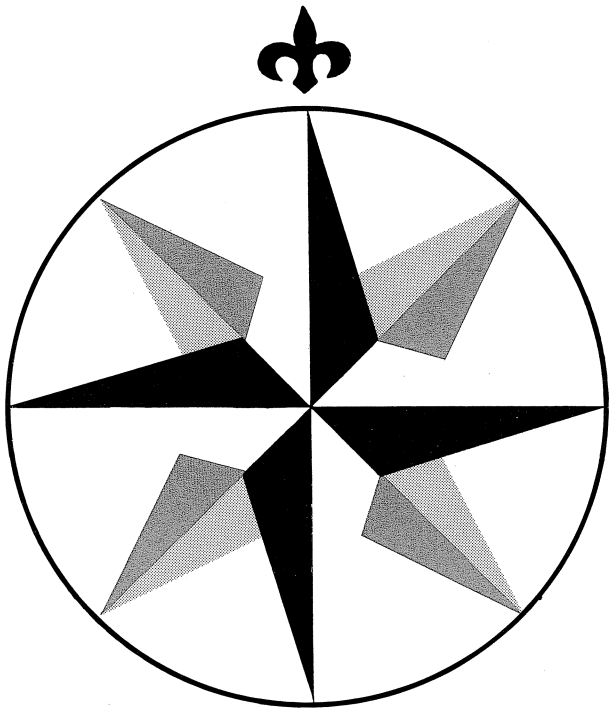

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INTEGRATED RADIOTELEX SYSTEM
SYSTEM INTRODUCTION
AND OVERVIEW MANUAL

A/S S. P. RADIO · AALBORG · DENMARK

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GENERAL INFORMATION

SECTION 1

GENERAL INFORMATION

1.1. INTRODUCTION

Welcome to the world of Radiotelex communication. Your new system offers a wide variety of facilities to give you reliable and efficient communication with telex subscribers all over the world.

The heart or brains of your Radiotelex equipment is the Modem. The Modem unit will support a variety of teleprinters and video display terminals at your own choice.

Regardless of your background or previous radiotelex experience, you should read this manual. It provides information on how to issue commands to create, edit and transmit messages to another telex subscribers.

We will discuss many topics in relatively few pages so that you can:

- Get an understanding of Radiotelex systems

- Start manual telex operation in just a few minutes

- Use the text memory for creating and storing messages

- Begin using the editing capabilities of the Radiotelex Modem.

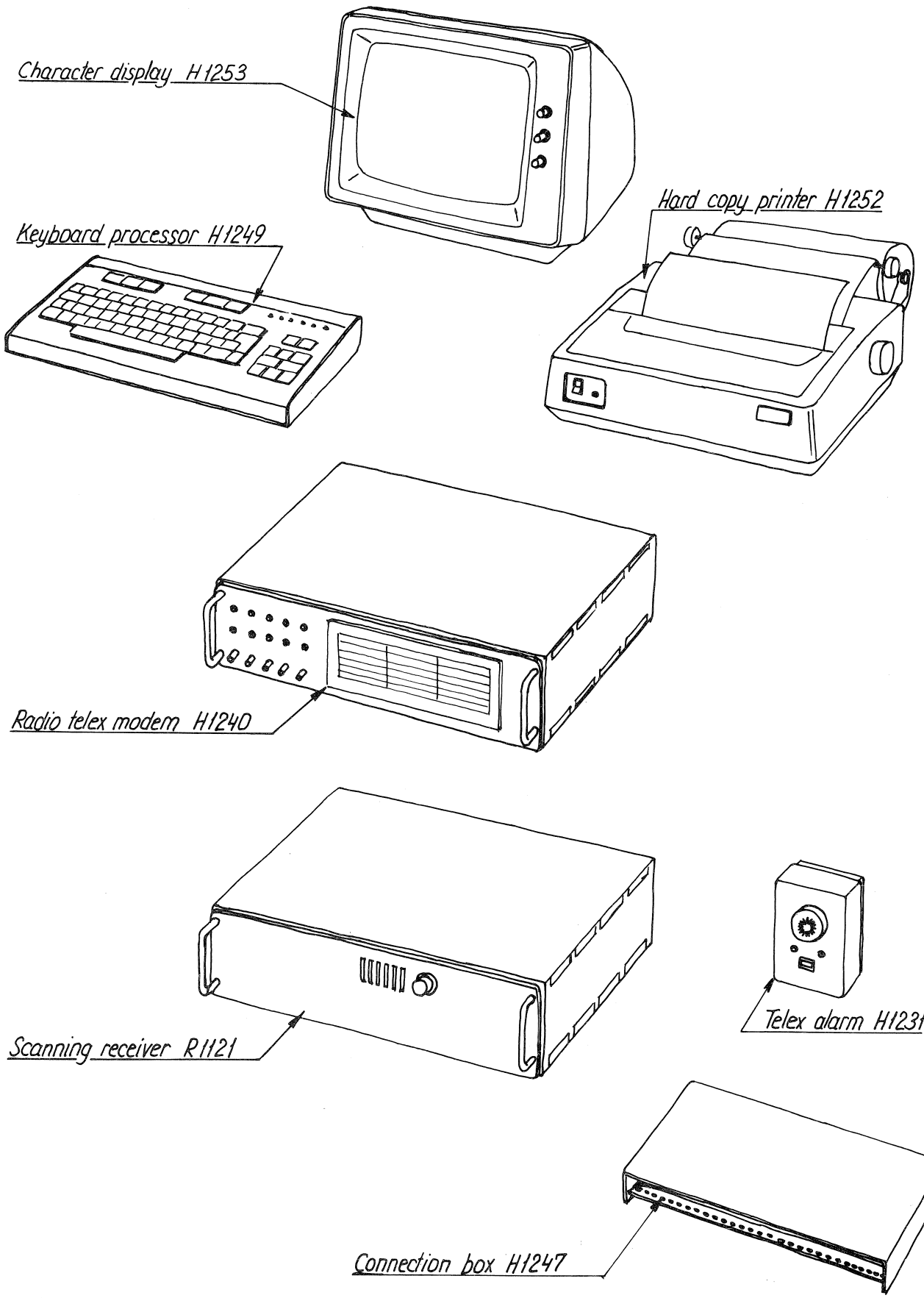
Section 2 describes the terms and concepts of Radiotelex communication.

Section 3 contains a special set of instruction material so you do not have to be a telex expert to be able to operate this powerful but compact system.

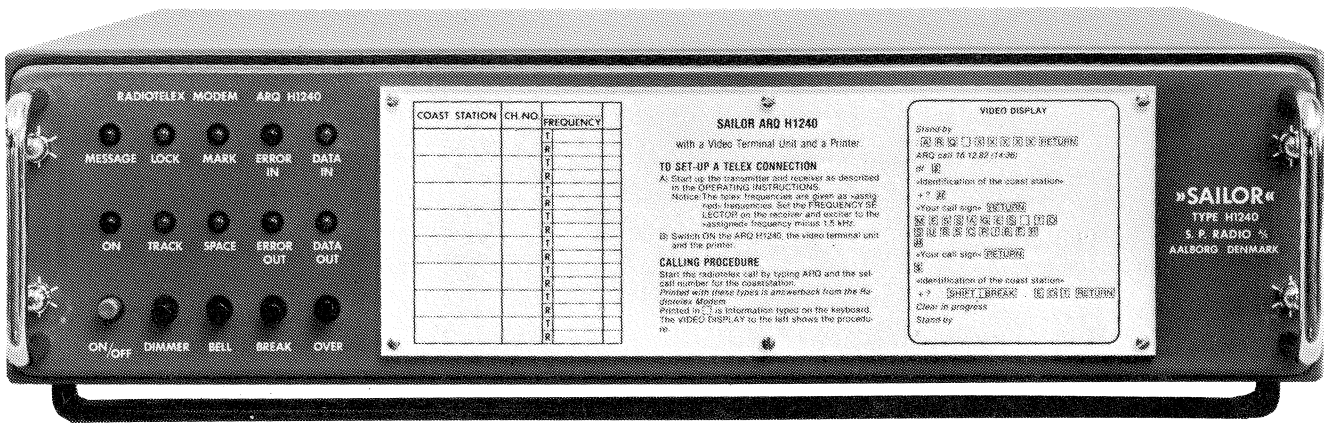
The best way to feel at ease with the system is to sit down with this manual and the H1240 and actually key in the examples provided in each of the sections. It will not take long to become familiar with the system, and it is well worth the time you invest to obtain a complete understanding of the equipment.

1.2. CONFIGURATION AND OPTION EXAMPLES

You will find a few examples on the following pages that show some of the basic configurations and options that your new system can have.



1.3. FRONT PANEL OF THE RADIOTELEX MODEM ARQ H1240



INDICATORS

LOCK
The modem is locked to another station. This reflects one of the following conditions:

- The modem has established connection on ARQ.
- The modem receives FEC.
- The modem receives a "Free" signal.

TRACK
The receive filters are tracking the incoming signals. The modem tracks +/-65 Hz and the receiver should not be readjusted during a connection.

MARK
Receiving mark tone.

SPACE
Receiving space tone.

DATA IN
Receiving data.

DATA OUT
Transmitting data. The indicator will flash when the output buffer is empty, i.e. the message has been transmitted.

ERROR IN
Error in received data.

ERROR OUT
Error in transmitted data (only used during ARQ).

MESSAGE
A message has been received.

CONTROLS

ON/OFF
Mains power switch.

DIMMER
Varies the light intensity of the front panel LED's in four steps.

BELL
Resets the "Message" indicator and the external alarm.

BREAK
Terminates the connection. If pressed during ARQ information-receiving, the station will first change into information-sending, and then terminate the connection.

OVER
If the station is information-sending, a short push will change the direction of information, when the buffer is empty, i.e. the message has been transmitted.
If the station is information-receiving a short push acts as a poll request, i.e. change the direction of information, when the other station sends an End-Of-Communication sequence. The MESSAGE indicator will lit when OVER is pressed.
A long push (2.5 sec.) changes the direction of information immediately.
When the 2.5 sec. has passed the MESSAGE indicator will extinguish.

1.5. TECHNICAL FEATURES

This section describes the technical features of the Radiotelex Modem. If you are not interested in technical details at this moment, skip this section and continue reading Section 2 and 3 which tell you more about the operation of the equipment.

The Radiotelex Modem H1240 provides automatic ARQ/FEC telex communication in Maritime and Point-to-Point applications. It fulfils or exceeds all relevant CCIR recommendations and the requirements of the Nordic MARITEX system for automatic Radiotelex.

The H1240 recognises individual- and group calls with automatic reception and transmission of messages. The system is very flexible with user control of all relevant functions. Parameters selected during installation are stored permanently in the computer. Any later modification can be carried out directly from the keyboard.

The data demodulator uses independent detection of the Mark- and Space tones which gives the best performance when the signals are derived from the HF-band. The Mark- and Space filters are implemented as 4-order Bessel filters using a special tuning technique, which allows for independent selection of the Mark- and Space frequencies. The modem can be programmed for any combination of Mark- and Space frequencies in the audio band from 1 kHz to 3 kHz.

Frequency tracking is accomplished through the use of an internal reciprocal frequency counter with an integration time proportional to the inverse of the input signal/noise ratio. This technique ensures correct tracking even under adverse conditions.

Signal detection is carried out by bit-slicing and bit timing restoration. The detection threshold is dynamically varied in order to ensure optimum detection during interference and selective fading.

Interface to the radio equipment is accomplished through the control of receiver muting, transmitter high-tension, transmit-time and transmitter key. The receiver muting and the transmitter key signals can be adjusted by the operator during installation for optimum timing with the associated HF-equipment. The Radiotelex Modem H1240 can be used for automatic power-up of radio stations by incoming calls. Other features include fully automatic frequency scanning, tuning and operation of the complete radio installation.

The Radiotelex Modem H1240 includes a large text memory of 64,000 characters, with optional battery back-up. The File Manager (a programme module in the Radiotelex Modem) is responsible for organisation and control of messages. It operates on user defined names and enables creation of multiple messages for simultaneous- or separate transmission.

The built-in Text Editor is a random access, line oriented Editor similar to those used on large computers. It supports a full line of editing capabilities and gives the Radiotelex Modem H1240 word processing facilities.

The Radiotelex Modem H1240 can be used in a number of automatic modes:

- The "Remote" mode permits the H1240 to transmit available messages to a calling station. The remote mode can be either public or protected. In the latter case it requires a password before the message is transmitted.

- Frequency scanning and control gives the modem the power to control the associated radio equipment. This enables unattended operation with coast radio stations all over the world. It means that the equipment can receive and transmit telex messages fully automatic, you do not need to be there all the time. The modem can select frequencies and transmit any message via the coast radio station that you have selected. At the same time the modem can keep watch on other coast radio stations.

Programmability provides the operator with a tool for fully automatic operation of the H1240. It is sometimes useful or necessary to execute a sequence of commands. If such a sequence is frequently used by an operator, he can group these commands, give a common name and execute the complete sequence with a single command. Any such group of commands can be executed once or many times; they can be executed by the operator, or they can be executed automatically by the Radiotelex Modem.

1.5.1. SPECIFICATIONS

Modem specifications are listed in Table 1.1. These specifications are the performance standards against which the modem is tested.

Table 1.1. Modem Specifications.

SYSTEM SPECIFICATIONS	
Communication protocol:	CCIR Rec. 476-3
Local signal:	5-level, serial start-stop data ITA-2 code, 50 to 2400 Baud (BAUDOT) or 7-level, serial start-stop data ITA-5 code, 75 to 9600 Baud (ASCII)
Line signal:	Two tone keyed with 7-unit code, constant 4B/3Y ratio in accordance with CCIR Rec. 476-3, 100 Baud synchronous. Optional: Four tone keyed 200 Baud synchronous Twinplex in accordance with CCIR Rec. 346-1
LOCAL INTERFACE	
Console/Printer:	CCITT Rec. V.24/V.28 (RS-232C) Optional: Neutral 40 mA Polar +/- 20 mA
Tape reader:	CCITT Rec. V.24/V.28 (RS-232C) Optional: Neutral 40 mA
Remote control:	CCITT Rec. V.10 SPECIAL

Table 1.1. Modem Specifications (continued)

LINE INTERFACE

Tone frequencies:	Mark- and Space frequencies adjustable from 1 kHz to 3 kHz
Modulation:	Phase-continuous AFSK keying
Frequency stability:	0.1 Hz
Filter tracking:	Adaptive tracking within +/-65 Hz
RX-tone input:	+10 dBm to -40 dBm / 600 ohm balanced, strap selectable
TX-tone output:	+10 dBm to -30 dBm / 600 ohm balanced, continuous adjustable
Radio control output:	RS-410 type N (Open collector Darlington drive)
Radio control input:	RS-410 type N

GENERAL:

Power source:	24V DC (-10/+30%) 115/127/220/240V AC (-15/+10%) 50/60 Hz
Ambient temperature:	0 to +55 degr. C operation -20 to +70 degr. C storage
Relative humidity:	95 % non-condensing
Vibration:	IEC, CEPT and MPT 1204

Our products are under continuous research and development. Any information may therefore be changed without prior notice.

SECTION 2

INTRODUCTION TO RADIOTELEX COMMUNICATION

SECTION 2

INTRODUCTION TO RADIOTELEX COMMUNICATION

2.1. INTRODUCTION

This section describes the basic properties of radiotelex systems employing error correction in the form of ARQ (Automatic Retransmission Request) and FEC (Forward Error Correction). The technical details of the error correction is defined by the CCIR (The International Consultative Committee) in the recommendation rec. 476-3. These specifications are generally accepted and permits equipment from different manufacturers to communicate via common radio circuits.

2.2. BASIC SYSTEM DESCRIPTION

The advantage of telex communications as compared to voice communications are obvious to anyone used to communicate by an ordinary telex machine. For mobile communications, especially where HF-radio circuits are the primary transmission media, the quality of the connections is subject to interference effects from a variety of sources. The result of this noise and interference is an annoyance and inconvenience but it is not particularly damaging for voice connections since the meaning of the message can be understood without recognizing every word. Telex communication, however, should not be subjected to character mutilation because it might be impossible to distinguish the intended information from the characters actually received. As an example, this could be position information, tonnage reports and payroll information. Therefore a means must be used to overcome the adverse results of noise and interference which is inherent on HF-radio circuits.

The answer to reliable and efficient telex communication via radio is error detection and correction. In 1970 the CCIR drafted the recommendation for error detection/correction, defining a constant-ratio code for automatic error detection and giving detailed requirements for the error correction.

2.2.1. DATA CODING

The recommended code is a 7-level synchronous code which uses only those bit combinations having a ratio of 3 Mark bits to 4 Space bits to represent valid characters. There are 35 of the 3/4 ratio combinations, allowing all 32 CCITT-2 characters to be represented.

The CCIR recommended code needs no start or stop bits because it is synchronous. No error-detecting parity bits are required because the Mark/Space ratio is constant. This allows efficient transmission of messages, since all character bits are used to determine the character.

2.2.2. ERROR DETECTION

In addition to allowing more efficient use of message transmission time, the CCIR code is more effective in detecting errors than the parity-equipped CCITT-2 code. The CCIR code detects all combinations of bit inversions odd or even, except the rare inversion of an equal number of Space and Mark bits in one character, preserving the 3/4 ratio. Thus the undetectable combinations of the CCIR code will occur much less often than those of the CCITT code.

2.2.3. ERROR CORRECTION

The elementary error detection system does what it is designed to do - detect errors. The usefulness of the system lies in its ability to correct errors. Depending on the application several methods exist for error correction. Two basic methods are recommended, ARQ and FEC.

2.3. ARQ OPERATION

The first method is named ARQ (Automatic Retransmission Request). ARQ is workable between two stations only, and involves sending data in small blocks, then listening between blocks for the receiving station to request either the next block, or retransmission of the last block because of an error.

In ARQ mode, two stations communicate directly with one another. The station which initiates the connection is designated the Master and the other is the Slave. Initially the Master is the sending station, but at any later instance the Slave may take the role of the sending station and send information to the Master. This is like a telephone conversation; the Master is the one who makes the initial call, at any later time the Slave or the Master may be talking. Data is transmitted in blocks of three characters. Between the block of characters, the sending station waits for a reply of a single character from the receiving station, indicating the validity of the received data. If an error occurs in a data block, the receiving station sends a request for repetition. The sending station, upon receiving a request for repetition, retransmits the block. The request may be repeated up to 32 times, until the complete block have been received error-free. After 32 repetitions the Master station automatically initiates a new call. If this new call is unsuccessful and two-way communication cannot be re-established, both Master and Slave reverts to the Standby condition. If the new call is successful the two units automatically continue the interrupted communication.

The characteristics of ARQ communication can be summarised:

- It practically guarantees error-free data, assuming reception is possible at all.
- Communication is possible between only two stations at a time. This gives some limited protection against unauthorized eavesdropping.
- The receiving station must have an operating transmitter.

2.4. FEC OPERATION

The second method is designated FEC (Forward Error Correction). This method of error correction is used where there is more than one receiving station, and no replies are required by the transmitting station. It consists of sending the message in time diversity, that is, each message is sent twice, the characters of the first message being interleaved with those of the second. The receiving thus has two chances to receive each character correctly. If both characters are in error, a special character (*) is printed.

The primary characteristics of a FEC are:

- A message may be sent to several receiving stations simultaneously.

- It does not require transmitters at the receiving stations.

- There is no acknowledgment of transmissions.

- There is no active error correction.

- There is no protection against eavesdropping.

A sub-class of FEC, designated SEL/FEC (Selective Forward Error Correction) allows selective calling of one or more stations by means of call codes. The message is transmitted in inverted format with the Mark/Space signals interchanged. Only the receiving stations with the correct call codes will receive the data correctly.

SECTION 3

USING THE RADIOTELEX MODEM

SECTION 3

OPERATIONS

3.1. INTRODUCTION

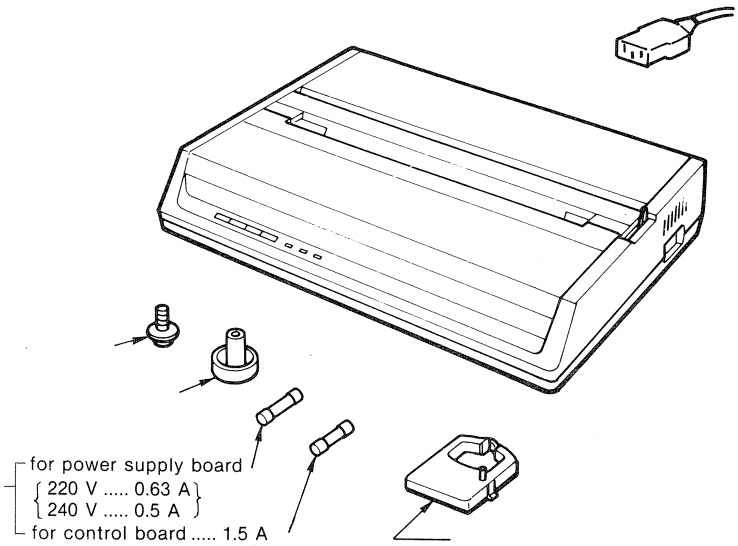
Within this section are instructions enabling you to start using your Radiotelex Modem H1240. This section contains an explanation of the Power-on Self-test that identifies your H1240 Radiotelex Modem is ready for use. This section also teaches you how to create and transmit telex messages with your modem.

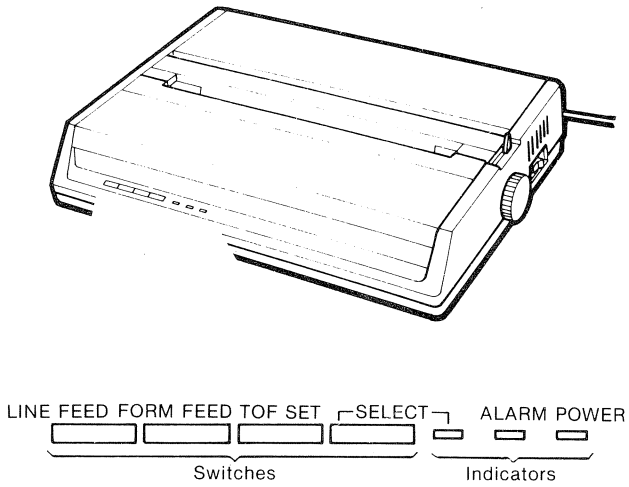
If your Radiotelex Modem H1240 has a OKI Printer H1252, the next section will be a handy reference when getting started, and a quick reminder in the future. Otherwise you may skip to Section 3.2., Starting the modem.

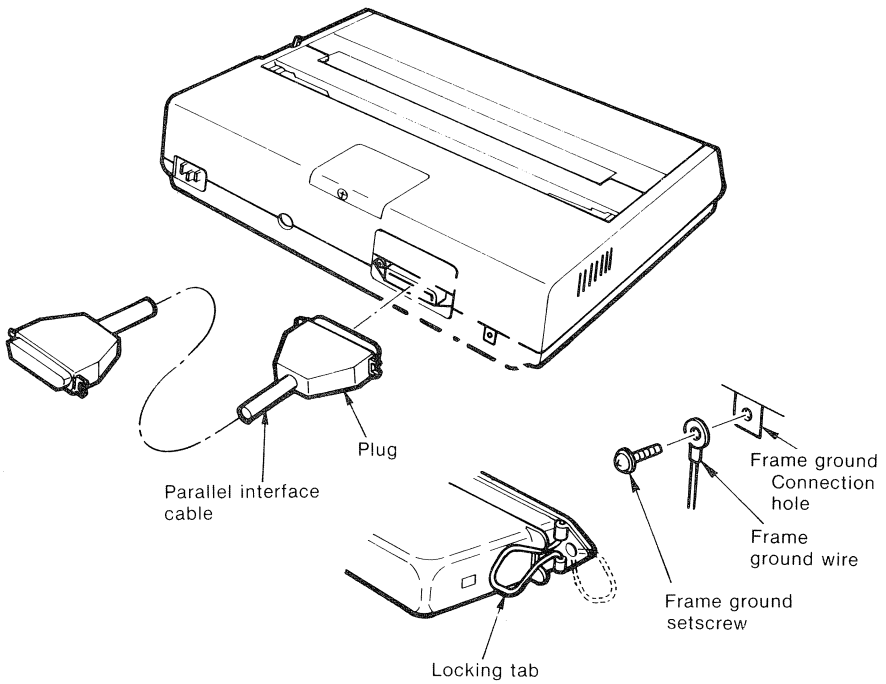
3.2. PRINTER OPERATIONS

The OKI Printer H1252 is a desk-top type, receive only, dot matrix printer. It is small in size and light in weight because it employs an extra small printing head and a built-in microprocessor that controls all the functions.

The basic unit consists of the printer and paper roll holder. Ordinary roll paper or sprocket paper may be used, and multi-part copies can be made. If an optional variable tractor is mounted, sprocket paper of various widths can be used.





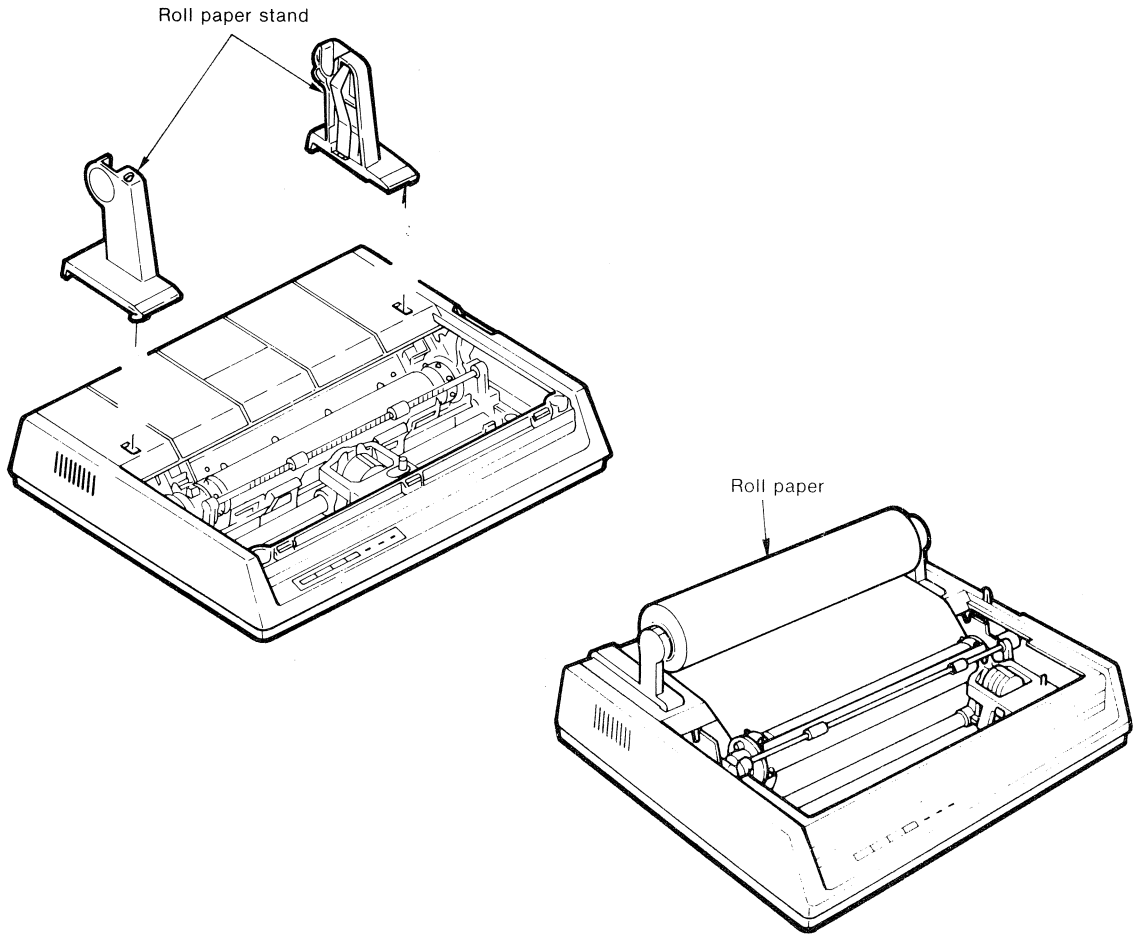


Locations of Operating Buttons, Lamps and Knobs.

1. Power light is on when the printer POWER switch is on.

2. The printer is ready for receiving information for printing when the SELECT switch is on. (SELECT indicator is ON).

3. The printer stops printing when the printer unit detects the absence of paper about 50 mm (2") from the print line.



Paper Installation.

1. Switch the power off and remove the top cover by lifting it.

2. Push a roll of paper 128 mm (5.04") in maximum diameter, 216 mm (8.50") in maximum width, onto the paper mounting shaft until it hits the flange as shown, exercising care about its unwinding direction.

3. Set the roll paper on top of the roll paper holder.

4. Pull the paper lock release lever towards yourself (to the release position).

5. Set the paper guide wire at the open position.

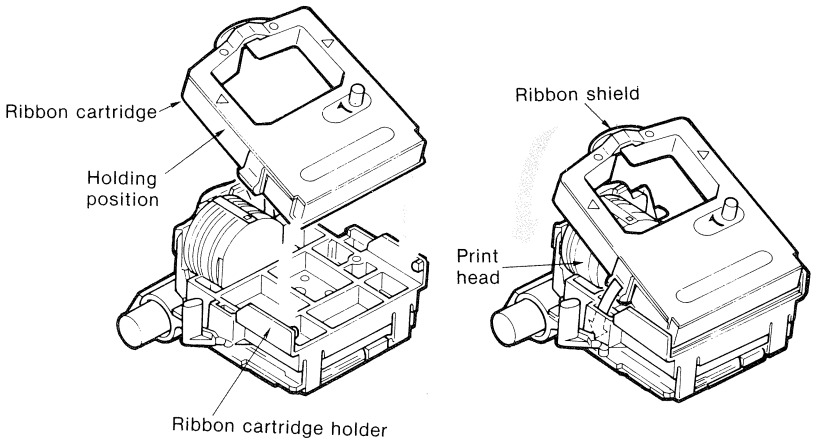
6. Run the paper between the paper chute and paper separator to the top of the platen.

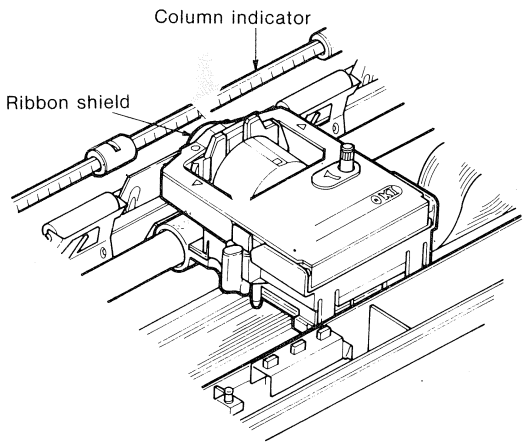
7. Make sure that the paper is straight, set it in the center of the platen and push the paper lock release lever backwards to the lock position.

8. Set the right and left paper holder guides 0.5 to 1.0 mm (0.02" to 0.04") away from both edges of the roll paper.

9. Put the paper guide wire and top cover back into place.

10. Move the platen knob aprox. 10-20 mm forwards and bend the paper as shown on the top cover.





Ribbon Installation

1. Switch the power off and remove the top cover by lifting it.

2. Remove the used ribbon. See above.

3. Place the black ribbon cartridge on the ribbon cartridge holder. The easiest method is to tilt the back of the cartridge so that it slides into the area of the plate that is nearest the front of the printer, then lower the top of the cartridge (when the plastic ribbon shield is located) over the print head. The tabs on both side of the cartridge should align perfectly with the inserts on the print head plate.

4. Press on the cartridge until you feel it snap into place. To remove the ribbon cartridge, make sure the print head is away from the rollers, then grasp the cartridge on both sides of the print head and lift up.

5. The blue lever located to the left of the ribbon cartridge is used to adjust the print head gap for single- or multi-part paper. When single-part paper or two-part paper is in the printer, slide the blue lever toward the print head. To print on three- or four-part paper, slide the lever away from the print head.

3.3. STARTING THE MODEM

3.3.1. POWER-ON SELF-TEST

When you first position the H1240 power switch to on, it performs a Power-on Self-test. The Self-test only takes a few seconds.

Position the H1240 Power switch to ON. There will normally be two responses:

1. The cursor will appear on the screen in approximately 3 seconds.

2. The message

```
Current date is dd.mm.yy (hh:mm)
Enter new date:-
```

will appear on the screen.

These responses tell you that your Self-test has completed successfully.

NOTE

The system automatically runs through a number of Self-test routines when the Power is switched on. During these tests a blinking pattern will be visible on the front panel of the H1240 Radiotelex Modem. After these tests the Mark and/or the Space indicator should light. If a problem is found during this short test, neither of these indicators will be on. This means that your system is not operating properly. Refer to the Installation and Configuration Manual for a detailed performance verification.

3.3.2. TELLING THE DATE AND TIME

When the modem has been switched on, you will see something similar to this on the screen:

```
Current date is dd.mm.yy (hh:mm)
Enter new date:-
```

It is an excellent idea to fill in the current date whenever you start your modem because all your telex traffic will be stamped with the correct date. Also, any message that you create or change will have the correct date stored in the message directory.

1. Type one or two numbers for the day.
2. Type a period " . "
3. Type one or two numbers between 1 and 12 for the month.
4. Type another period.
5. Type the two last numbers of the year between 00 and 99.
6. Type a left bracket " ("
7. Type one or two numbers between 0 and 23 for the hours.
8. Type a colon " : "
9. Type one or two numbers between 0 and 59 for the minutes.
10. Type a right bracket ") "
11. Press the carriage return key.

The modem checks the date and time that is types. If the date and time does not check out, the modem displays the message:

Invalid date

3.3.3. THE PROMPT

On modems equipped with standard teleprinters, the modem displays:

Standby
:

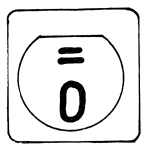
The colon " : " is the modem PROMPT. A Prompt tells you that it is your time to type information , that is, to tell the modem what to do by entering a command.

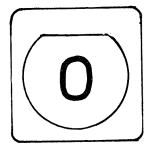
3.4. SOME KEYS YOU WILL USE

In addition to the keys you would find on a typewriter, your keyboard has some special keys you will use for telex handling.

Before we get to the special keys, here are a few differences between your keyboard and a typewriter, that you need to know.

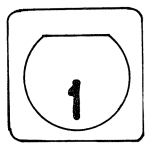
3.4.1. CHARACTERS THAT LOOK ALIKE - OH'S AND ZERO'S ONE'S AND EL'S

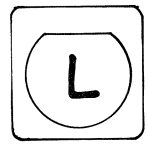




Computers are fuzzy about the number zero and the letter O - they want what they want, and you cannot fool them into taking the wrong one. Make sure you type the right key in commands and message names.

The letter O looks a little squarer than the number zero.

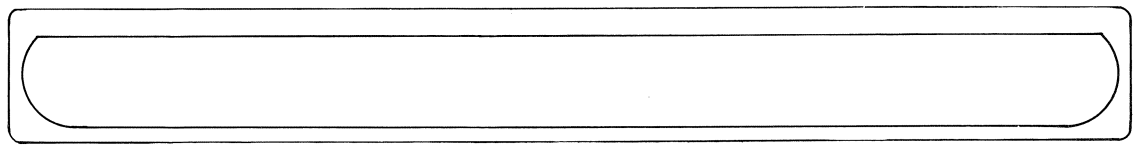




If you are used to type a lowercase L for the number 1 (if you have used a portable typewriter a lot, for example), you will have to break that habit.

Again, the modem knows the difference. Use the number key when the number 1 is required.

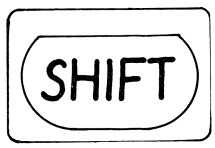
3.4.2. THE SPACEBAR



This is the spacebar. Use it to put a blank (a space) in a line you are typing.

To the modem, blanks are important; a blank is as much a character as A or B. Many times blanks are used to separate what you type for the modem just as we use them to separate words in everyday writing. You have to make sure when you are typing that the modem allows a blank. Otherwise, it may not understand what you have typed.

3.4.3. THE SHIFT AND ALPA-LOCK KEYS



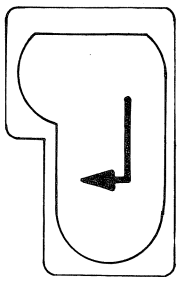
There are two Shift keys on the keyboard, located about where you find them on a typewriter keyboard.

Use them to type uppercase (capital) letters or to type the symbol shown in the upper position on the keytop. That is just as you would expect.

The Alfa-Lock key lets you type capital letters and numbers. You still have to press one of the Shift keys to type the symbols that are on the upper portion of the symbol keys (for example the left bracket " (" on the number key 8.

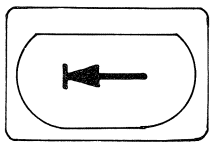
Unlike an ordinary typewriter, pressing one of the Shift keys does not get you out of Alfa-Lock mode. You must press the Alfa-Lock key again to type lowercase letters.

3.4.4. TO ENTER A COMMAND



Use the carriage return key when you have finished typing a whole command. After you press the carriage return key, the command starts.

3.4.5. TO CORRECT A TYPING MISTAKE

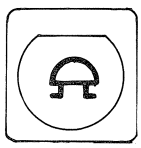


There are several ways to correct a mistake that you notice before you press the carriage return key.

One of the easiest ways is to use the Backspace key to move the cursor backwards, under the leftmost wrong character. The Backspace key may or may not delete the characters as it moves to the left, depending on the type of the display terminal you use (the Backspace key is located in the right side of the top row).

More ways to correct typing mistakes are discussed later.

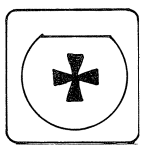
3.4.6. RINGING THE BELL



Most telex subscribers are operating unmanned. If you want to get the attention of an operator, use the Bell key to ring the Indicator Bell in the subscribers teleprinter. Each time you press the Bell key, the other party's Bell will ring once.

3.4.7. WHO-ARE-YOU AND THIS-IS

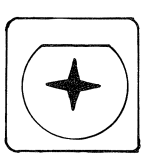
Each telex subscriber has a unique identification, known as the Answerback. This is a line of 20 characters stored in the subscribers teleprinter or associated equipment. The Answerback may include the telex number and abbreviated name of the subscriber.



When you are connected to a telex subscriber, you may want a confirmation of who you are talking to. This is automatically carried out by pressing the Who-are-you key.

When you press the Who-are-you key, the modem automatically sends a request to the subscriber's teleprinter which in turn changes the direction of data flow, sends the built-in Answerback to you and then automatically changes the direction of data flow back to you.

You can then continue transmitting your message



The Here-is key on your keyboard enables you to send your own Answerback to the other subscriber. Simply press the Here-is key, and your complete Answerback will be transmitted.

3.5. CREATING MESSAGES

When you establish a telex connection, you should already have prepared the message you want to send to the other telex subscriber. You may of course want to type your message directly to the subscriber after you have established connection, that is simple, just use the keyboard and send your message.

However, that is an expensive solution, unless you are a very skilled typist. Remember that you pay for all the time you have an error-free connection with the other subscriber, even if you do not send anything on this connection. You should rather use the built-in text memory to prepare your messages before you establish connection with the subscriber,

The following examples show how to create, display and remove a message from the text memory. You do not need to review the details of the Text Editor to complete these examples - just follow the steps provided.

NOTE

In the following examples, to ENTER something means that you should TYPE the information and then press the carriage return key.

3.5.1. A FEW WORDS ABOUT FILES

WHAT IS A FILE?

A file is a collection of related information. A file in your text memory is like a folder in a file cabinet.

Nearly every business office has one or more filing cabinets containing folders of information. For example, one folder might contain your personal letters. You might name this file the Myletter File. A file in your text memory could also contain this information and could also be named the Myletter File.

All the messages in your text memory reside in files, each with a unique name. You create a file whenever you enter a message.

You keep track of your files by their names.

WHAT CAN I NAME MY FILES?

With a few exceptions, you can give your files any names you want. Your filenames can be 1 - 8 characters in length and can be followed by a filename extension. Filename extensions start with a period and can be 1 - 3 characters in length.

LETTER.1 MESSAGE TELEX.005 LONDON PAYROLL

are all valid file names.

HOW MANY FILES CAN I HAVE?

Files in your text memory vary in size just like files in a file cabinet. Your text memory has a certain maximum size of approximately 64,000 characters (32 A4-size pages of text).
You can have as many files as you want, as long as the total size of all your files does not exceed this limit.

HOW DOES THE MODEM KEEP TRACK OF MY FILES?

The names of your files are kept in the text memory in an area known as the directory. The directory also contains pertinent information concerning the size of your files and the dates and times they were created, used or last updated.

3.5.2. EDIT - ENTERING A MESSAGE INTO MEMORY

To start the Screen Editor

1. Create a file named message. Enter:

   EDIT message

   The following message will be displayed on the screen (Status message):

   Editing new file MESSAGE

   The Editor tells us that the file is a new one (the Editor could not find the name in the directory).

   To start entering text into the text memory, you now have to use the Append command.

   Now enter the Append command (A):

   ```
   *A
       1:* _
   ```

   Notice, that the prompt for the Editor is an asterisk (*).

   Now you can enter your message into the file just like on a typewriter.

2. Type **This is a test letter.** on line 1 and press Carriage return.

3. Type **Editing is easy.** on line 2 and press Carriage return.

You now have two lines of text in your MESSAGE file.

4. Leave the message as it is. Enter a period (.) as the first and only character on line 3. This tells the Editor that you want to leave the text entry mode and enter the command mode which allows you to modify some of the lines you have already entered. Remember to press the Carriage return key. The screen should look like this:

   ```
   1:* This is a test letter
   2:* Editing is easy.
   3:* .
   ```

Example 1

Let's change the word letter in the first line to the word message.

1. Enter the number (1). This tells the Editor that you want to display line 1 on the screen. The screen should now look like this:

```
*1
    1:*This is a test letter.
```

   The first line is your request to edit line 1, followed by the display response.

2. Move the cursor (the blinking underline, or the block cursor) by pressing the ---> key until the cursor is located on top of the letter (1).

3. Press the DEL key until the word letter has been deleted, and then type the word message. The screen now looks like this:

```
*1
    1:* This is a test message.
```

   Press Carriage return to return to the Editor prompt.

If you want an overview of all the commands in the Editor, try to enter a question mark (?). The Editor then displays a complete Help screen so that you have a quick reference to the commands at any time.

Example 2

Let's continue entering text into our file.

1. To enter text after line number 2, use the Append command. Enter the number (2) followed by letter (A) to indicate that we want to append text after line 2. The entry and the screen looks like this:

```
*2A
    3*_
```

2. Type Now is the time for all good med on line 3 and press Carriage return.

3. Leave the text entry mode again by entering a period (.) as the first and only character on line 4. Remember to press the Carriage return key. The screen should look like this:

```
*2A
     3:* Now is the time for all good men
     4:* .
*_
```

Example 3

Now let's view what we have written until now.

1. To list the message, simply enter the letter (L). The screen looks like this:

```
*L
     1:  This is a test message.
     2:  Editing is easy.
     3:* Now is the time for all good men
*_
```

Example 4

Now we will delete line number 2.

1. Enter the number (2) followed by (D) to delete line number 2.
   The screen looks like this:

```
*2D
*_
```

2. To view the corrected text, use the List command. Enter the letter (L).
   The screen now looks like this:

```
*L
    1:  This is a test message.
    2:* Now is the time for all good men
*_
```

To stop the Screen Editor

You have now completed the examples. To close the text memory and leave the Editor:

1. Enter the letter (E)

This tells the Editor to close the file and return to the Standby condition.

3.5.3. DIR - FINDING OUT WHAT IS IN THE MEMORY

It is often handy to find out what files are in the text memory. The Directory command (DIR) displays a list of all the files in the text memory. Let us see how you might use it.

1. Type:

   DIR

   and press the carriage return key.

2. Watch the screen.

   The screen displays the name(s) of all the files in the text memory. You might only have one file, the MESSAGE file you have just entered.

   The last line displays the amount of memory left in the text memory for further messages.

3.5.4. LIST - DISPLAYING A MESSAGE ON THE SCREEN

The LIST command lets you "look into" a file; that is, it displays the contents of a file on the screen. You only need to know the name of the file.

1. Type:

   LIST MESSAGE

   and press the carriage return key.

2. The name and contents of MESSAGE will be displayed.

3.5.5. PRINT - PRINTING A MESSAGE ON THE PRINTER

The PRINT command lets you print the contents of a file on a hardcopy printer like OKI Printer H1252.

1. Make sure the printer is turned on, is on-line, and has paper in it.

2. Type:

   PRINT MESSAGE

   and press the carriage return key.

3. The contents of MESSAGE will be printed.

3.5.6. ERA - REMOVING A MESSAGE FROM THE MEMORY

When a message has been transmitted, and you no longer need it, you may remove it from the text memory. The Erase command (ERA) does this for you.

Removing old files makes room for new messages in the text memory.

After a file is erased, the text in the file is gone. You should therefore check your typing when using the Erase command.

Let us erase the file containing the message we have already created.

1. Type:

   ERA MESSAGE

   and check your typing. Now press the carriage return key.
   MESSAGE has now been removed from the text memory.

2. To assure that the file has been erased, try the DIR command again like this:

   DIR MESSAGE

   and press the carriage return key.

3. The modem displays the following message:

   Not found

   You may notice that the number of remaining (free) lines now have increased, so that you have more room for new messages.

3.6. ESTABLISHING A RADIOTELEX CONNECTION

To initiate the transmission of a call or phasing signals, enter any of the following commands:

1. ARQ nnnn — Start an ARQ call to a station with call code nnnn. Transmission of the call sequence continues until response is received from the called station, or until a maximum call time of 58 seconds has been reached.

2. CALL nnnn — Start an ARQ call to station nnnn, but wait until the channel is free. This form of call can only be used with stations transmitting "Free" signals on idle channels.

3. FEC — Start a collective FEC phasing sequence. Your transmitter sends a number of phasing tones to permit synchronisation at the receiving stations.

4. FEC nnnn — Start a selective FEC phasing sequence. This is similar to the collective call, but after the phasing sequence has been transmitted, the modem inverts the Mark/Space tones and sends out a selective call code. Only those receiving stations that has the correct call code will retain synchronisation with your transmitted signals.

Before any message can be sent, you have to wait until the connection has been established, or in the case of FEC until the complete phasing sequence has been transmitted. When the system is ready for message transmission it will display a message "df" to indicate that you are connected with the other station.

3.7. TRANSMITTING MESSAGES

A message that has been stored in the text memory may be transmitted by a procedure very similar to the one used for manual transmission directly from your keyboard.
Let us review the steps involved in establishing an ARQ connection and let us then transmit a message stored in the text memory.

The first step is to establish the radio connection with the other station. This also means that your modem and the modem at the other end has to synchronize with each other.

The next step is to exchange Answerback codes, so that you and the other party know each others identity.

You may then transmit the message which you have already stored in the text memory.

After you have sent what you want, you should always exchange Answerbacks again.

As a last step you should send an End-Of-Transmission sequence to the other station and then terminate the radio connection.

Let us look at the complete sequence.

1. Initiate the call sequence by entering

   ARQ 0832 (RETURN)

2. After a few seconds you will see the *"df"* message.

3. Press the Who-are-you key and receive the other stations Answerback.

4. Press the This-is key and send your own Answerback.

5. Your message can now be transmitted. Let us assume you have a file named MESSAGE that you want to transmit. Simply enter:

   JJJJC MESSAGE (RETURN)

   The JJJJC tells the modem that it should take the next word entered and try to find a file with that name. If found, the modem should then transmit the contents of that file.

   Watch the "Data out" indicator on the Front Panel of your modem H1240 or on your keyboard, if you use the Keyboard Processor H1249.

6. When the modem starts to transmit the message the "Data out" goes steadily on. This tells you that the modem transmits real traffic. When the message has been transmitted, the "Data out" indicator blinks to tell you that the modem has no more traffic to transmit, and therefore sends out what is known as idle characters. These are stripped off in the other end, and nothing appears on the other party's terminal.

7. Press the Who-are-you key and receive the other stations Answerback.

8. Press the This-is key and send your own Answerback.

9. Terminate the conversation by entering the command:

   JJJJC EOT (RETURN)

   which tells the modem to send an End-Of-Transmission sequence to the other station. After a few seconds the modem reverts to the Standby condition.

NOTE

Some modems intended for Crypto operation are programmed to recognize the command word:

JJJJ:

instead of the JJJJC word. If your modem does not do what you want it to do, try to use JJJJ: in the examples above.

Example 1

As an example let us assume we make an ARQ call to the Danish Coast Radio Station, Lyngby Radio. Let us also assume that the transmitter and receiver are tuned to the correct frequencies and ready.

Lyngby Radio has the call code 0832.

1. Type this:

   ARQ 0832

   and press the carriage return key.

2. The modem immediately starts the transmitter and sends out a calling sequence. The modem displays the following message:

   ARQ call dd.mm.yy (hh:mm)

   where the date and time stamp will be displayed and printed.

2. If connection is established with the coast radio station within one minute, the modem will display:

   df

   This short message is a common telex service message which indicates that you are connected to the other party.

3. Press the Who-are-you key to receive the Answerback of the coast radio station.

4. Press the This-is key to identify yourself to the coast radio station.

5. You can now transmit your message by typing directly on your keyboard, or you can send the contents of a file you have stored in the text memory.

6. To change the direction of traffic, type this:

   +?

   When this sequence is transmitted, the direction will automatically be changed and you can receive a message the other party may want to send to you.

7. To change the direction back to you (so you can transmit again), the other party must send you the (+?) sequence. You can, however, at any time force a change in direction by pressing the OVER softkey on your H1249 Keyboard Processor.

On ASCII terminals, the ($) key is used as the Who-are-you key, and the ( ) key used as the Here-is key.

EXAMPLE 2

A message can be transmitted directly from the keyboard. Let us transmit a common test message, known to contain all the letters in the English alphabet. Let us transmit the message in Forward-Error-Correction (FEC).

1. Type:

   FEC

   and press the carriage return key.

2. The modem starts transmitting the phasing sequence and displays the message:

   Collective FEC call dd.mm.yy (hh.mm)

   and after a few seconds:

   df

3. Press the carriage return key, and enter the message:

   THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 0123456789 (RETURN)

NOTE

You may notice, that you immediately see on the screen what you key in, but that printing on the OKI Printer H1252 is delayed. In fact, printing is carried out as the characters are actually sent out, so you always know what you have sent is transmitted.

When you want to terminate the transmission, press the (break) key on the front panel of H1240 or press the Soft-key labelled END if you have the Keyboard Processor H1249.

The modem will transmit an ending sequence and revert to the Standby condition.

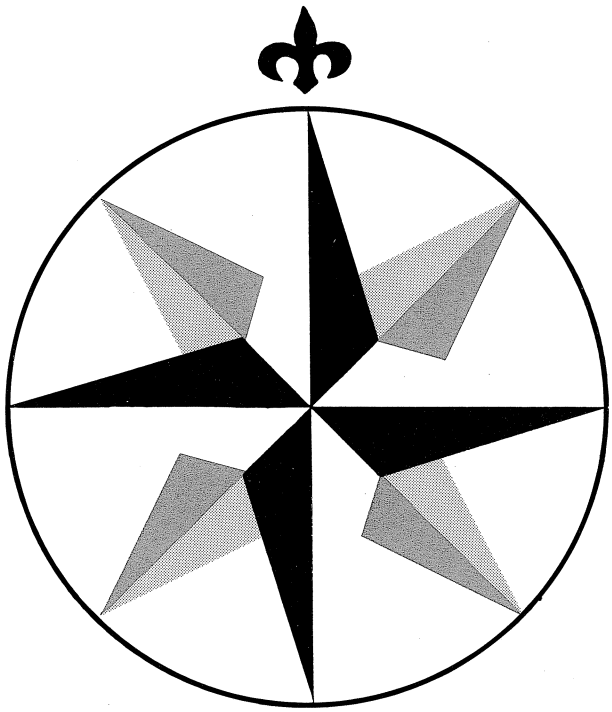
Try to send a few messages in FEC mode to get the feel of the Radiotelex Modem. The transmitter should of course operate into a dummy load. If you have the chance to listen to the transmitted signals you hear the characteristic two-tone signals with a speed of 100 tones per second.

3.8. HELPS AND HINTS

We are ending this chapter with a few hints - maybe they will save you some trouble or help you as you use your Radiotelex Modem H1240.

Sometimes, commands do not work as you expected because a command or a filename was typed incorrectly.

- What mode are you in, Standby, Editor or are you communicating?
- Check your typing including any spaces between words.
- Has the filename been spelled correctly?
- Check the directory of the text memory if you cannot find the file you are looking for.
- If a commend still does not work, refer to the System Operation Manual that fully describes the command.



Sailor

Sailor

INTEGRATED RADIOTELEX SYSTEM
SYSTEM OPERATION
REFERANCE MANUAL

A/S S. P. RADIO · AALBORG · DENMARK

TABLE OF CONTENTS

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SECTION 1

INTRODUCTION

SECTION 1

INTRODUCTION

1.1. INTRODUCTION

This Manual describes the Modem commands and tells how to use them for Radiotelex communication. It provides information on how to create, edit and transmit/receive telex messages.

Regardless of your background or previous radiotelex experience, you should read the "System Introduction and Overview Manual" before you read this Manual.

This Manual has seven main sections and three appendixes.

Section 1 presents information common to all commands and files.

Section 2 contains information about Local Operation of the modem, including directions on how to manage messages in the text memory.

Section 3 describes how to use the Text Editor (EDIT) to create, alter, and display files containing telex messages.

Section 4 contains detailed descriptions of all commands used for Telex Communication, including procedures for calling, exchange of Answerbacks, change of traffic direction and termination of the connection.

Section 5 describes how the Station Tables provides abbreviated dialling facilities, including information on frequency control of associated short-wave receivers and -transmitters.

Section 6 presents information on Automatic Control of receivers and transmitters, including frequency scanning.

Section 7 describes the advanced features of the modem.

Appendix A lists messages generated by the modem.

Appendix B contains detailed information on automatic telex operation.

Appendix C describes the technical details of MARITEX operation.

1.2. FILES AND FILENAMES

Messages are stored in the text memory as files, just as information in a book may be grouped into chapters.

Each file has a name - when you want the modem to find the file, you give the modem its name. It is therefore important that each file has a unique name.

You can have as many different files in the text memory as you want, provided there is space for them. The maximum room for files is close to 64,000 characters (32 A4-size pages of text).

A file's name is made up of a filename and an extension. Filenames are from one to eight characters long. The characters of a filename can be:

- The letters of the alphabet

- The numbers 0 through 9

- and these special characters,

( ) + -

A filename can be followed by an optional short name called an extension. An extension starts with a period, has one, two, or three characters, and follows immediately after the filename.

Here are some filenames with extensions:

WEATHER.87
MESSAGE.001
LETTER.URG

IMPORTANT

If a filename is followed by an extension, you must use both parts when telling the modem about that file.

1.2.1. BAD, OKAY, AND GOOD NAMES FOR FILES

The Modem likes names that follow the rules. These files have names that the modem will not accept:

Name	Why the Modem will not accept it
A AND B	Spaces in the name
A,B	Commas in it
ANDTHISONEISTOO.LONG	

These names are okay, but rather unusual:

```
()().XXX
-1-2-A3B
++.---
```

A good name for a file will help you remember what kind of message is in the file. Here are some more examples:

```
PAYROLL.08
LONDON
MYLETTER.LTR
BUNKER
```

1.2.2. THE ? CHARACTER

Sometimes you will want to do the same thing with several files - for example, listing the names of files that are somehow related.

A special global filename character lets you indicate a number of files with one specification. This character is the question mark (?). It is used in a filename and/or an extension to mean "any character".

Let us look at some examples to tell you about the global filename character. In these examples you need to know that the modem command DIR displays information about files that match the file specification you type.

The ? in a filename or extension means that any character can be in that position. So, all files that have a name that matches in all except the ? positions are selected. For example, suppose that these files are in the text memory.

```
TELEX.001
TELEX.002
MESSAGE
LOAD
TELEX.PRV
SAVE.002
```

If you enter:

```
DIR TELEX.???
```

then files number 1, 2, and 5 are listed on the screen.

For another example, suppose you give the command:

```
DIR ?????.00?
```

then files number 1, 2, and 6 are listed.

1.3. ENTERING COMMANDS

In short, to give the modem a command:

1. Type the command and any other parts the command requires, for example a filename.

   You can type in uppercase or lowercase letters (or a combination). Use a blank (Spacebar) to separate the parts of the command from each other.

2. Press the carriage return key when you have finished typing.

1.3.1. INFORMATION COMMON TO ALL COMMANDS

The following information applies to all commands:

- Commands are usually followed by one or more parameters.
- Commands and parameters may be entered in uppercase or lowercase, or a combination of both.
- Commands and parameters must be separated by delimiters (space, comma, or equal sign).
- The two parts of a filename must not be separated by delimiters. The (.) already serves as delimiter.
- In this manual we usually use a space as the delimiter in the commands for readability.
- Also, when we say "Press any key", we mean "Press any character key".
- Files are not required to have filename extensions when you create them or rename them; however, you must include the filename extension when referring to a file that has a filename extension.
- Command become effective only after you press the carriage return key.
- For commands producing a large amount of output, you can press the Line feed to suspend the display of the output. You can then press any other key to restart the display.

1.3.2. FORMAT NOTATION

We will use the following notation to indicate how the modem commands should be entered:

- You must enter any words shown in capital letters. These words are called keywords and must be entered exactly as shown. You can, however, enter keywords in any combination of uppercase and lowercase letters, the modem automatically converts keywords to uppercase.

- You must supply any item shown in lowercase letters. For example, you should enter the name of your file when the word "filename" is shown in the format.

- Items in square brackets ([ ]) are optional. If you want to include optional information, you should not type the brackets, only the information inside the brackets.

- Items separated by a bar ([|]) mean that you can enter one of the separated items. For example:

  ON | OFF

  means that you can enter ON or OFF, but not both.

- You must include all punctuation (except square brackets and vertical bars) such as commas, equal signs, question marks, colons, or slashes were shown.

1.4. AUTOSTART

You may want to start a specific set of commands every time you start the modem or return to the standby mode. You can do this by using Automatic Command Start.

Every time you start the modem or return to the Standby Condition after a radiotelex connection, the modem searches the text memory for a file named AUTOST.COM. This filename is special because it refers to a Command file that is automatically executed whenever your system goes to Standby.

If the modem finds the AUTOST.COM file, the file is immediately executed. The date and time prompt are bypassed.

If the modem does not find the AUTOST.COM file, it issues the date and time prompts whenever you start the modem. Refer to "Advanced features" in Section 7 for details on how to create an AUTOST.COM file.

SECTION 2

LOCAL OPERATION

SECTION 2

LOCAL OPERATION

2.1. INTRODUCTION

This section explains how to use the modem in Local operation. You can use Local operation to:

- Display, print, erase, and rename files containing telex messages or command sequences.
- Start the Text Editor for creating messages.
- Read and punch files from and to paper tape.
- Set or alter the internal clock.
- Set and check various options for external alarm and modem control.

2.2. ALARM COMMAND

A L A R M

C o m m a n d

A L A R M

C o m m a n d

Purpose: The external alarm output is activated when the Modem receives an incoming call.

Format: ALARM [ON | OFF]

Remarks: The ALARM condition is not affected by power-failure.

When the modem receives a call, the external alarm will be activated. To stop the alarm, you should press the Bell key on the front panel of H1240 or simply press any key on your keyboard. This stops the alarm, but it is still enabled, so the alarm will start again when the next call is received.

The external alarm can be activated, even if the condition has been set to the OFF state. If the sequence:

AAAA

is received, and you have not yet touched the keyboard (or the Bell key on the front panel) then the alarm will always start.

Example: This example causes the external alarm to be turned on:

ALARM ON (RETURN)

2.3. CLR (CLEAR) COMMAND

C L R (CLEAR) C o m m a n d

Purpose: Erase the complete contents of the text memory.

Format: CLR

Remarks: All files stored in the text memory will be erased. This command should therefore be used very carefully.

Notes:

1. The Modem issues the following message to verify that you actually want to erase all files:

   All files (Y/N)?

   If you do want to erase all of the files, enter Y. Otherwise enter any other key. Then press the carriage return key.

Example: In this example, alle files are erased:

```
CLR     (RETURN)

All files (Y/N)? Y
```

2.4. COPY (PRINTER) COMMAND

C O P Y (Printer) C O P Y (Printer)

C o m m a n d C o m m a n d

Purpose: Print all displayed output on the printer.

Format: COPY [ON | OFF]

Remarks: If you have a printer and want to print whatever you type and what the modem displays, use the COPY command. Now each time you press the carriage return key or the modem displays a line, the line will be echoed to the printer.

Although this allows the printer to act as a system log, it slows down some operations because the modem waits during printing.

COPY will automatically be disabled when you are called.

Example: In this example, we will turn the copying on:

COPY (RETURN)

2.5. DIR (DIRECTORY) COMMAND

D I R (Directory) D I R (Directory)

C o m m a n d C o m m a n d

Purpose: Lists either all the directory entries, or only those for specified files. The information provided in the display, for each file includes its attributes, if any, its size in lines, and the date the file was last used.

Format: DIR [filename [.ext]] [/W]

Remarks: The /W parameter produces a wide display of the directory, which lists only the filenames. Each line displayed contains four filenames.

You can use the global character ? in the filename or extension parameters. The extension may be omitted, in which case the name supplied will match any extension.

The DIR command has two format options (the /W parameter may be used with either option):

Option 1

Use this option to list all the files in the directory. For example:

DIR (RETURN)

will list all directory entries in the text memory. The directory listing might look like this:

Message directory

```
MYLETTER.001   P    16  29.6.84 (17:36)
MESSAGE        C    56  29.6.84 (11:03)
MESSAGE.027         23  28.6.84 (19:23)
SAVE-003       R    29  28.6.84 (23:56)

  741 lines free
```

The special attributes can be (P), indicating a private file, file or (R) indicating a received message, protected against unauthorized access.

Option 2

Use this option to list selected files from the directory. For example:

DIR filename.ext

If the (.ext) is omitted, a ??? is assumed.

Using the previous example, if you enter:

DIR MESSAGE (RETURN)

the screen might look like this:

Message directory

```
MESSAGE          56   29.6.84 (11:03)
MESSAGE.027      23   28.6.84 (19:23)

  741 lines free
```

2.6. DE (THIS-IS) COMMAND

D E (This-is) Command

D E (This-is) Command

Purpose: Displays the Answerback of the Modem

Format: DE

Remarks: The Answerback will be displayed as it appears at the other end of a radiotelex connection.

Example: In this example, the Answerback is "12345 abcdefg x"

DE (RETURN)

12345 abcdefg x

2.7. ERA (ERASE) COMMAND

E R A S E (or E R A)

C o m m a n d

E R A S E (or E R A)

C o m m a n d

Purpose: Deletes the file with the specified filename from the text memory.

Format: ERASE filename

or

ERA filename

Remarks: You can use the global character ? in the filename and extension. Global characters should be used with caution, however, because multiple files can be erased with a single command.

Notes:

1. Files with the (R) or (P) attribute cannot be erased. For more information about attributes, refer to the STAT command.

Example: The command:

ERASE MESSAGE (RETURN)

will erase the file MESSAGE from the text memory.

2.8. FECRX (BROADCAST RECEIVE) COMMAND

F E C R X (Broadcast receive) F E C R X (Broadcast receive)

C o m m a n d C o m m a n d

Purpose: Enable reception of messages in Forward Error Correction (FEC) and Selective Forward Error Correction (SELFEC). This is also known as Broadcast messages.

This command is normally set to the ON condition to enable reception of broadcast messages (Press news, weather forecasts, etc.).

Format: FECRX [ON | OFF]

Remarks: FEC messages are transmitted by coastal radio station to permit several ships to receive the same message. Normally, the modem automatically detects incoming FEC phasing signals and adjusts the demodulator to receive and display the message.

If your station operates in an automatic mode, where the receiver scans several frequencies on a regular basis, automatic reception of all FEC messages can be a nuisance. You can therefore disable the modem's FEC reception capability.

Notes:

1. SELFEC reception can be of practical importance to you when you are not able to use your transmitter. You can then arrange with the coast radio station that they can transmit any message to you in Selective FEC.

Example: In this example, we will disable the modem's capability to receive FEC and SELFEC:

FECRX OFF (RETURN)

2.9. LIST COMMAND

L I S T
C o m m a n d

L I S T
C o m m a n d

Purpose: Displays the contents of the specified file on the screen or on the teleprinter.

Format: LIST filename [.ext]

Remarks: The file will be displayed on the operator console.

Notes:

1. If information is appearing on the screen to fast for you to read, press the line-feed key.

   When you are ready to see some more information, press any key.

   If you press the Line-feed key, single lines are displayed, one at a time.

2. If a filename is followed by an extension, you must use both parts when you want to see the file.

3. If you want to stop the display completely, simple press any other key than the Line-feed key.

Example: To display the file MYLETTER.001 on the screen enter the command:

LIST MYLETTER.001 (RETURN)

2.10. PAS (PASSWORD) COMMAND

P A S (Password) Command

P A S (Password) Command

Purpose: Changes the password used for protecting files against unauthorized access, and for opening secretly received files.

Format: PAS newpas oldpas

Remarks: The password is not affected by Power-failure.

Passwords are from one to eight characters long. The characters of a password follow the same rules as filenames, so they can be any letter, any number or some of the special characters ( ) + -

In order to change the password you need to know the existing password, shown here as OLDPAS.

Any file that has been made secret with the old password, can be opened by using the new password.

Notes:

1. As shipped, the modem has been programmed with the password:

   SECRET

   The password can only be changed with the PAS command. If you cannot remember the password, you can restore it by a System Generation, see the "Installation and Configuration" Manual. However, the contents of the text memory will be lost.

Example: If this example, we will change the password from SECRET to MYPASSWD:

PAS MYPASSWD SECRET (RETURN)

2.11. PRINT (PRINTER) COMMAND

P R I N T (Printer) Command

P R I N T (Printer) Command

Purpose: Prints the contents of the specified file on the hard-copy printer while you are doing other tasks on the modem (if you are using buffered printing).

Format:

PRINT filename

or

PRINT

or

PRINT/T

Remarks: The file will be printed on the hard-copy printer, if available. Otherwise, the file will be printed on the Console.

If PRINT is entered with no parameters, PRINT displays the amount of characters currently in the PRINT buffer.

/T sets the terminate mode. All buffered characters are cancelled. If a message is currently being printed, the printing stops, a cancellation message is printed, and the paper is advanced to the next page.

Notes:

1. If the CLR (Clear all files) command is used, while the PRINT buffer is not empty, the CLR will not take effect.

2. If you are using the modem together with a teleprinter, the use of printer buffering means buffering of all output to the teleprinter. This has the effect, that you can use type-ahead (with blind entering of data) while the teleprinter is printing other messages.

2.11. PRINT (PRINTER) COMMAND

P R I N T (Printer) Command

Example: In this example, the file message is printed on the hard-copy printer:

PRINT message

The command:

PRINT

gives a status report of the PRINT buffer. The status could look like this:

2126 char's in PRINT buffer

If the buffer is empty, the following message will appear:

PRINT buffer is empty

The command:

PRINT/T

cancels the PRINT buffer. If the buffer was not empty, the following message will be displayed:

Printing terminated by operator

2.12. PUNCH (PAPER TAPE) COMMAND

P U N C H (Paper-tape) Command

P U N C H (Paper-tape) Command

Purpose: Punch the contents of the specified file on the Paper-tape puncher.

Format: PUNCH filename [.ext]

Remarks: The file is punched exactly as it is stored in the text memory. If the file was created using the Paper-tape READ command in Crypto mode, all characters are shown, including all the Shift characters (Letter-shift, Figure-shift).

The PUNCH command automatically inserts leading and trailing Letter-shift characters (all holes) on the tape.

Normally, you have to start your Paper-tape puncher manually, immediately after you have issued the PUNCH command.

Notes:

1. The Paper-tape puncher has to be installed between the Modem and your Console, and it must therefore operate on the same alphabet as your Console. However, Paper-tape punchers are available, that can operate in the ASCII code and punch Baudot tapes.

2. If the Paper-tape puncher is operating in ASCII code, the Modem issues special control characters that can be used to control the puncher. At the start of a PUNCH command, the Modem sends out a DC2 (Ctrl-R) control character to start the puncher, and after the file has been punched the modem sends out a DC4 (Ctrl-T) control character to stop the puncher.

Example: To punch the file MYLETTER.RTL on Paper-tape enter the command:

PUNCH MYLETTER.RTL (RETURN)

2.13. READ (PAPER TAPE) COMMAND

R E A D (Paper-tape) Command

R E A D (Paper-tape) Command

Purpose: Read the contents of a Paper-tape into a file in the text memory.

Format: READ filename [.ext] [/C]

Remarks: When the contents of the Paper-tape is stored in the text memory, all non-printable characters will be removed. This means, that all Letter-shift and all Figure-shift characters are removed. This has been done to enable you to edit the file after it has been stored. When the file is later printed or transmitted, the Modem re-inserts single shift characters at the correct places.

During the read operation, no characters will be echoed to the Console.

The Modem will output a Reader-start signal until all characters have been read. The read operation will terminate automatically of the first characters has not been received within 30 seconds and when no further characters have been received within 5 seconds.

If you specify /C then all characters on the Paper-tape will be stored in the text memory exactly as they appear on the tape. This will make it very difficult, or even impossible to edit what you have stored, but when you later transmit the contents of the file, an exact copy of your Paper-tape is transmitted. The /C parameter is mainly used for transmission of off-line encrypted messages.

2.13. READ (PAPER TAPE) COMMAND

R E A D (Paper-tape)

C o m m a n d

R E A D (Paper-tape)

C o m m a n d

Notes:

1. You should always use the READ command when you want to read Paper-tape messages into the text memory. Using the Line Editor to input data from Paper-tape will give unpredictable results with loss of characters.

2. The Paper-tape reader has to be installed between the Modem and your Console, and it must therefore operate on the same alphabet as your Console. However, Paper-tape readers are available, that can operate in the ASCII code and read Baudot tapes.

3. If the Paper-tape reader is operating in ASCII code, the Modem issues special control characters that can be used to control the reader. At the start of a READ command, the Modem sends out a DC1 (Ctrl-Q) control character to start the reader, and after the file has been read the modem sends out a DC3 (Ctrl-S) control character to stop the reader.

4. In Modems manufactured before 1984 you must write ",C" instead of "/C" when you want to read encrypted Paper-tape messages.

Example: In this example, a Paper-tape is stored in the text memory as a file with the name CRYPTO.001. We want the file to be an exact copy of the tape.

READ CRYPTO.001/C (RETURN)

2.14. REN (RENAME) COMMAND

R E N A M E (or R E N)

C o m m a n d

R E N A M E (or R E N)

C o m m a n d

Purpose: Changes the name of the file specified in the second parameter to the name and extension given in the first parameter.

Format: RENAME newname [.ext] oldname [.ext]

or

REN newname [.ext] oldname [.ext]

Remarks: You can use the global character ? when specifying the old filename.

Example: The command:

RENAME TELEX.001 MYTELEX (RETURN)

renames the file MYTELEX to TELEX.001

The command:

REN LONDON OSLO (RETURN)

renames the file OSLO to LONDON

2.15. SAVE (SAVE MESSAGES) COMMAND

S A V E (Save Messages) Command

S A V E (Save Messages) Command

Purpose: To save all incoming messages as files in the the text memory.

Format: SAVE [ON | OFF]

Remarks: The SAVE command is used to enable automatic saving of all incoming traffic in the text memory, provided the memory is not already full.

When your Modem receives traffic, it will automatically be saved in the text memory as a file with the name SAVE.xxx, where xxx is a three digit reference number, that is automatically incremented.

Incoming traffic will of course also be printed on your Hard-copy printer (see note 2).

The SAVE condition is not affected by Power-failure.

Notes:

1. Messages may be stored in your text memory, even when you have switched SAVE to the OFF condition. If you do not have a Paper-tape puncher then all traffic received between the sequences:

   CCCC

   and

   FFFF

   will be saved as a file SAVE.xxx.

2. If you have enabled operation with secret files, all traffic received between the sequences:

   QQQQ

   and

   FFFF

   will be saved in a secret file, even if you have an external Paper-tape punch device. No copy will appear on your printer.

Example: To enable automatic saving of all incoming messages, enter the command:

SAVE ON (RETURN)

2.16. SKIP (PRINTER) COMMAND

S K I P (Printer) Command

S K I P (Printer) Command

Purpose: Advances the paper on the Hard-copy printer.

Format: SKIP

Remarks: The paper will be advanced a number of lines to allow you to separate printed information.

Example: The command:

SKIP (RETURN)

prints a number of carriage returns.

2.17. STAT (STATUS REPORT) COMMAND

S T A T (Status Report) Command

S T A T (Status Report) Command

Purpose: Produces a memory and modem Status report, and sets the special attributes of files.

Format:

STAT

or

STAT/M

or

STAT/F

or

STAT filename[.ext] = [PUBLIC | PRIVATE]

Remarks: The STAT command has four format options:

Option 1 (Memory and modem status)

Use this option to get a full Status report on the memory and modem settings. For example:

STAT (RETURN)

may produce a report that looks like this:

Status report

869 lines total text memory
132 lines in 3 files
734 lines free
80 char's transmit buffer

Alarm is ON
Save is OFF
FECRX is ON

Track is ON
Frq. err. is 4 Hz, S/N is

The number of lines in files, plus the number of files, plus the number of free lines should equal the total number of lines in the text memory.

2.17. STAT (STATUS REPORT) COMMAND

S T A T (Status Report) Command

Option 2

STAT/M (RETURN)

is similar to STAT, except that only a memory Status report is produced. For example the display may look like this:

Status report

```
630 lines total text memory
321 lines in 12 files
297 lines free
18000 char's transmit buffer
```

Option 3

STAT/F (RETURN)

is similar to STAT, except that only the modem frequency status is displayed.

The command will continuously update and display the status until you press any key. For example, the status might look like this:

```
Track is ON
Frq. err. is   0 Hz, S/N is
Frq. err. is  -2 Hz, S/N is
Frq. err. is  -4 Hz, S/N is
Frq. err. is  -4 Hz, S/N is
Frq. err. is  -6 Hz, S/N is
```

Option 4

The attributes of a file can be changed, using the STAT command. You can protect a file against unauthorized access by others. This is called a Private file.

You can also open a protected file for public access. This could be a file you had previously made Private or it could be a file that had been secretly received.

In order to change the attributes of a file, you must know the modem's Password.

As an example, to protect the file MESSAGE, enter:

STAT MESSAGE = PRIVATE (RETURN)

The modem will respond:

Enter password: _

You now have to enter the secret Password stored in the modem. When you enter the Password, it will not be shown on the display. If correct, the file will be made Private.

To open the same file for public access, enter:

STAT MESSAGE = PUBLIC (RETURN)

The modem will respond with the message:

Enter password: _

Again, you have to enter the correct password.

Notes:

1. A protected file stored in your text memory, will be displayed in a directory search, but you cannot list, print, erase, or edit the file.

2. The CLR command will clear the complete text memory, including protected files.

2.18. TEST COMMAND

T E S T — T E S T

C o m m a n d — C o m m a n d

Purpose: Internal test of the modem and its electrical circuits.

Format: TEST (RETURN)

Remarks: Please refer to the "Installation and Configuration" Manual for details on this command.

2.19. TIME COMMAND

T I M E T I M E

C o m m a n d C o m m a n d

Purpose: Permits you to enter or change the time known to the system. Whenever you create or use a file, the time is recorded in the directory. Every incoming call is time-stamped, and you can transmit the time for reference purposes.

Format: TIME [dd.mm.yy (hh:mm)]

Remarks: If you enter a valid date and time with the TIME command, the system responds:

Strike a key to set time_

This tells you, that the date and time has been accepted, but the clock is not yet running. Press any key to start the clock.

If you enter the TIME command without parameters, the system will display:

dd.mm.yy (hh:mm)

where:

dd - is a one- or two-digit number from 1 to 31 (representing day of the month)
mm - is a one- or two-digit number from 1 to 12 (representing month)
yy - is a two-digit number from 00 to 99 (representing year, 19- is assumed)
hh - is a one- or two-digit number from 0 to 23 (representing hours)
mm - is a two-digit number from 00 to 59 (representing minutes)

Notes:

1. When you enter a new time, be sure you use exactly the format shown, otherwise you receive an "Invalid date" message.
2. The clock will reset on Power failure.

Example: In this example, you want to set the date and time to 19.7.85 (12:46)

TIME 19.7.85 (12:46) (RETURN)

The system responds:

*Strike a key to set time*_

Press any key, and the clock starts.

2.20. TRACK (MODEM) COMMAND

T R A C K (Modem) T R A C K (Modem)

C o m m a n d C o m m a n d

Purpose: To enable the modem receive filters to track the incoming telex signals in frequency.

Format: TRACK [ON | OFF]

Remarks: The modem receive filters will automatically track the incoming signals with +/-65 Hz. This tracking is carried out by an advanced algorithm in the modem, and you should not try to confuse the system by readjusting the clarifier control on the receiver during a connection, unless the Track indicator on your front panel (H1240) or on your keyboard (H1249) extinguishes.

The condition of this command is not affected by Power failure.

Notes:

1. After having established a connection, it takes a few seconds for the modem to collect the information needed for proper tracking. You can check that on the Track-indicator.

2. During very unfavourable conditions, the modem may loose track of the signals, in which case the Track indicator extinguishes. You should not readjust the receiver.

Example: To enable tracking, enter:

TRACK (RETURN)

or

TRACK ON (RETURN)

2.21. USE (DEVICE) COMMAND

U S E (Device) Command

U S E (Device) Command

Purpose: Causes printer output to be routed to a printer.
Switches the ARQ AF-line input between two receivers (ex. R1121 or R1119/20) or selects the mode (Telex, SSB) of R1121 receiver.

Format: USE LPT1

USE RX1

or just

USE

Remarks: All printer output will be sent to printer where:

Either 1, 2, 3, or 4 (Printer No.)

On power-up, the modem automatically sets the printer to 1 and the RX to 1. The printer must exist, or an error message will be displayed.

If USE is entered with no parameters, USE displays the devices selected.

Notes:

1. The USE command can only be used with printers connected to the T-BUS. For all other types of printers, the printer will be set to 1 by the modem.

2. Every time the USE command is used, an automatic test of the printer takes place. In case an error is discovered, the following error message will be displayed:

   Errors on printer indicate that it may be off-line. Please check it.

3. RX1 is R1121 in telex mode.
   RX2 is R1121 in SSB mode.
   RX3 is external receiver, ex. R1119/20.

Example: In this example, all printer output is directed to printer number 2.

USE LPT2

In this example the ARQ AF-line is connected to Receiver 3.

USE RX3

The command:

USE

gives a status of the printer used. The status could look like this:

printer is LPT2
receiver is RX3
transmitter is TX1

SECTION 3

THE SCREEN EDITOR

SECTION 3

THE SCREEN EDITOR

3.1. INTRODUCTION

In this section, you will learn how to use the Screen Editor.

NOTE

This Screen Editor can only be used together with the H1249 Keyboard Processor. If you are using another CRT terminal or a teleprinter, you will automatically be restricted to the use of the Line Editor.

If you are using the H1249 Keyboard Processor and want to use the Line Editor, you should use the command word EDLIN when starting the editor.

You can use the Editor to create, change and display text files. In short, you can use the Editor to,

- Create new text files
- Update existing text files
- Delete, edit, insert and display lines
- Search for, or delete text within one or more lines

The text files created by the Editor is divided into lines of varying length, up to 69 characters per line.

Line numbers are generated and displayed by the Editor during the editing process, but are not actually present in the saved file.

When you insert numbers, all line numbers following the inserted text advance automatically by the number of lines inserted. When you delete lines, all line numbers following the deleted text decrease automatically by the number of lines deleted. Consequently, line numbers always go consecutively from 1 through the last line number.

3.2. HOW TO START THE EDITOR

To start the Editor, enter:

```
EDIT filename
```

3.2.1. EDITING AN EXISTING FILE

If the specified file already exist, the following status is displayed:

```
Editing filename
```

where (filename) is the same of the specified file. The Editor informs you about the number of remaining, free lines in the text memory and displays the first 16 lines of text in the file.

You can then edit the file.

3.2.2. EDITING A NEW FILE

If the specified file does not exist in the text memory, a new file is created with the specified name. The following status is displayed:

Editing new file filename

where (filename) is the name of the specified file. The Editor also informs you about the number of remaining, free lines in the text memory.

You can now create a new file by entering the desired lines of text. To begin entering text you must use the Append (A) command or the Insert (I) command to insert lines.

When you have completed the editing session, you can save the updated or new file by using the End Edit command. The End Edit command is discussed in this chapter in the next section called "The Editor Commands".

3.3. THE EDITOR COMMAND PARAMETERS

PARAMETER DEFINITION

line — Denotes when you must specify a line number.

There are two possible entries that you can make using this parameter.

1. Enter a decimal integer from 1 to 999. If you specify a number greater than the number of lines in the text file, the last line will be selected.

   Line numbers must be separated from each other by a comma or space.

   OR

2. Enter a period (.) to specify the current line.

   The current line indicates the location of the last change to the file, but it is not necessarily the last line displayed. The current line is marked by an asterisk (*) between the line number and the first character of text in the line. For example:

   10: FIRST CHARACTER OF TEXT

text — Denotes when you must enter one or more characters to represent the text to be found.

You only use this parameter with the Search text command.

tab Denotes when you must specify the tab setting. Enter a decimal integer from 2 to 68. The tab is expanded in columns of (tab) characters.

3.4. THE EDITOR COMMANDS

This section describes the Editor commands and tells how to use them. The commands are in alphabetical order; each one with its purpose, format and remarks. Examples are provided where appropriate.

3.4.1. INFORMATION COMMON TO ALL EDITOR COMMANDS

- With the exception of the Edit Line command, all commands are single letter.
- With the exception of the End Edit, Free lines and Help commands, commands are usually preceded and/or followed by parameters.
- You should separate commands with delimiters for readibility. However, a delimiter is only required between two adjacent line numbers. Remember, delimiters are spaces or commas.
- Commands become effective only after you press the (RETURN) key.
- For commands producing a large amount of output, you can press the Line feed to suspend the display of the output. Press any other key to restart the display.
- The prompt from the Editor is an asterisk (*).
- It is possible to refer to line numbers relative to the current line. Use a Minus sign (-) and a number to indicate a line before the current line. Use a plus sign (+) and a number to indicate a line after the current line. For example:

  -10,+10L

  This command displays 10 lines before the current line, the current line, and 10 lines after the current line.

3.4.2. HOW TO MAKE CORRECTIONS ON THE CURRENT LINE

If you have not yet pressed (RETURN), you can correct typing mistakes on the current line, using a number of special keys on your keyboard.

As you type things on your keyboard, you will notice a blinking underline or a box appearing just to the right of the last character you typed. This line or box is called the cursor. It marks the next position at which a character is to be typed, inserted or deleted.

SPECIAL EDITOR KEYS

You use the cursor keys on the right keypad, the Backspace key and the Roll Up and the Roll Down keys to move the cursor to a location on the line, insert characters, or delete characters. The keys and their functions are listed below:

<---- Moves the cursor one position left. The cursor cannot be advanced beyond the first character in the line.

----> Moves the cursor one position right. The cursor cannot be advanced beyond the last character in the line.

ROLL UP Moves the cursor to the beginning of the current line. Characters typed from this position are added to the beginning of the line.

ROLL DOWN Moves the cursor to the end of the line. Characters typed from this position are added to the end of the line.

|<---- Backspace. Same function as the <---- Cursor Left Key.

---->| Pressing the Tab key inserts blanks from the current cursor position to the next tab stop. Tab stops can be programmed to occur every (tab) characters, where (tab) is a decimal integer in the range from 2 to 68.

DEL Deletes the character at the current cursor position. All characters to the right of the deleted character move one position left to fill in the empty space.

ADDING CHARACTERS

If you see that you have omitted characters in the line you are typing, move the cursor to the position where you want to put the new characters, and simply type the characters you want to add. The characters will be inserted at the cursor and the characters above and following it will be pushed to the right. Then you can move the cursor back to the end using the Cursor Right or the Roll Down key, and continue typing.

ERASING CHARACTERS

If you notice you have typed wrong characters in the line you are typing, you can erase (delete) them using the Del key. Use the Cursor Left key to move the cursor to the character you want to erase. Press the Del key, and it is deleted. Then use the Cursor Right or Roll Down key to move the cursor back to the end of the line, and continue typing.

CHANGING CHARACTERS

If you are typing a line and discover you typed something incorrectly, you can correct it. Use the Cursor Left or the Backspace key to move the cursor to the position where the mistake occurred, press the Del key to delete the incorrect text, and type the correct letters. As before, when you are ready to continue typing at the end of the line, use the Cursor Right or the Roll Down key to move the cursor there, and just continue typing.

3.5.1. APPEND LINES COMMAND

A P P E N D L I N E S A P P E N D L I N E S

C o m m a n d C o m m a n d

Purpose: Enter lines of text immediately after the specified line. When you create a new file, you must enter the Append Lines command (or the Insert Lines command) before text can be entered into the file.

Format: [line] A

Remarks: If you do not specify a line, or you specify line as a period (.), the text entry is made immediately after the current line.

If the line number you specify is greater than the highest existing line number, the text entry is made after the last line in the file.

The Editor displays the appropriate line number so that you can enter more lines, ending each line by pressing (RETURN). During the text entry, successive line numbers appear automatically each time (RETURN) is pressed.

You must type a period (.) as the first and only character on a line to leave the text entry mode.

The last entered line becomes the current line. The current line and any remaining lines are renumbered.

Example: Assume you want to edit the following text file. Line 2 is the current line:

```
1:  This is a sample file
2:* used to demonstrate
3:  line entry
4:  and dynamic
5:  line number generation
```

If you want to append text after line 3, the entry and immediate response look like this:

```
*3 A
        4:*_
```

Now if you only want to insert two new lines of text, enter:

```
*3 A
        4: *First new line of text
        5: *Second line of text
        6: *.
```

```
*_
```

Observe the single period (.), used on line 6 to end the text entry mode. Remember, that also this last line must end with a (RETURN).

The original lines 4 and 5 are now renumbered to lines 6 and 7.

If you display the file with a List Lines command, the file looks like this:

```
1:  This is a sample file
2:  used to demonstrate
3:  line entry
4:  First new line of text
5:* Second line of text
6:  and dynamic
7:  line number generation
```

Observe that the last entered line becomes the current line.

3.5.2. DELETE LINES COMMAND

Purpose: Deletes a specified range of lines.

Format: [line] [,line] D

Remarks: The line following the deleted range becomes the current line. If the deleted range includes the last line in the file, the last line becomes the current line. The current line and any following lines are renumbered.

Default values are supplied if either one, two or all three parameters are omitted.

If you omit the first parameter, as in:

,line D

deletion starts with the current line and ends with the line specified by the second parameter. The beginning comma is required to indicate the omitted first parameter.

If you omit the second parameter, as in:

line D

or

line, D

only the one specified line is deleted. If you omit both parameters, as in:

D

only the current line is deleted, and the line that follows becomes the current line.

Example: Assume that you want to edit the following file. The current line is line 29.

```
 1:  This is a sample file
 2:  used to demonstrate
 3:  line deletion
 4:  and dynamic
 5:  line number generation
 .
 .
 .
25:  See what happens
```

DELETE LINES Command

```
26:  to the lines
27:  and lines numbers
28:  when lines are
29:* deleted
```

If you want to delete a range of lines, from 5 to 25, enter:

5,25 D

The result is:

```
1:  This is a sample file
2:  used to demonstrate
3:  line deletion
4:  and dynamic
5:* to the lines
6:  and line numbers
7:  when lines are
8:  deleted
```

Lines 5 to 25 are deleted from the file. Lines 26 to 29 are renumbered to 5 to 8. Line 5 becomes the current line

If you want to delete the current and the following line, enter:

,6 D

The result is:

```
1:  This is a sample file
2:  used to demonstrate
3:  line deletion
4:  and dynamic
5:* when lines are
6:  deleted
```

Lines 5 and 6 are deleted from the file. Lines 7 and 8 are renumbered to 5 and 6. Line 5 is still the current line, but has now has a different text.

If you want to delete a single line, say line 2, enter:

2 D

The result is

```
1:  This is a sample file
2:* line deletion
3:  and dynamic
4:  when lines are
5:  deleted
```

Line 2 is deleted. Lines 3 to 6 are renumbered 2 to 5. The new line 2 becomes the current line.

If you want to delete only the current line, enter:

D

The result is:

```
1:  This is a sample file
2:* and dynamic
3:  when lines are
4:  deleted
```

The current line, line 2, is deleted. Lines 3 to 5 are renumbered 2 to 4. The new line 2 becomes the current line.

3.5.3. EDIT LINE COMMAND

E D I T L I N E E D I T L I N E

C o m m a n d C o m m a n d

Purpose: Allows you to edit a line of text. You must enter the line number of the line to be edited, or enter a period (.) to indicate the current line.

Format: [line]

Remarks: If you just press (RETURN), you specify that the line after the current line is to be edited.

The line number and its text are displayed and the cursor is placed on top of the first character on the line.

You can use the editing keys, described in the section "How to make corrections on the current line", to edit the line.

When you press (RETURN), the edited line is placed in the file and becomes the current line. You do not have to be at the end of the line when you press (RETURN), the line is saved exactly as it appears on the screen.

Example: Assume that you want to edit line 6. The following display would appear on the screen:

```
*6
      6:* This is a sample unedited file
```

The first line is your request to edit line 6, followed by the display response.

If you want to move the cursor to the letter (u), press the → key until the cursor is located on top of the letter. The result is:

```
*6
          6:* This is a sample unedited file
```

If you want to delete the next two characters, press the Del key twice. The result is:

```
*6
          6:* This is a sample edited file
```

Now you can press (RETURN) to save the changed line.

3.5.4. END EDIT COMMAND

E N D E D I T E N D E D I T

C o m m a n d C o m m a n d

Purpose: Ends the Editor and saves the file in the text memory.

Format: E

Remarks: The edited file is saved in the text memory with the name specified when you started the Editor.

3.5.5. FREE LINES COMMAND

F R E E L I N E S F R E E L I N E S

C o m m a n d C o m m a n d

Purpose: Displays the remaining, unused lines in the text memory.

Format: F

Remarks: The free lines in the text memory can be used to enter text in the present or other files.

The command is used to determine how many lines of text you have left.

If you are entering text into the file, and there is no more lines left in the text memory, you will always get a warning message.

3.5.6. INSERT LINES COMMAND

Purpose: Insert lines of text immediately before the specified line. When you create a new file, you must enter the Insert Lines command (or the Append Lines command) before text can be entered into the file.

Format: [line] I

Remarks: If you do not specify a line, or you specify line as a period (.), the insert is made immediately before the current line.

If the line number you specify is greater than the highest existing line number, the text entry is made before the last line in the file.

The Editor displays the appropriate line number so that you can enter more lines, ending each line by pressing (RETURN). During the text entry, successive line numbers appear automatically each time (RETURN) is pressed.

You must type a period (.) as the first and only character on a line to leave the text entry mode.

The last entered line becomes the current line. The current line and any remaining lines are renumbered.

Example: Assume you want to edit the following text file. Line 3 is the current line:

1: This is a sample file
2: used to demonstrate
3: * *line entry*
4: and dynamic
5: line number generation

If you want to append text before line 4, the entry and immediate response look like this:

```
*4 I
          4:* _
```

Now if you only want to insert two new lines of text, enter:

```
*4 I
          4:* First new line of text
          5:* Second line of text
          6:* .
*_
```

Observe the single period (.), used on line 6 to end the text entry mode. Remember, that also this last line must end with a (RETURN).

The original lines 4 and 5 are now renumbered to lines 6 and 7.

If you display the file with a List Lines command, the file looks like this:

```
1:  This is a sample file
2:  used to demonstrate
3:  line entry
4:  First new line of text
5:* Second line of text
6:  and dynamic
7:  line number generation
```

Observe that the last entered line becomes the current line.

3.5.7. LIST LINES COMMAND

L I S T L I N E S L I S T L I N E S

C o m m a n d C o m m a n d

Purpose: Displays a specified range of lines.

Format: [line] [,line] L

Remarks: Depending on the form of the command, the current line will be changed.

Default values are provided if either one or both of the parameters are omitted.

If both parameters are present, the display starts with the first specified line, and end with the second specified line. The first specified line becomes the current line.

If you omit the first parameter, as in

,line L

a total of 18 lines are displayed, ending with the specified line. The last line displayed becomes the current line. The beginning comma is required to indicate the omitted first parameter.

If you omit the second parameter, as in:

line L

or

line, L

a total of 18 lines are displayed, starting with the specified line which becomes the current line.

If you omit both parameters, as in:

L

a total of 18 lines are displayed - the 8 lines before the current line, the current line, and the 9 lines after the current line. If there are not 8 lines before the current line, the extra lines after the current line are displayed to make a total of 18 lines. The current line is not changed.

Example: Assume that you want to edit the following file. Line 15 is the current line.

```
 1:  This is a sample file
 2:  used to demonstrate
 3:  line deletion
 4:  and dynamic
 5:  line number generation
 .
 .
 .
15:* This is the current line
 .
 .
 .
18:  See what happens
19:  to the lines
20:  and line numbers
21:  when lines are
22:  deleted.
```

If you want to display a range of lines from 5 to 18, enter:

5,18 L

The screen looks like this:

```
 5:* line number generation
 .
 .
 .
15:  This is the current line
 .
 .
 .
18:  See what happens
```

If you want to display 18 lines of the file, starting with line 3, enter:

3 L

The screen looks like this:

```
 3:* line deletion
 4:  and dynamic
 5:  line number generation
 .
 .
 .
```

```
15:  This is the current line
 .
 .
 .
18:  See what happens
19:  to the lines
20:  and line numbers
```

If you want to display lines ending with line 5, enter:

```
,5 L
```

The screen looks like this:

```
 1:  This is a sample file
 2:  used to demonstrate
 3:  line deleteion
 4:  and dynamic
 5:* line number generation
```

If you want to display 18 lines centered around the current line, enter:

```
L
```

The display looks like this:

```
 1:  This is a sample file
 2:  used to demonstrate
 3:  line deletion
 4:  and dynamic
 5:* line number generation
 .
 .
 .
15:  This is the current line
 .
 .
 .
18:  See what happens
```

3.5.8. MERGE TEXT COMMAND

M E R G E T E X T M E R G E T E X T

C o m m a n d C o m m a n d

Purpose: Merges (transfers) the contents of a specified file into the file currently being edited.

Format: [line] M filename

Remarks: The filename contents will be inserted after the specified line in the file. If (line) is omitted then the current line is used.

3.5.9. SEARCH TEXT COMMAND

S E A R C H T E X T S E A R C H T E X T

C o m m a n d C o m m a n d

Purpose: Searches a specified range of lines in order to locate a specified text string.

Format: [line] /[text]/

Remarks: The first line to contain the specified string is displayed together with a prompt (O.K.?). If you enter (Y) or press (RETURN), the line that matches the specified string becomes the current line. Enter any other key to continue the search until another string is found, or until all lines after the specified line have been searched. Once all lines have been searched, a "Not found" message is displayed.

If you omit the first parameter, the line after the current line becomes the first line to search.

If you do not enter any string, the command will use the last search string that was entered on a Search Text Command.

Examples: Assume that you want to edit the following file. Line 4 is the current line.

```
1:  This is a sample file
2:  used to demonstrate
3:  the Search Text command
4:* This includes the
5:  required string
6:  parameter
```

If you want to search for the first occurrence of (the) in the file, enter:

```
1 /the/
```

The result is:

```
                3:  the Search Text command
O.K.?             N
                4:  This includes the
O.K.?             Y
*_
```

Notice that we did not accept the first occurrence of the word (the). Therefore we pressed (N) to continue the search. After pressing (Y) line number 4 becomes the current line.

3.5.10. SET TABS COMMAND

S E T T A B S

C o m m a n d

S E T T A B S

C o m m a n d

Purpose: To set and view the tab settings.

Format: T [tab]

Remarks: The tab stops are expanded in columns, of (tab) characters. The tab setting is stored permanently in the modem, so you do not have to reenter the setting every time you use the Editor.

To view the current setting of the tab stops, use the command without parameters.

Example: To set the tab stop to every 8 column, starting with column 1, 9, 17, etc., enter

T 8

3.6. SUMMARY OF THE EDITOR COMMANDS

The following chart is provided for quick reference.

Command	Format
Append Lines	[line] A
Delete Lines	[line] [,line] D
Edit Lines	[line]
End Insert	
End Editor	E
Free Lines	F
Insert Lines	[line] I
List Lines	[line] [,line] L
Merge Text	[line] M filename
Search Text	[line] /[text]/
Set Tabs	T [tab]
View CR, LF's	G
Help	?

Note: The Command "View CR,LF's" is used to view the end of lines when using the Editor (by showing a ⟨). The command toggles the function, i.e. switches the function ON and OFF every time the command is used.

SECTION 4

TRANSMITTING AND RECEIVING

SECTION 4

TRANSMITTING AND RECEIVING

4.1. INTRODUCTION

This section explains how to use the Modem for communication in the standard radiotelex modes ARQ, FEC, and SELFEC. Also included here are the commands that allow you to communicate by means of direct Frequency Shift Keying DIRC and DIRCA, and radiotelegraphy CW.

Special commands allow you to prepare the Modem for automatic transmission of messages AUTOTX, and you may even permit certified users to call your Modem and retrieve messages from your text memory REM.

Special commands are used during communication to control the exchange of answer-backs and the transmission of messages.

4.2. MAKING A CALL

If you want to make a call manually, you may use one of the following commands:

- ARQ nnnn — Start an ARQ call to a station with call code nnnn.
- CALL nnnn — Start an ARQ call to station nnnn, but wait until the channel is free. This form of call can only be used with stations transmitting Free signals on idle channels.
- FEC — Start a collective FEC phasing sequence.
- FEC nnnn — Start a selective FEC phasing sequence. After the phasing sequence has been transmitted, the modem inverts the Mark/Space tones and sends out a selective call code to station nnnn.

4.3. CALL CODES

Each Radiotelex Modem has its own call code. When you want to establish a connection with another station, you must know this call code. This is exactly like a telephone connection, where you must also know the telephone number of the subscriber you want to call.

In accordance to international agreement, two types of call codes are in use, 4-digit, and 5-digit call codes.

- Coast stations are using 4-digit call codes. This means, that whenever you want to call a Coast station you should use its 4-digit number. As an example, the following list shows the selective call codes of some typical Coast Stations:

3502	Bern
3220	Burnham
0832	Lyngby
1090	Mobile
2550	Rogaland
1091	San Fransisco
2770	Scheveningen
4620	Singapore

- Ship stations are using 5-digit call codes, e.g. 86032.

NOTE

Please refer to the Chapter on Advanced Features if you want to use non-standard call codes.

The H1240 Radiotelex Modem is equipped with abbreviated dialling. Up to 15 often-used numbers can be permanently stored and represented by a single letter in the range from A to O. Chapter 5 describes the use of abbreviated dialling together with other station control facilities.

SETTING THE CALL CODE

When you make a call you must enter the call code in one of the following ways:

- 4-digit number to call Coast stations

  or

- 5-digit number to call Ship stations

  or

- Single letter A to O used for abbreviated dialling.

4.4. TERMINAL MODE

Once your Modem calls and connects to a distant radio station, it enters Terminal mode. The Modem tells you that the connection has been established by displaying the message df.

If you receive an incoming call the Modem enters Terminal mode automatically.

At this point, your system looks like a telex terminal to the other station. Any keys that you type on the keyboard are sent to the other station, and any characters received from the other station are displayed in your screen.

The connection you have established is half-duplex. This means that you may transmit and receive, but not at the same time.

EXCHANGING ANSWERBACKS

Press the Who-are-you key to receive the identity of the other station. If you are using an ASCII terminal, you must use the $ key.

The other station automatically changes to the sending station and its Answerback code is transmitted, immediately followed by a +? to restore the original direction of traffic.

You may transmit your own identity (Answerback) by pressing the Here-is key. If you are using an ASCII terminal, you should use the key to send your own identity.

TRANSMISSION

The "Data out" indicator is on.

You may send characters directly from your keyboard simply by entering them, one after the other.

Observe, that the characters need not be transmitted at the time they are actually entered from the keyboard. The Modem includes an output buffer that will hold the characters until they can be transmitted. If an ARQ connection is carried out under adverse conditions, with many repetition requests, the output buffer may be filled. The Modem then blocks the keyboard, so that you cannot enter more characters. You can continue to enter characters as soon as there is space in the output buffer again.

The "Data out" indicator will blink when the transmit buffer is empty.

If the H1252 Hard-copy Printer is used, the characters will be echoed on the printer at the time they are actually transmitted.

RECEPTION

The "Data in" indicator is on.

The Modem automatically goes into receive mode when it receives a call that matches one of its call codes.

CHANGING DIRECTION

When you want to give the traffic direction to the other station, you enter

+?

When you at any later time receive the +? sequence, the direction switches back to you, and you may again transmit to the other station.

There are other ways of changing direction.

1. If you are using an H1240 Modem, the Front panel keys can be used for changing direction:

   If your Modem is the sending station, a short push on OVER will change the direction when your transmit buffer is empty.

   If your Modem is the receiving station, a short push on OVER will act as a Poll request, i.e. change the direction if the other station sends a disconnect sequence.

   A long push on OVER (2.5 sec) immediately changes the direction of traffic. The MESSAGE indicator changes when the 2.5 seconds have passed.

2. If you are using the H1249 Keyboard Processor you can change direction by:

   Press the OVER Soft-key to immediately change the direction.

   Press the POLL Soft-key to change the direction when your transmit buffer is empty.

   If your Modem is the receiving station and you press the POLL Soft-key, the Modem will change the direction if the other station sends a disconnect sequence.

4.5. ENTERING COMMANDS WHILE CONNECTED

Once you are connected to another station, the Modem will remain in Terminal mode until you give it a command. There are several ways to enter commands.

1. While you are transmitting directly from your keyboard, enter JJJJC followed by your command(s), and press Carriage return.

   or

2. If you are using the H1249 Keyboard Processor, press the COMMAND softkey. Wait until the cursor jumps down to the command line, then enter your command(s), and press Carriage return.

   or

3. If you are using a teleprinter, press the (break) key on your teleprinter. Wait until the Modem responds by printing a period (.), then enter your command(s), and press Carriage return.

You may enter several commands on the same line, one after the other, separated by comas or blanks. As an example, to exchange Answerbacks, send the time, send the message named telex-1, and finally exchanging Answerbacks again, you can use the following command lines:

```
JJJJC  WRU  DE  TIME  telex-1  DE  WRU
```

The individual commands used in this example will be described later.

Whenever you enter the command made by one of the two last methods, the Modem immediately switches direction so that you are the sending station. You may use this facility to force a change in direction. As an example, if you are using a teleprinter and want the direction, simply press the (break) key on the teleprinter, wait for the (.) and press Carriage return. You will then be in Terminal mode.

TRANSMITTING MESSAGES FROM THE TEXT MEMORY

You may send messages that you have already prepared and stored in the text memory.

To send a message: go into the command mode and simply enter the name of your message, followed by Carriage return. As an example, to transmit the message telex-1, enter:

JJJJC telex-1

If you want to transmit several messages, one after the other, enter all the relevant names in one line, separated by commas, or blanks. As en example, to send the messages, named LETTER, NEWS, and PAYROLL, you may enter:

JJJJC letter news payroll

TO STOP A MESSAGE DURING TRANSMISSION

Press any key on your keyboard to stop a message while it is being transmitted. The Modem stops after the current line and goes into Terminal mode.

You may now send characters directly from your keyboard.

To send the remaining part of the message, go into Command mode, and press Carriage return without actually entering any command.

4.6. WHEN YOU ARE FINISHED

After you have completed a connection, you may want to hang up and stop the communication.

If you are using an H1240 Radiotelex Modem, simply press the BREAK key on the Front panel.

If you are using an H1249 Keyboard Processor, press the END softkey.

You may also terminate the connection by using the EOT command, e.g. when you are in terminal mode, enter:

JJJJC EOT

4.7. RESTART

If you are operating in ARQ mode and an error occurs in a data block, the receiving Modem sends back a request to repeat the block in error. The sending Modem, upon receiving the request for repetition, retransmits the block. Such a request may be repeated up to 32 times, until the complete data block has been received error-free.

After 32 repetitions the Master station automatically makes a new call while the Slave station enters a waiting mode (the Master station is the station that originally made the call). The two stations will both indicate the rephasing condition by simultaneous indication of "Error in" and "Error out".

If the new call is successful, normal traffic will continue exactly from the disrupted point in the traffic. To be more specific,

- If the slave was the sending station at the time of interruption, it will automatically change the direction of traffic after the rephasing has been successfully completed.

- Any interrupted message in transmission will automatically be completed after rephasing.

If the new call is unsuccessful and two-way communication cannot be reestablished within 30 seconds, both stations return to the Standby condition.

4.8. SAVING INCOMING MESSAGES

You may save incoming data in your text memory. Please refer to the SAVE command in Chapter 2 for a detailed explanation.

4.8.1. ARQ

A R Q

Local Command

A R Q

Local Command

Purpose: Initiates a call using full error-detection and -correction (Automatic Retransmission Request).

Format: ARQ callcode

Remarks: The Modem starts a call sequence, trying to establish connection with the other station. The call attempt continues until a response is received, or until a maximum call time of 58 seconds has been reached.

As soon as the other station answers the call by sending back control signals, a df is displayed to indicate that you are actually connected with the other radio station.

An unsuccessful call attempt may be repeated, using the letter **R** as the call code. Then the Modem will automatically use the previously entered call code.

To stop a call in progress, press the END Softkey on the H1249 Keyboard Processor or press the BREAK key on the front panel of the H1240 Radiotelex Modem.

Example: In this example, we will try to establish an ARQ connection to a radio station with call code 12345. The entry looks like this:

ARQ 12345

The following response is displayed:

ARQ call 1.12.85 (10:23)

where the Modem tells you the date and time. After some time, when the connection has been established, you will get the following display:

df

If you do not get connected, you can repeat the call by entering:

ARQ **r**

4.8.2. AUTOTX (AUTOMATIC TELEX) LOCAL COMMAND

Purpose: Automatic transmission of telex messages using full error-detection and -correction (Automatic Retransmission Request).

A message may be prepared and placed in the Coast Station queue waiting for the reception of a "Free" signal. The Modem automatically transfers the stored message to the selected telex subscriber.

Format: AUTOTX station command+ [filename]

Remarks: This command requires abbreviated dialling.

STATION is the abbreviated letter for the Coast station you want to reach.

The Modem awaits the reception of "Free" signals. When a "Free" signal is received, an ARQ call sequence is transmitted, using the call code of STATION. The call attempt continues until a response is received, or until a maximum call time of 58 seconds has been reached. If the Modem fails to establish connection within 58 seconds, it will automatically try again the next time a "Free" signal is received.

When connection has been established with the Coast station, the Modem awaits the reception of GA+?, then it transmits the command.

COMMAND+ must be one of the available commands. These are:

AMV+ The following message is to be sent to the AMVER organisation.

BRK+ The radio path is to be immediately disconnected.

DIRTLXxy+ Direct (conversational) telex connection with subscriber xy, where x is the F69 country code (preceeded by an 0, when applicable), and y is the subscribers telex number. The maximum number of digits must be limited to 18.

FREQ+ The following message indicates the frequency on which the ship is keeping watch.

4.8.2. AUTOTX (AUTOMATIC TELEX) LOCAL COMMAND

A U T O T X

A U T O T X

L o c a l C o m m a n d

L o c a l C o m m a n d

HELP+ The ship station needs to immediately receive a list of available facilities within the system.

MAN+ The following message is to be stored and manually forwarded to a country which cannot be accessed automatically.

MED+ An urgent medical message follows.

MSG+ The ship station needs to immediately receive any messages held for it at the coast station.

NAV+ The ship station needs to immediately receive navigational warnings.

OBS+ The following message is to be sent to the meteorological organisation.

OPR+ Connection to a manual assistance operator is required.

POS+ The following message contains the ship's position.

RTL+ The following message is a radiotelex letter.

STA+ The ship station needs to immediately receive a status report of all Store-and-Forward messages which have been sent by that ship station.

SVC+ The following message is a service message.

TGM+ The following message is a radio telegram.

TLXxy+ The following message is for immediate connection to a Store-and-Forward facility located at the coast station. xy indicates subscriber y with country code x (F69 country code, preceeded by an 0, when applicable).

URG+ The ship station needs to be connected immediately to a manual assistance operator.

This code should only be used in cases of emergency.

WX+ The ship station needs to immediate receive weather information.

4.8.2. AUTOTX (AUTOMATIC TELEX) LOCAL COMMAND

A U T O T X

Local Command

A U T O T X

Local Comma nd

Having transmitted the command to the Coast station, the Modem awaits the reception of *MSG+?*, which indicates, that you may proceed with sending your message. Any file-name specified in the Autotelex command will then be transmitted.

After the complete message has been sent, the Modem will automatically terminate the connection with the subscriber and the Coast station.

If the connection is interrupted during transmission, the Modem will automatically repeat the complete Autotelex command.

To stop an Autotelex in progress, press the END Softkey on the H1249 Keyboard Processor or press the BREAK key on the front panel of the H1240 Radiotelex Modem.

Notes:

1. Coast stations may implement a limited subset of the commands shown in the command list.

2. The Autotelex command uses a set of internationally recommended procedures, found in CCIR Rec. 492. The called Coast station must comply with these recommendations, otherwise this command will not work properly.

3. A sophisticated algorithm is used for placing calls when receiver frequency scanning is used (Remote control).

   All frequencies in the Scan Table will be scanned for "Free" signals or incoming calls.

   If a "Free" signal is received, then a call will be started only if the present receiver frequency is in the Station Table belonging to the STATION code you have specified.

4. When operating with the Scandinavian MARITEX system, a number of additional commands are available. Please refer to the Maritex Traffic Manual for a description of the commands.

4.8.2. AUTOTX (AUTOMATIC TELEX) LOCAL COMMAND

Examples: In the following example, we will send a message named telex-1 to subscriber 19298+ in Denmark (F69 code: 55). The call will be done through a Coast station stored as letter F in the abbreviated store. The complete command looks like this:

AUTOTX F DIRTLX05519298+ telex-1

The immediate response from the Modem will be

Autotelex:
nnnn+ name

Waiting for free channel

where nnnn+ is the call code of the Coast station and NAME is its abbreviated name (stored in the abbreviated store).

The Modem now waits for a "Free" channel, establishes the connection, and sends the message with name telex-1.

If you stop the Autotelex command, the Modem replies:

Autotelex terminated

C A L L

L o c a l C o m m a n d

Purpose: Initiate an ARQ call when "Free" signals are received.

Format: CALL callcode

Remarks: The Modem awaits the reception of "Free" signals. When a "Free" signal is received, an ARQ call sequence is automatically transmitted. The call attempt continues until a response is received, or until a maximum call time of 58 seconds has been reached.

As soon as the other station answers the call by sending back control signals, a *df* is displayed to indicate that you are actually connected with the other radio station.

An unsuccessful call attempt may be repeated, using the letter R as the call code. Then the Modem will automatically use the previously entered call code.

To stop a call in progress, press the END Softkey on the H1249 Keyboard Processor, or press the BREAK key on the front panel of the H1240 Radiotelex Modem.

Examples: By issuing the following command, the Modem will await the reception of "Free" signals and will then automatically transmit an ARQ call with call code 0832:

CALL 0832

The immediate response is:

Waiting for free channel

When the other station transmits "Free" signals, you will see the following response on the screen:

ARQ call 1.12.85 (10:23)

where the Modem tells you the date and time. After some time, when the connection has been established, you will get the following display:

df

4.8.4. CW (RADIOTELEGRAPHY)

C W (R A D I O T E L E G R A P H Y) C W

L o c a l C o m m a n d L o c a l C o m m a n d

Purpose: Enable transmission by Radiotelegraphy.

Format: CW [M | S]

Remarks: The Radiotelegraph mode operates manually, i.e. you have to use a morse key to transmit your messages. The Modem operates in this mode with full break-in.

The Modem will transmit MARK tone if the command is used without parameters, or if the M parameter is used.

To transmit the morse signal on the SPACE tone, you have to use the CW command with the S parameter.

To leave the Radiotelegraph mode, press the END Softkey on the H1249 Keyboard Processor, or press the BREAK key on the front panel of the H1240 Radiotelex Modem.

Examples: To transmit morse, using the SPACE tone of the Modem, enter:

CW S

The Modem responds:

Radiotelegraph mode

4.8.5. DIRC (DIRECT FSK)

Purpose: Enables reception and transmission using direct Frequency Shift Keying of the teleprinter signals (FSK).

Format: DIRC [mark space]

Remarks: The DIRC mode can be used for Start-Stop transmission at data signalling rates up to 110 Baud and all types of character structures, including CCITT alphabet ITA-2 and ITA-5.

You may select the Mark- and Space- tones. If you do not include tone frequencies in your command, the Modem will use the tone frequencies selected for ARQ and FEC operation.

The direction of traffic is determined by the Morse key input. The Modem transmits when the morse key input is grounded.

The DIRC mode has automatic Mark insertion, i.e. if Space signals are received for more than 250 ms, the Modem outputs Mark polarity to the teleprinter.

To leave the DIRC mode, press the BREAK key on the front panel of the H1240 Radiotelex Modem.

Note:

1. The DIRC mode does not perform any character conversion. For reception, the Modem simply translates the incoming Mark- and Space- tones to Mark- and Space-signals on the teleprinter side.

   No conversion of alphabet can take place, e.g. Baudot to ASCII conversion is not possible. If you want to use this mode for reception of Baudot FSK, you have to use a Baudot teleprinter.

2. In order to be able to transmit in the DIRC mode, pin numbers X3-2 and X3-4 on the Console connector has to be wired together (Transmitted Data from the teleprinter).

Examples: In this example we will use the DIRC mode, operating on 1200 Hz and 1600 Hz. The correct command looks like this:

DIRC 1200 1600

If you want to operate on the same frequencies you are using for ARQ connections, simply enter the command without parameters:

DIRC

4.8.6. DIRCA (DIRECT, AUTOMATIC FSK)

Purpose: Enables reception and transmission using direct Frequency Shift Keying of the teleprinter signals (FSK),

Format: DIRCA [mark space]

Remarks: The DIRCA command is similar to the DIRC command, except in the receive condition, where a continuous Mark signal exceeding 2 seconds is required to leave the Mark insertion mode. If Space signals are continuously received for more than 250 ms, the Modem will reenter the Mark insertion mode and output Mark polarity to the teleprinter.

The DIRCA mode can be used for Start-Stop transmission at data signalling rates up to 110 Baud and all types of character structures, including CCITT alphabet ITA-2 and ITA-5.

You may select the Mark- and Space- tones. If you do not include tone frequencies in your command, the Modem will use the tone frequencies selected for ARQ and FEC operation.

The direction of traffic is determined by the Morse key input. The Modem transmits when the morse key input is grounded.

To leave the DIRCA mode, press the BREAK key on the front panel of the H1240 Radiotelex Modem.

Note:

(Refer to notes in DIRC command)

Examples: In this example we will use the DIRCA mode, operating on 1200 Hz and 1600 Hz. The correct command looks like this:

DIRCA 1200 1600

If you want to operate on the same frequencies you are using for ARQ connections, simply enter the command without parameters:

DIRCA

4.8.7. EOT (END-OF-TRANSMISSION)

E O T (E N D - O F - T R A N S M I S S I O N) E O T

C o m m u n i c a t i o n C o m m a n d C o m m a n d

Purpose: Terminate the radio connection on ARQ and FEC calls.

Formats: EOT

Remarks: The Modem sends a terminating sequence and returns to the Standby mode.

The terminating sequence differs for ARQ and FEC.

In ARQ the Modem will change into the sending station (if it was receiving). The Modem then transmits a sequence of 10 alpha-blocks, after which it returns to the Standby condition, if not interrupted by a request for change of direction (Poll request by the other station).

In FEC the Modem sends a sequence of 24 alpha characters, after which it returns to the Standby condition.

Example: To disconnect, enter the command:

EOT

The Modem replies:

Clear in progress

and returns to Standby after a short delay.

4.8.8. FEC (BROADCAST)

F E C (B R O A D C A S T) F E C

L o c a l C o m m a n d L o c a l C o m m a n d

Purpose: Transmit collective or selective broadcast, using Forward Error Correction.

Format: FEC [callcode [/L]]

Remarks: The Modem starts transmission by sending 50 phasing pairs. Then a *df* is printed on the operator terminal to indicate that transmission of messages may proceed.

You must always start transmission by sending either a Carriage return or a Line feed.

If the call code is included, the Modem will initiate a selective call. The call starts with 50 phasing pairs, as above. Then the Modem transmits the call code 6 times in succession. This call code, and all subsequent characters are sent in inverted form to ensure that only stations with the correct call code will receive the message.

If the optional parameter /L is used, the initial phasing sequence will be extended to a total time of 36 seconds enabling scanning receivers to lock to your station before the selective call code is transmitted.

To stop a call in progress, press the END Softkey on the H1249 Keyboard Processor or press the BREAK key on the front panel of the H1240 Radiotelex Modem.

Examples: In this example, we will transmit Collective broadcast.

FEC

The following response is displayed:

Collective FEC 1.12.85 (10:23)

where the Modem tells you the date and time. After the phasing sequence you will get the following display:

df

In the next example we will use Selective FEC to call a ship with call code 12345. We want to use a long, initial phasing sequence. The entry is:

FEC 12345 /L

4.8.9. FOX (TEST MESSAGE)

Purpose: To send a test message

Format: FOX

Remarks: The command sends the test message:

the quick brown fox jumps over the lazy dog
0123456789 (:)

where the three last characters are used for national characters. They may therefore vary, depending on the national characters used.

4.8.10. RDR: (TAPE READER)

Purpose: Transmits Paper-tape messages.

Format: RDR:

Remarks: The command is used to transmit characters directly from a Paper-tape reader. The characters are echoed on the terminal and on the Hard-copy printer when they are actually transmitted (works only with terminals where echo is set to ON).

If an ARQ connection is carried out under adverse conditions, the transmit buffer in the Modem may be filled. In order to avoid any loss of characters, the buffer size must have a size sufficient to store most of the tape message. Alternatively, the tape reader must be controlled by the CTS signal (X3-5).

The read operation will terminate automatically, if the first character has not been received within 30 seconds, and when no further characters have been received for 5 seconds.

Notes:

1. The Paper-tape reader has to be installed between the Modem and your Console, and it must therefore operate on the same alphabet as your Console. However, Paper-tape readers are available, that can operate in the ASCII code and read Baudot tapes.

2. If the Paper-tape reader is operating in ASCII code, the Modem issues special control characters that can be used to control the reader. At the start of a RDR: command, the Modem sends out a DC1 (Ctrl-Q) control character to start the reader, and after the file has been read the modem sends out a DC3 (Ctrl-S) control character to stop the reader.

4.8.11. REM (REMOTE)

Purpose: Enable other radio stations to request and receive messages stored in either the text memory or prepared on punched tape.

Format: REM filename [password]

or

REM RDR: [password]

Remarks: When your Modem has been called and receives an +? sequence, the message(s) or paper tape will be transmitted automatically. Upon completion of the transmission the Modem sends the following sequence:

NNNN +?

to tell the other station, that everything has been sent, and that it may now clear the connection.

You may specify messages in the text memory or the tape reader as input.

If a message in the text memory is specified as input, your Modem will return to the Remote mode when the connection is cleared. This means, that the message may be transmitted several times.

A message may be referenced by its exact filename, or you may use the global character ? in the filename. If you enter a ? in the filename parameter, all the files that match the name will be transmitted back when requested by the other station.

If the paper tape reader is specified as input (RDR:), an external start/stop signal controls the reader. The paper tape input is automatically terminated when no characters have been received from the reader for 5 seconds. After the other station has cleared the connection, your Modem reverts to the Standby mode.

The optional password is a sequence of up to eight characters that protects against unauthorised access to the message which is in Remote mode. Any station that issues a request for transmission by sending the +?, must preceed this sequence with the password. The password need not be placed immediately before the +?.

To leave Remote mode, press the END Softkey on the H1249 Keyboard Processor or press the BREAK key on the front panel of the H1240 Radiotelex Modem.

Note:

1. The password is not the same password as used in the PAS and STAT command, they are secret to the Modem and you. This password has to be agreed between you and the other radio station operator.

Examples: In the first example we will allow any other stations to call us and receive the message gonehome:

REM gonehome

The immediate response from the Modem will be:

Remote mode

In the next example we will allow a station to call us and receive a paper-tape message, but only if we receive the password 82375390:

REM RDR: 82375390

The response from the Modem is:

Protected Remote mode

4.8.12. STAT (MODEM STATUS)

S T A T (M O D E M S T A T U S) S T A T

C o m m u n i c a t i o n C o m m a n d C o m m a n d

Purpose: Displays general Modem status.

Format: STAT [/F]

Remarks: This command is used to display the receive frequency error.

The Modem uses a special, highly accurate algorithm to calculate the frequency error. This algorithm takes noise and interference into account. If the receive signal/noise ratio is low, the Modem needs more time to measure and calculate the frequency error. This also means, that you should not change the receiving frequency during tracking or at least you must have patience in reading new values for the frequency error after a change in receiving frequency.

If you specify /F then you will get a continuous update and display of the status until you press any key. For example, the status might look like this:

```
Frq. err. is    0 Hz, S/N is
Frq. err. is   -2 Hz, S/N is
Frq. err. is   -4 Hz, S/N is
Frq. err. is   -4 Hz, S/N is
Frq. err. is   -6 Hz, S/N is
```

The Modem displays a line of data every time it has compiled enough data to calculate a new value for the frequency error.

An S/N ratio is also displayed. This facility is not fully developed, and the reading should be used with caution. Values range from 0 through 15. They can be used as a logarithmic figure for the S/N ratio.

Example: To continuously display the status of the Modem, enter the command:

STAT /F

4.8.13. TIME

T I M E T I M E

C o m m u n i c a t i o n C o m m a n d C o m m a n d

Purpose: Transmits the date and time.

Format: TIME

Remarks: The command sends the date and time determined by your internal clock in the Modem.

The date and time is sent in the following form:

dd.mm.yy (hh:mm)

Examples: To send the date and time in front of the message named telex-1, you may enter the command:

JJJJC TIME telex-1

The next example requires that you know that the command DE will send your own Answerback, while the command WRU will request the Answerback of the other station.

Sending a telex message will normally include, that you start by exchanging Answerbacks, then you transmit the time, and your message. Finally you again exchange Answerbacks. If the message is stored in your text memory as a file with the name message.001 you may group all these activities on a single command line as follows:

JJJJC WRU DE TIME message.001 DE WRU

SECTION 5
STATION TABLES

SECTION 5

STATION TABLES

5.1. INTRODUCTION

This section explains how to use the Station tables stored in the Modem. These tables provide abbreviated dialling with storage for up to 15 commonly used Coast station call codes, that you can very easily recall to establish the required communication.

Each abbreviated store can be used to:

- Store a Coast station call code together with a short-hand name for the station.
- Store up to 7 different frequency channels (RX and TX) for the Coast station. These frequencies can also be used for automatic frequency control.
- Enable or disable the use of rephasing when communicating with the Coast station.
- Limit the call commands that can be used to contact the Coast station.
- Control the procedure for automatic transmission of telex messages to the Coast station.

On delivery, the Station tables are preprogrammed to 15 commonly used Coast stations. You may reprogramme any of the Station Table entries, so that they suit your particular application.

5.2. DISPLAYING THE STATION TABLES

To display a summary of the Station tables, enter:

STN

The display will show all the programmed tables with call codes and the short-hand names for the Coast stations.

TO GET MORE DETAILS

If you want to get a more detailed view of a particular table entry, enter the STN command together with one of the first 15 letter keys (letter A to O).

As an example, to get a detailed view of entry H, enter:

STN H

The display will now show the call code and the short-hand name for the particular Coast station. Any programmed frequencies for station H will also be displayed.

If you specify a character outside the range A to O, the following is displayed:

Invalid group code

If you specify an empty entry, the following is displayed:

Group does not exist

5.3. CREATING YOUR OWN STATION TABLES

You may create your own entries in the Station tables. Any of the 15 available entries may be reprogrammed to suit your particular requirements.

CLEARING A TABLE ENTRY

If you want to completely change an entry, you should first clear the previous contents of the entry by using the CREATE command together with the selected letter key (letter A to O).

As an example, to clear entry L, enter:

CREATE L

IMPORTANT

The first 5 entries in the Station tables are protected against accidental erasure. If you want to programme any of these first 5 entries, you must first enable programming.

Use the following procedure:

In H1240: Remove jumper W8

When you have finished programming you should restore the original position of jumpers and switches.

If you try to programme any of the first 5 entries while they are protected, you will get the following response:

Cannot programme EEPROM

PROGRAMMING THE CALL CODES

Having cleared the table entry, you can programme the particulars of the Coast station. To programme the call code and a short-hand name for the station, use the STN command together with the selected letter key (letter A to O), followed by the call code and the name of the station (maximum 8 letters can be inserted here).

As an example, to programme Station entry E with the call code 0832 and the abbreviated name LYRA, enter:

STN E 0832 LYRA

PROGRAMMING THE FREQUENCIES

You may now programme the station frequencies. A maximum of 7 frequency channels may be assigned to each table entry. To programme a frequency channel, use the STN command together with the channel number (characters A1 to 07), followed by the frequency specification.

The frequencies have to be specified either as the Maritime channel number, or you can enter the frequencies directly in kHz.

As an example, to programme table entry B, channel 5 (channel number B5) with the frequencies corresponding to Maritime channel no. 1241 used for Narrow-Band Direct-Printing Telegraphy, enter:

STN B5 1241

To programme channel number E1 with receiver frequency 13091.5 kHz and transmitter frequency 12511.5 kHz, enter:

STN E1 13091.5 12511.5

PROGRAMMING THE MODE

A mode word for each table entry describes special procedures for communication with Coast stations.

The MODE command allows you to specify the detailed operation of the modem. In summary, the mode word must be based on:

- The initial request for Answerback
- The use of Restart (Rephasing)
- Any limitation in the permitted call commands
- The land subscriber terminating sequence.

Please refer to the MODE command description in this section for details about the use and programming of the Station table mode words.

5.3.1. CREATE COMMAND

C R E A T E C R E A T E

C o m m a n d C o m m a n d

Purpose: Clears the complete contents of a Station table entry.

Format: CREATE letterkey

Remarks: You should use this command whenever you want to re-programme a Station table entry with your own selection.

letterkey is any of the letters A to O used for abbreviated dialling.

The command clears the complete contents of the selected entry, i.e. clears the call code, the short-hand name, and all the frequency channels.

The command also sets the mode word to disable the initial request for Answerback, enable the restart condition, enable all possible call commands to the Coast station, and terminate the land subscriber connection on the NNNN sequence.

Example: In this example, Station table entry C is cleared:

CREATE C

5.3.2. MODE COMMAND

M O D E

C o m m a n d

M O D E

C o m m a n d

Purpose: Sets the mode of operation for communication with Coast stations.

Format: MODE letterkey

or

MODE letterkey [W] [,R] [,C] [/term/]

Remarks: letterkey is any of the letters A to O used for abbreviated dialling (station tables A to O).

The MODE command has two format options:

Option 1:

Use this option to view the current setting of the mode word for a particular table entry. For example:

MODE F

may produce a display that look like this:

W,R,C, /KKKK/

where the initial request for Answerback is enabled, the restart condition is enabled, only the CALL command is allowed, and the land subscriber terminating sequence is KKKK.

Option 2:

You can use this option to change the setting of the modem word for the selected table entry. As an example:

MODE F W, R, C, /,,,,,/

sets the mode word of entry F to enable the initial request for Answerback, enable the restart condition, enable only the CALL command to the Coast station, and terminate the land subscriber connection on the ,,,,, sequence.

Whenever you want to set a mode parameter, you must supply the parameter in the MODE command. If you want to reset the parameter, simply leave out the parameter in the list.

5.3.2. MODE COMMAND

M O D E

C o m m a n d

M O D E

C o m m a n d

The possible parameters are (reset conditions are shown in brackets):

W, Initial request for Answerback
(No initial request for Answerback)

,

R, Enable Restart
, , (Disable Restart)

,C, Enable only the CALL command

, , (Enable all possible call commands, i.e. ARQ, CALL, FEC, CW, and DIRC)

/nnnnn/ Sequence used to terminate the connection with land subscribers, max. 5 characters.

5.3.3. STN (STATION) COMMAND

S T N (S T A T I O N) S T N

C o m m a n d C o m m a n d

Purpose: Produces a status display of the abbreviated dialling store and sets the call codes and frequencies of the individual entries in the dialling store.

Format: STN

or

STN letterkey

or

STN letterkey callcode [name]

or

STN channelno frequency

Remarks: letterkey is any of the letters A to O used for abbreviated dialling.

callcode is any valid selective call code.

name is the stations short-hand name.

The STN command has four format options:

Option 1:

This option will produce an overall view of the abbreviated store:

STN

The display will show all the programmed tables with call codes and short-hand names for the stations in the abbreviated store.

5.3.3. STN (STATION) COMMAND

Option 2:

Use this option to get more detailed information about a particular station in the abbreviated store. As an example, the command:

STN B

will produce a display of the call code, and the short-hand name for stations B. Any programmed frequencies for station B will also be displayed.

Option 3:

This option is used to programme call codes and short-hand names for the individual entries in the abbreviated store. As an example, to programme entry N with the call code 2550 and the short-hand name rogaland, enter:

STN N 2550 rogaland

The short-hand name must be limited to a maximum of 8 characters.

SECTION 6

FREQUENCY SCANNING

SECTION 6

FREQUENCY SCANNING

6.1. INTRODUCTION

This chapter describes how you can automatically control your radio equipment through frequency selection and -scanning.

The use of frequency control requires that your radio receiver and -transmitter can be fully remote controlled by the T-BUS control system supplied with your Radiotelex modem.

Frequency scanning can be used for automatic watchkeeping. Based on your selection, the modem continuously scans through a number of frequencies. Scanning stops when an incoming call is detected; the transmitter is tuned to the corresponding transmitting frequency, the communication link is established, and the traffic is automatically exchanged. The scanning continues once the connection has again been terminated.

Scanning can also be used when you want to place a call to a specific Coast station. The modem stops scanning when a Free signal is received from the selected station (the scanning sequence may include many different stations), the communication link is automatically established, and the traffic transmitted to the selected station.

Scanning a single channel is useful whenever you want to place a call on a specific frequency. This gives you full keyboard or -computer control of the radio equipment.

Please refer to the T-BUS Reference Manual for technical information if you want to design your own interface to the radio equipment.

6.2. SCAN TABLES

Scanning of radio channels gives the modem a number of sophisticated features that include automatic receiver watchkeeping for incoming calls and optimum frequency selection for outgoing calls.

The basis for frequency scanning is the scanning table which controls the number and selection of frequencies to be scanned. The scanning table must be determined by you, based on:

- The Coast stations used
- The frequency channels on which you want to keep watch
- The maximum number of frequencies you want to scan

The scanning table can include a maximum of 21 frequencies, selected among the channels in the Station tables. Since there may be up to 15 Station table entries, each with up to 7 frequency channels, there may exist 105 frequencies to select from.

Whenever the Radiotelex modem is in the Standby mode, it automatically scans the frequencies in the scanning table. Having selected a new frequency in the table, the modem waits a few seconds, known as the Dwell time, to check for any Free signals or incoming calls. After the dwell time has expired, the modem selects the next frequency in the scanning table. When the table end is reached, the scanning starts all over.

The command:

SCAN

displays the current scanning table. If you are not using Remote control, and try the SCAN command, the following error message is displayed:

Remote control not used

THE DEFAULT SCANNING TABLE

When you first switch on power, the modem automatically loads a preprogrammed scanning table, known as the default scanning table. This ensures, that scanning will start, even after power failures. You can reprogramme the default scanning table to suit your particular application.

If you at any time want to reload the default table, use the command:

SCAN X

BUILDING YOUR OWN SCANNING TABLE

To build a scanning table, you first have to select the channel numbers you want to put in the table. Let's assume this has been done, and that you have selected all channels in Station table A, channel B3, channel C1 to C3, and finally all channels in table N. To build a scanning table consisting of these channels, enter the following command:

SCAN A C1 C2 C3 N

Suppose that you want to delete channel A4 from the scanning sequence. Use the command:

DELETE A4

If you want to add channel D5, enter:

ADD D5

Now you have created a scanning table that works fine. Let's suppose that you want to store this table, so that it is automatically reloaded whenever you apply power to the modem. The command:

STORE

reprogrammes the default scanning table to contain your present selection of scanning frequencies.

You can now set the dwell time, i.e. the time your modem waits on each channel before it selects the next frequency in the scanning sequence. To set the dwell time to 4 seconds, enter:

DWELL 4

6.2.1. ADD COMMAND

A D D

C o m m a n d

A D D

C o m m a n d

Purpose: Adds frequency channels to the existing scanning table.

Format: ADD channelno [channelno ...]

Remarks: The command will always have the effect that scanning is started.

If channelno is specified as any of the letters A to C used for abbreviated dialling then all channels in the specified station entry are added to the present scanning sequence.

If you use X as a channelno parameter, then the default scanning table is added to the present scanning sequence.

If channelno is specified as a single channel number, e.g. C3, then only that channel is added to the present scanning sequence.

You may enter several channelno parameters together with a single ADD command. An error message is displayed if the scanning table becomes full before all the specified channels have been added to the scanning sequence.

Example: To add all frequency channels of station table A, the single channel D4, and all channels from the default scanning table, enter:

ADD A D4 X

6.2.2. DELETE COMMAND

D E L E T E

C o m m a n d

D E L E T E

C o m m a n d

Purpose: Deletes frequency channels from the existing scanning table.

Format: DELETE channelno [channelno...]

Remarks: If channelno is specified as any of the letters A to O used for abbreviated dialling then all channels in the specified station table entry are removed from the present scanning sequence.

If channelno is specified as a single channel number, e.g. B7, then only that channel is deleted from the present scanning sequence.

You may enter several channelno parameters together with a single DELETE command. An error is displayed if the scanning table becomes empty. An automatic reload of the default scanning sequence will then be performed by the modem.

Example: To delete all frequency channels of station table A, the single channel D4, and all channels from station table C, enter:

DELETE A D4 C

6.2.3. DWELL COMMAND

D W E L L

C o m m a n d

D W E L L

C o m m a n d

Purpose: Sets the dwell time of the scanning. The dwell time is the number of seconds the modem stays on each frequency channel during scanning.

Format:

DWELL

or

DWELL dwelltime

Remarks: Using the command without parameters will display the current value of the dwell time.

The dwell time can be set to any value between 2 and 16 seconds.

For normal use, a value of 4 seconds is recommended.

Example: To set the dwell time to 4 seconds, enter:

DWELL 4

6.2.4. SCAN COMMAND

S C A N S C A N

C o m m a n d C o m m a n d

Purpose: Builds a complete scanning table.

Format: SCAN

or

SCAN channelno [channelno...]

Remarks: Using the command without parameters will display the current scanning table.

If one or more parameters are supplied, then scanning is automatically started.

If channelno is specified as any of the letters A to O used for abbreviated dialling then all channels in the specified station table entry are used in the scanning sequence.

If you use X as a channelno parameter, then the default scanning table is used to build the scanning sequence.

The R parameter can be used to include the present scanning table when building the new scanning sequence. When using this parameter alone with the SCAN command, the only effect will be to start scanning.

If channelno is specified as a single channel number, e.g. C3, then only that channel is used in the scanning sequence.

You may enter several channelno parameters together with a single SCAN command. An error message is displayed if the scanning table becomes full before all the specified channels have been used to build the scanning sequence.

Example: To build a scanning table including all frequency channels of station table A, the single channels B1 and B2, and all channels from the default scanning table, enter:

SCAN A B1 B2 X

To view the current scanning table, use the command:

SCAN

6.2.5. SELECT COMMAND

S E L E C T

C o m m a n d

S E L E C T

C o m m a n d

Purpose: Stops scanning when Free signals are received.

Format: SELECT [ON | OFF]

Remarks: If you want to stop scanning whenever the modem receives Free signals, use the SELECT command. The modem will automatically continue the frequency scanning if and when the Free signal again disappears.

If you are scanning frequencies from a single station this facility may be useful, because it will normally lead to faster response when you are called.

The SELECT facility is not recommended if you are keeping watch on several different stations. If you have stopped scanning on a Free signal from a station then it will be impossible for other stations to contact you.

Example: To stop scanning when receiving a Free signal, use the command:

SELECT

If you want to switch this facility off again, enter:

SELECT OFF

6.2.6. STOP COMMAND

S T O P

C o m m a n d

S T O P

C o m m a n d

Purpose: Stops scanning

Format: STOP

Remarks: The scanning stops on the present scan frequency when you use this command.

To start scanning again, you can either use the SCAN command with an R parameter, or you may use the ADD command without parameters.

Example: To stop scanning, enter:

STOP

To start scanning again, use one of the following commands:

SCAN R

or

ADD

6.2.7. STORE COMMAND

S T O R E

C o m m a n d

S T O R E

C o m m a n d

Purpose: Stores the present scanning sequence into the default scanning table.

Format: STORE

Remarks: The default scanning table is programmed in EEPROM memory, which means that the information is never lost, even during prolonged power failures.

When power is applied to your modem, the contents of the scanning sequence is automatically examined by the system. If the modem is equipped with built-in battery back-up, then the scanning sequence may still be intact. In this case the scanning sequence that existed prior to the power failure will be used. However, if the information about the scanning has been destroyed, the modem will automatically reload the default scanning table into the scanning sequence.

Storing the present scanning sequence into the default scanning table ensures that your favourite scanning is automatically reloaded when power is applied to your modem.

Example: To store the present scanning sequence into the non-volatile default scanning table, enter the command:

STORE

SECTION 7

ADVANCED FEATURES

SECTION 7

ADVANCED FEATURES

7.1. INTRODUCTION

This chapter explains how to use the advanced modem commands. You can use advanced command to:

- Execute commands contained in a file
- Operate with non-standard call codes
- Control operation of the transmitter
- Operate the modem together with Crypto equipment

7.2. AUTOMATIC OPERATION USING COMMAND FILES

It is sometimes useful or necessary to execute a sequence of commands. If you frequently use such a sequence of commands, it would be convenient to group these commands, give them a common name, and execute the complete sequence with a single command, just like you use the existing system commands.

Command files are files consisting of valid system commands to be executed in sequence. Whenever you enter the command filename, the complete sequence of commands in the file is executed.

You can pass parameters to the command file when the file executes. Therefore, the file can do similar work with different data during each execution.

You create a command file by using the Editor.

NOTES:

1. Only the filename must be entered to run the command file.
2. The commands in the file named filename.COM are executed.
3. You can stop command processing at any time by pressing any key on your keyboard.
4. The last command in a command file may be the name of another command file. This allows you to invoke one command file from another when the first is finished.
5. There are 5 subcommands that can be used to control command processing: DE, FIND, OVER, WAIT, and WRU. They are explained in the following pages.

6. If you want to supply text in a command file, you must put slashes (/) around the text string, e.g. /this is a string/. The slashes indicate that the text supplied in the command must be transmitted directly.

7. Most commands may be grouped together on the same line. However, the commands ARQ, CALL, FEC, FIND, WAIT, EOT, and /..../ must appear as the last command on a line.

8. Command files can only be started while you are in Local mode.

9. You may not use filenames that are already used as standard modem commands, e.g. DIR or CALL.

THE AUTOST.COM FILE

The AUTOST.COM file is a special command file. Every time you start the modem or return to the Local mode after a connection has been terminated, the modem searches the text memory for a file named AUTOST.COM. If this file is present, the modem automatically executes the commands in the file whenever it returns to the Local mode.

CREATING A COMMAND FILE WITH REPLACEABLE PARAMETERS

Within a command file you may include dummy parameters that can be replaced by values supplied when the command file executes. For example, the command file CONNECT.COM may contain the following commands:

```
ARQ  =1
WRU  DE
=2
DE WRU
EOT
```

The dummy parameters =1 and =2 are replaced sequentially by the parameters you supply when you execute the file.

EXECUTING A COMMAND FILE WITH REPLACEABLE PARAMETERS

To execute the CONNECT.COM file and pass parameters, enter the command filename followed by the parameters you want sequentially substituted for =1, =2, etc.

For example, you can enter:

```
CONNECT 0832 telex
```

0832 is substituted for =1, and telex for =2.

The result is the same as if you entered each of the commands in the command file with their parameters, as follows:

```
ARQ 0832
WRU DE
telex
DE WRU
EOT
```

The file calls the station with call code 0832, exchanges Answerbacks, sends the message named telex, exchanges Answerbacks again, and finally terminates the radio connection.

COMMAND FILE EXAMPLES

The first example is a command file that transmits a message in FEC (Broadcast):

```
FEC
DE TIME
=1
DE EOT
```

Let's assume you have given the command file the name NEWS.COM. If you want to send a message, named weather, you may simply enter:

```
NEWS weather
```

and the command sequence is automatically executed.

The second example is a command file named REPCLOCK.COM that repetitively displays the date and time:

```
TIME
REPCLOCK
```

Observe, that the last command in the file is the name of the file itself. Therefore the command file will continue execution until you terminate it by pressing a key on your keyboard. To start the command file, enter:

```
REPCLOCK
```

The third example implements the command sequence used when calling the Nordic MARITEX system. The command file is preprogrammed in the modem with the command name AUTOTX. The complete command file is:

```
CALL  =1
WRU
FIND GA+?
/=2/
FIND MSG+?
=3
/NNNN/
FIND GA+?
EOT
```

Observe, that the second parameter you supply is transmitted directly as a text string. It is the command text used by the Coast station computer to select your required service.

As an example, to execute the AUTOTX command, you can enter:

AUTOTX A TLX12345+ message

where A is substituted for =1, TLX12345+ is substituted for =2, and message is substituted for =3.

7.3. USING NON-STANDARD CALL CODES

The H1240 Radiotelex Modem can operate with the following types of call codes:

1. 4-digit call codes, e.g. 1234

2. 5-digit call codes, e.g. 12345

3. 4 or 5 alphanumeric characters, e.g. ABCD2

   Each alphanumeric character is converted internally in the Radiotelex Modem to its ASCII equivalent. Then the 4 most significant bits are zero'ed, and the numeric value of the remaining bits are used as digits in the call code. As an example, the call code AXMD2 will be converted to the call code 18342.

4. 4-letter direct call code, e.g. +OUQV

   Observe the + in the last option, its use is mandatory. The four letters are used directly as the call code, e.g. a call code of +ABCD will in an ARQ call be transmitted in the two blocks as:

   A RQ B C D RQ

7.4. TRANSMITTER CONTROL

The transmitter control commands allow you to select special types of operation.

The BUSY command is used to enable/disable transmission of a busy signal (successive Mark- and Space-tones, each during 500 ms). During busy signal transmission the modem is insensitive to incoming calls.

To start the busy signal, enter:

BUSY

The busy signal is automatically switched off whenever you start a call, or return to the Standby condition.

For service purposes you can control the transmitter High-tension. The SEND command is used to activate the modem's High-tension output.

7.5. CRYPTO OPERATION

Your radiotelex modem can operate together with external crypto equipment.

If the Crypto input is activated, the modem enters crypto mode. This implies, that the modem, when in the information receiving state, is insensitive to the reception of Figs.D (Who-are-you) and Figs.+?, so that the modem will not transmit back its Answerback or change traffic direction. When operating in this mode, you may exchange any type of enchiphered information. In this mode only the information receiving station can change the direction of traffic.

If your crypto equipment is using the more standard 5-letter groups, then you do not need to go into crypto mode. The modem will in the normal mode transfer 5-letter groups without any problems.

NOTES:

1. The modem can recognize certain types of crypto equipment and provide a number of "smart" features. Please consult the factory for any details regarding this operation.

7.5.1. BUSY COMMAND

B U S Y

C o m m a n d

B U S Y

C o m m a n d

Purpose: Transmits busy signals.

Format: BUSY [ON | OFF]

Remarks: The command is used to enable/disable transmission of busy signals in the form of successive Mark- and Space tones, each during 500 ms.

During busy signal generation the modem is insensitive to incoming calls.

The busy signal is automatically switched off whenever you start a call, or return to the Standby condition.

Examples: To enable the transmission of busy signals, enter:

BUSY

To stop busy signalling again, use the command:

BUSY OFF

7.5.2. DE (HERE-IS) COMMAND

D E (H E R E - I S) D E (H E R E - I S)

C o m m a n d C o m m a n d

Purpose: Transmits your own identity (Answerback).

Format: DE

Remarks: When using the DE command, your modem sends your Answerback. The effect is the same as pressing the Here-is-key.

Example: A command file that makes a call and then exchanges Answerbacks may look like this:

```
ARQ =1
WRU DE
```

Having established the connection, the modem first requests the other stations Answerback, then your own identity is transmitted.

7.5.3. FIND (STRING) COMMAND

Purpose: Searches for text in the received data.

Format: FIND string [string ...]

Remarks: The command is used to search for text in the received data. If several text strings are grouped together, like:

FIND text1 text2 text3 text4...

then the command first waits for text1, then text2, then text3 etc.

Example: Consider the Coast station at Gothenburg, Sweden. The station has an Answerback that contains the sequence maritex s. A call to the coast station is followed by an automatic exchange of Answerbacks, after which the station sends a GA+? sequence. To search for the Answerback and then the GA+?, use the FIND sequence:

FIND maritex s ga+?

7.5.4. OVER COMMAND

O V E R

C o m m a n d

O V E R

C o m m a n d

Purpose: Forces the modem into information sending.

Format: OVER

Remarks: This command is used whenever you want to be assured that you have the direction of traffic.

Example: If you want to wait for the string secret and then force an over command, insert the following two lines in a command file:

```
.
.
FIND  secret
OVER
.
.
```

7.5.5. SEND COMMAND

S E N D

C o m m a n d

S E N D

C o m m a n d

Purpose: Forces control of the transmitter High-tension.

Format: SEND [ON | OFF]

Remarks: For service purposes you can control the transmitter High-tension from your keyboard. Once activated, the transmitter will be operative until you again switch the transmitter off from your keybcard.

The transmitter High-tension will always be activated when you make a call or receive an incoming ARQ call.

Example: To set the transmitter High-tension, enter:

SEND

To switch the High-tension off again, enter:

SEND OFF

7.5.6. WAIT COMMAND

W A I T

C o m m a n d

W A I T

C o m m a n d

Purpose: Waits for incoming calls.

Format: WAIT

Remarks: The WAIT command is used in the Standby condition. When used in a command file, the modem waits for an incoming call before the command file execution proceeds to the next command.

Example: If your modem is operated unmanned and you want to be sure that you always get the Answerback of any station calling you, you can create a command file with the name AUTOST.COM and the following contents:

```
WAIT
OVER
WRU
```

7.5.7. WRU (WHO-ARE-YOU) COMMAND

W R U (W H O - A R E - Y O U) W R U

C o m m a n d C o m m a n d

Purpose: Requests the Answerback of the other station.

Format: WRU

Remarks: The command will request the other stations identity by transmitting the Who-are-you sequence and want for the Answerback before the command file execution proceeds to the next command.

Example: A command file that makes a call and then exchanges Answerbacks may look like this:

```
ARQ  =1
WRU  DE
```

Having established the connection, the modem first requests the other stations Answerback, then your own identity is transmitted.

SECTION 8

SYSTEM GENERATION

SECTION 8

SYSTEM GENERATION

8.1. INTRODUCTION

The H1240 Radiotelex Modem is flexible and of a general nature, so you can configure your particular needs into a system tailored to your exact requirements. This is done by the System Generation procedure. This procedure should be used during installation, when the modem must be adapted to the radio station, and the identity of the station, i.e. answerback codes are selected. The system generation procedure can be repeated at any later time whenever you want to change particulars of the system.

PROCEDURE:

(1) H1240 Radiotelex Modem: Remove jumper from W8 and insert jumper in W19-7.

(2) The modem should now display a message which looks like this:

TT-1585 Vers 2.1.

Software configuration(s)

50 Baud operation

Select an option

1 - MODEM control
2 - RX/TX interfaces
3 - SELCALL and WRU codes
4 - EQUIPMENT interfaces
5 - MEMORY formats
6 - TESTING system performance
7 - PRINTER logging

Enter the action desired ? _

This heading tells you the software version number (2.1), and any special software options in the modem.

(3) Press the digit corresponding to the function you request. The modem will respond with a number of questions. Select answers to the questions as they are displayed on the screen. If you want to skip a question, just press (RETURN).

(4) When the system generation procedure is complete, use the following procedure:

H1240 Radiotelex Modem: Remove jumper from W19-7 and insert jumper in W8.

8.2. MODEM CONTROL

Select the Modem Control by pressing (1). The following message will be displayed (factory selected options):

FEC and CW transmit allowed = ON
FEC diversity = 2 periods
Max. FEC error rate (%) = 30
Max. errors in ARQ-block (0,1,2) = 0
Max. Autotelex call series = 2
Restart = ON
Finite start/restart = ON
Standby on single Alpha-block = ON

*Change any settings (Y/N)?*_

Press (Y) if you want to change any of the default settings. The system will now step through all the settings and prompt for your answer. If you want to leave a setting unchanged, simply press (RETURN) in response to that particular question.

The following is a description of each of the settings. The questions are formulated so that the normal response to (Y/N) questions is (Y):

FEC and CW transmit allowed

Enables transmission of unconditional ARQ, FEC and CW calls.

FEC diversity

Separation between direct and repeated character in FEC. Must be the same at both stations. Standard (CCIR Rec. 476-3) is 2 periods. Can be selected in the range 1 through 30.

Max. FEC error rate (%)

The maximum accepted error rate (in percent) measured as the number of error characters printed. Can be selected in the range 1 to 100.

Max. errors in ARQ-block (0,1,2)

If an ARQ-block is mutilated, the block is not accepted, and a request for repetition is sent back. However, if the number of error-characters in the received block is less than the value selected in the parameter above, the correct characters in the block are memorized and compared with the next, repeated 3-character block to increase transmission efficiency. A value of 0 means that no error characters are accepted in the block, a value of 2 means that every correct character is memorized.

Max. Autotelex call series

The use of Autotelex command for automatic transmission of telex messages, includes automatic retries if the connection is unsuccessful. The retries are grouped into call series, separated by minimum 15 minutes. Each call series includes 3 retries. The maximum number of call series can be selected by this parameter.

Restart

Enables the Restart (Rephasing) function. The value of this parameter is overrided by the mode word used in the station tables for abbreviated dialling.

Finite start/restart

Revert to the Standby condition if an ARQ call or a Restart condition remains unsuccessful for more than 58 seconds (ARQ) or 64 cycles of 450 ms (Restart). If disabled, the call will continue indefinitely until stopped manually by the operator.

Standby on single Alpha-block

Revert to the Standby condition after reception of a single Alpha-block. If disabled, the effect of receiving a single Alpha-block is to send a (break) character (2 sec. space) on the local connection (Baudot alphabet only).

8.3. RX/TX INTERFACES

Select the RX/TX interface by pressing (2). The following message will be displayed (factory selected options):

```
RX1-mark  = 1615 Hz
RX1-space = 1785 Hz
TX1-mark  = 1615 Hz
TX1-space = 1785 Hz
Receiver Post-Mute    = 3 x 1.25 ms
Transmitter Pre-key   = 0 x 1.25 ms
Transmitter Post-key  = 0 x 1.25 ms
Slave delay           = 3 x 1.25 ms

Change any settings (Y/N)?_
```

Press (Y) if you want to change any of the default settings. The system will now step through all the settings and prompt for your answer. If you want to leave a setting unchanged, simple press (RETURN) in response to that particular question.

The following is a description of each of the settings. The questions are formulated so that the normal response to (Y/N) questions is (Y):

RX1-mark

Receive Mark frequency in Hz. Range 1000 to 3000.

RX1-space

Receive Space frequency in Hz. Range 1000 to 3000.

TX1-mark

Transmit Mark frequency in Hz. Range 1000 to 3000.

TX1-space

Transmit Space frequency in Hz. Range 1000 to 3000.

Receiver Post-Mute

Select the number of 1.25 ms time ticks the receiver is muted after release of the transmitter TT signal. Range 0 to 80 (0 to 100 ms).

Transmitter Pre-key

Select the number of time ticks the transmitter key signal must be present before the transmission of tone signals starts. Range 0 to 48 (0 to 60 ms).

Transmitter Post-key

Select the number of time ticks the transmitter key signal must be present after the transmission of tone signals stops. Range 0 to 80 (0 to 100 ms).

Slave delay

ARQ slave delay, i.e. the time between the reception of signals, and the transmission of the response. The ARQ has a fixed delay of approx. 7 ms which has to be added to the setting. Also the receiver and transmitter increase the slave delay with approx. 5 ms.

8.4. SELCALL AND WRU CODES

Select the Selcall and WRU codes by pressing (3). The following message will be displayed (factory selected options):

ARQ/FEC selcall number = 00000
GroupFEC selcall number = 11111
Internal Answerback = ON
Answerback =
12345 abcdefg x
7E-0D-0A-31-32-33-34-35-7F-20-61-62-63-64-65-66-67-20-78-7F

Change any settings (Y/N)?_

Press (Y) if you want to change any of the default settings. The system will now step through all the settings and prompt for your answer. If you want to leave a setting unchanged, simply press (RETURN) in response to that particular question.

The following is a description of each of the settings. The questions are formulated so that the normal response to (Y/N) questions is (Y):

ARQ/FEC selcall number

4- or 5-digit selective call number for the station. Used to call the station selectively on ARQ and FEC.

GroupFEC selcall number

4- or 5-digit selective FEC group number for the station. Used to call a group of stations at the same time.

Internal Answerback

Select internally or externally used answerback. If an external answerback is used, the modem will accept 10 seconds delay in the answerback code, otherwise it will return control to the other station.

Answerback

The answerback is first displayed as it appears on print.

7E-OD-OA ...

The internal codes for the characters in the answerback are displayed (ASCII-Hex).

When changing the answerback, the contents of the first location in the answerback code is displayed, followed by a dash (-). The character is displayed in hexadecimal ASCII formate. Refer to section 9.7. for explanation of the codes.

To modify the contents of the location displayed, type in the code for the new character, followed by a space or a (RETURN). If you do not wish to modify the location, type only the space or the (RETURN).

If a space was typed, the next location in the answerback will be displayed as in the previous step. If a (RETURN) was typed, the command will be terminated.

8.5. EQUIPMENT INTERFACES

Select the Equipment Interfaces by pressing (4). The following message will be displayed (factory selected options):

```
Echo = ON
Auto-linefeed = ON
Operator interface:
   Console = T+T:
   Printer = LPT:
   Reader  = TTY:
   Puncher = MEM:
Remote control = OFF
Remote/printer port mode = 2400,O,8,1
Buffered printing = ON

Change any settings (Y/N)?_
```

Press (Y) if you want to change any of the default settings. The system will now step through all the settings and prompt for your answer. If you want to leave a setting unchanged, simply press (RETURN) in response to that particular question.

The following is a description of each of the settings. The questions are formulated so that the normal response to (Y/N) questions is (Y):

Echo

Echo all typed characters back to the console.

Auto-linefeed

Every time a (RETURN) character is received from the console, a (RETURN) character followed by a line-feed character is echoed back to the console. This is normally not used on teleprinters (set to OFF).

Operator interface sets the mode of operation for equipment connected to the H1240 Radiotelex Modem.

Console

The selection is:

TTY:, CRT:, or T+T:

where:

TTY: is a standard teleprinter
CRT: is a standard video terminal
T+T: is the H1249 keyboard

Printer

The selection is:

TTY:, or LPT:

where:

TTY: is a standard teleprinter
LPT: is a separate hard-copy printer

Reader

The selection is:

TTY:, or UR1:

where:

TTY: is a standard reader
UR1: is reserved for future use

Puncher

The selection is:

TTY:, MEM:, or UP1:

where:

TTY: is a standard puncher
MEM: is a memory punch (SAVE)
UP1: is reserved for future use

Remote control

Remote control of receiver and transmitter frequencies, using the T-BUS. Observe that if remote control is used, the hard-copy printer must also use T-BUS control.

Remote/printer port mode

The format is:

baud,parity,databits,stopbits

where:

baud	110, 150, 300, 600, 1200 2400, 4800, or 9600
parity	N(none), O(odd), or E(even)
databits	7, or 8
stopbits	1, or 2

Buffered printing

Enables buffered printing. When using buffered printing, all data to the printer are queued temporarily in the text memory (if there is space for it), and are then automatically sent out to the printer at the speed of the printer. The advantage of using buffered printing is that you do not have to wait for the slow printer, but can proceed with other tasks on the modem while it is printing.

8.6. MEMORY FORMATS

Select the Memory Formats by pressing (3). The following message will be displayed:

8 Kbytes scratch memory

256 Kbytes textmemory

Enter buffer size (char):_

The memory size may vary; on older equipment it may also be 16 kbyte

You must now enter the size of the transmit output buffer. This output buffer is used as temporary store for the transmit characters during keyboard entry, and during paper-tape transmission. To ensure that the buffer is not filled completely during repetition conditions when paper-tape is transmitted, you should select a buffer size that can hold a complete telex, e.g. 5000 characters.

The minimum size is 80 characters. The maximum size is approximately 64,000 characters, depending on the version of the software in your modem.

The remaining text memory can be used to create and store telex messages using the text editor.

Depending on your selection of size for the transmit buffer a message will be displayed, looking like this:

3522 lines in text memory

80 char's in transmit buffer

Secret messages: (Y/N)?_

If secret messages are enabled, the modem can receive and store messages (by receiving QQQQ) that can only be accessed by an operator that knows the internally stored password. If you enable the use of secret messages the modem will request you to enter a password by displaying:

Enter password:_

A maximum of eight characters may be entered as the password. This password may be changed at any later time by using the PAS command, but only if the "old" password is known.

Concerning 5-Letter groups and Enter combiner key: See Cipher Operation H1240

8.7. ANSWERBACK CHARACTER SET

The character codes used when entering the answerback sequence are based on the ASCII code and CCITT Rec. F.130.

Each character is representended by a 2-digit/letter code as follows:

DIGITS

Char		ASCII	Char		ASCII
0	-	30	5	-	35
1	-	31	6	-	36
2	-	32	7	-	37
3	-	33	8	-	38
4	-	34	9	-	39

LETTERS

Char		ASCII	Char		ASCII
A	-	61	P	-	70
B	-	62	Q	-	71
C	-	63	R	-	72
D	-	64	S	-	73
E	-	65	T	-	74
F	-	66	U	-	75
G	-	67	V	-	76
H	-	68	W	-	77
I	-	69	X	-	78
J	-	6A	Y	-	79
K	-	6B	Z	-	7A
L	-	6C			
M	-	6D			
N	-	6E			
O	-	6F			

SPECIAL CHARACTERS

Char		ASCII
Carriage return	-	OD
Line-feed	-	OA
Figure-shift	-	7E
Letter-shift	-	7F
Space	-	20

The series of 20 combinations in International Telegraph Alphabet No. 2 comprising the answerback code shall be allocated as follows:

- Figure-shift, or (if permanently fitted) Letter-shift
- Carriage return
- Line-feed
- The station's number, or (if Letter-shift is fitted in the first position) Figure-shift, followed by the station's number.
- Letter-shift
- Space, which should however be omitted if both the station's number consists of 8 digits and a letter-shift is fitted in the first position.
- The station's (abbreviated) name
- Space
- If necessary, a Letter-shift or Letter-shifts to bring the total number of combinations in the answerback code up to twenty
- The letter (X).
- Letter-shift

APPENDIX A

MESSAGES

INTRODUCTION

The following messages are either error messages indicating that you have entered invalid commands, or other messages displayed by the modem.

MESSAGES

The following messages are in alphabetical order:

All files (Y/N)?

This message appears if you use the CLR command. If you do want to erase all files in the text memory, press Y. Otherwise press any other key

ARQ call

The modem transmits an outgoing ARQ call.

Autotelex terminated

The Autotelex command in progress has been unsuccessfully terminated.

Bad password

The password you entered was not the correct one.

BROS command error

This is an internal error message that should not appear on your system. If this message appears several times, consult your dealer or the factory.

Cannot find file

The modem could not find any files that matched your specified entry (DIR command).

Cannot find message

The filename you have specified in an Autotelex command does not exist.

Cannot find xxxx

The modem could not find file xxxx.

Cannot programme EEPROM

While attempting to programme the EEPROM, the modem determined that it was not possible to verify successful programming. The cause may be a hardware error in the programmer, but more likely you have either not removed jumper W8 (H1240 Modem).

Channel does not exist

You have specified a non-existing frequency channel.

Checking channel

When calling a station that emits Free signals, the modem re-checks the channel for Free signals after having tuned your transmitter.

Collective FEC call

The modem transmits an outgoing FEC call.

Command not accepted

The selected call command has been generally or selectively disabled.

Command not accepted during scanning

Invalid command used. Only the CALL command is accepted during frequency scanning. You can use the STOP command to temporarily stop the scanning.

Creating default scan table

There was no scan table in the modem. Following this message the modem automatically builds a standard default scan table.

Creating station tables

The modem did not contain valid Station tables. Following this message the modem automatically clears all Station tables and reprogramme the mode words. This may take up to 60 seconds, so have patience. During this time jumper W8 must be removed (H1240 Modem).

Editing new file xxxx

You are editing a new file with filename xxxx. If you want to leave the editor again because you wanted to edit an existing file but you simply specified a wrong filename, enter E. Empty files are automatically erased from the text memory.

Editing xxxx

You are editing an existing file with filename xxxx.

Enter password:

You have to enter the secret password in response to this request. Your entry is not echoed to the display. Remember to press the carriage return key.

Errors on printer indicate that it may be off-line. Please check it.

The printer being used for hard-copy printing is offline. This message appears when the printer is offline, out of paper, power off, or not ready condition.

Group does not exist

You have specified a non-existing Station table entry.

Invalid argument

One or more of the parameters entered for this command was not valid.

Invalid autotelex command

The service code you specified in the Autotelex command was invalid.

Invalid call code

You have attempted to use a call code of improper format.

Invalid date

An invalid date or time was entered.

Invalid frequency

You have specified a frequency greater than 29999.99 kHz.

Invalid frequency channel

A frequency channel outside the range A1 to O7 was specified.

Invalid group code

An invalid Station table entry has been specified.

Invalid name

The filename you specified is invalid. Refer to Section 1.2. for a description of valid filenames.

Invalid parameters

One or more of the parameters entered for this command was not valid.

Invalid tone pair

When using the DIRC or DIRCA command, you have specified tone frequencies outside the frequency range 1 kHz to 3 kHz.

Loading default scan table

The default scan table was automatically reloaded after power was applied to the modem.

Missing group code

The station entry must be specified.

Missing message name

You have requested an Autotelex service type that requires a message (the file-name is missing).

No active channel

The Scanning table is empty.

No buffered printing

You are not using buffered printing.

No receiving frequency

You have specified a non-existing frequency channel.

Not enough room for command

There is not enough free space in the text memory to execute your command file.

Not found

The file you have specified does not exist, or the text you are searching for is not found in the file being edited.

Not implemented

You have used a command that is not implemented in your modem.

occ

You have attempted to place an outgoing call while receiving FEC (Broadcast).

O.K.?

The text you specified in the search command was found. If you press Y no further search will take place. Press any other character to continue the search.

Out of paper

The printer is either out of paper, or is not turned on.

Please use '?' for help

You have used an invalid Editor command. Enter ? to get a list of the correct commands.

PRINT buffer is empty

There are currently no characters to be printed.

Printing terminated by operator

This message appears on the printer whenever you stop any printing in progress.

Protected Remote mode

The modem is in protected Remote mode (please refer to Section 4.8. for details).

Radiotelegraph mode

You have placed the modem in the radiotelegraph mode.

Ready

The transmitter tuning has been successfully completed.

Receiving ARQ

The modem receives an incoming ARQ call.

Receiving Collective FEC

The modem receives an incoming FEC call.

Receiving Selective FEC

The modem receives an incoming SELFEC call.

Remote control not used

You have specified a command that requires remote control of your radio equipment, but you have switched this facility off.

Remote mode

The modem is in Remote mode (please refer to Section 4.8. for details).

Scan table empty

You have emptied the scanning table. The default scanning table is automatically reloaded.

Scan table is full

The scan table limit is 21 frequency channels.

Selective FEC call

The modem transmits an outgoing SELFEC call.

Soft-error x

Soft-errors are execution errors that are detected and handled by the modem software. These errors does not normally indicate a hardware fault in your modem, but are rather caused by a recoverable error in the dynamic text memory. Soft-error 1 may indicate that you have changed programmes in the modem and have not updated the Memory formating (refer to Section 8.6. for details). The modem automatically recovers after a soft-error, but the complete contents of the text memory will be lost.

Strike a key to set time

You have entered a new time and date. The modem has accepted your entry, but has not yet started the clock. Press any key to start the real-time clock.

Text memory is full

A command ended abnormally because the text memory does not have enough free space to save the entire file.

Some of the files may be saved in the text memory, but the portion not saved is lost.

This group is not scanned

The call code supplied in a CALL command is not included in the sequence of channels presently scanned.

Timeout

A timeout has occurred in a command file waiting for either the other stations Answerback or waiting for a specified text string. The maximum timeout value for Answerback request is 29 seconds, for the FIND command it is 116 seconds.

Too few parameters

You have supplied too few parameters when executing a command file.

Too many parameters

You have supplied too many parameters when executing a command file.

Transmitter down

Unsuccessful transmitter tuning.

Transmitter down, retrying

Transmitter tuning was unsuccessful. The modem makes another try.

Transmitter ready

The transmitter has completed the tuning cycle in response to the SEND command.

Transmitter stopped

The transmitter High-tension has been switched off in response to the SEND OFF command.

Transmitter tuning

Transmitter tuning is in progress.

Waiting for call

In response to the WAIT command, the modem waits for incoming calls.

Waiting for free channel

In response to the CALL command, the modem waits for a Free channel before it places the outgoing call.

Waiting 15 min. for next Autotelex call

After 3 unsuccessful Autotelex calls the modem waits 15 minutes before the next call is attempted.

xxx lines free

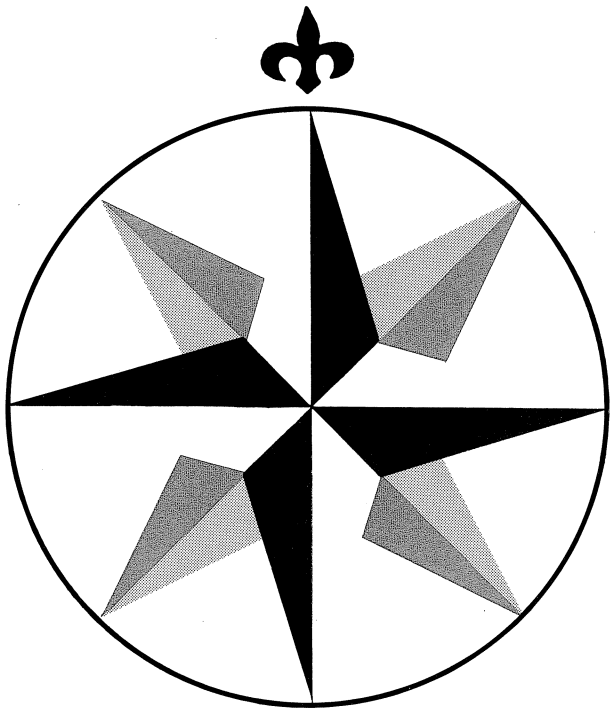
There are xxx free lines in the text memory that can be used to enter messages (Editor).

xxxx what?

The xxxx command requires a parameter.

xxxx ?

The xxxx command is not recognised by the modem. You have entered an invalid command, so try again.



Sailor

Sailor

INTEGRATED RADIOTELEX SYSTEM
INSTALLATION AND SERVICE MANUAL
FOR H1240 RADIOTELEX MODEM

A/S S. P. RADIO · AALBORG · DENMARK

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LIST OF TABLES

APPENDIX TO SECTION 6:

SYSTEM SPECIFICATIONS

Communication Control:	CCIR Rec. 476-3
Line Signal:	Two/four tone keyed with 7-unit code, constant 4B/3Y ratio in accordance with CCIR Rec. 476-3, 100 Baud synchronous for H1240.optional: 100 Baud synchroneous Twinplex in accordance with CCIR Rec. 346-1.
Mcdulation:	Phase-continuous constant envelope AFSK keying.
Tone Frequencies:	Full programmable between 1 kHz and 3 kHz with 1 Hz resolution.
Frequency stab.:	0.1 Hz.
Demodulation:	+/- 65 Hz adaptive tracking filter demodulation.
Decision filt.:	Bit-slicing with software controlled dynamic threshold.
Demodulator:	-1.2 dB signal/noise ratio at 10% block error rate (-0.4 dB with dual speed Twinplex) in 1 kHz noise bandwidth.
RX-tone input:	+10 dBm to -40 dBm, 600 ohm balanced, strap selectable.
TX-tone output:	+10 dBm to -30 dBm, 600 ohm balanced, continuous adjustable.
Control input:	RS-410 type N.
Control output:	RS-410 type N (open collector, Darlington drive).
Console interface:	CCITT Rec. V.28 (RS-232C), 50 to 2400 Baud ITA-2 code, or 75 to 9600 Baud ITA-5 code. Optional neutral 40 mA, polar +/- 20 mA.
Tape Reader/ Puncher Interface:	CCITT Rec. V.28 (RS-232C), optional neutral 40 mA.
Remote Control:	CCITT Rec. V.10 SPECIAL (RS-423, T-BUS).

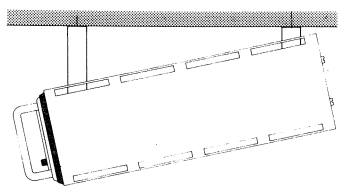
Character Storage Capacity:	64.000 characters (32 A4-size pages) shared between output buffer and text memory.
Keyboard Programming:	Full EEPROM programming of installation set-up, 105 user programmable frequency pairs and scanning tables.
Power Source:	24V DC (-10/+30%) and 220V/110V AC (-10/+15%) 50/60 Hz
Power Consumption:	25 VA
Ambient Temp.	0 deg. C to 55 deg. C operating, -20 deg. C to 70 deg. C storage.
Relative Hum.:	95% non-condensing.
Vibration:	IEC CEPT and MPT 1204.
Physical Dimensions in Cabinet H1225:	495 mm wide x 145 mm high x 475 deep incl. connectors
Weight:	Approx. 16 kg in Cabinet H1225.

Our products are under continuous research and development. Any information may therefore be changed without prior notice.

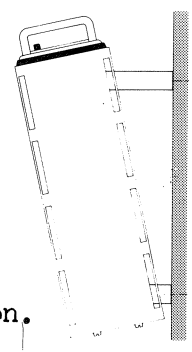
DIMENSIONS

Installation possibilities for SAILOR Radiotelex Modem ARQ H1240 in cabinet H1225.
The cabinet H1225 can be tilted-up in 5 steps.

20 mm clearance around the cabinet.
75 mm clearance at rear side of cabinet.

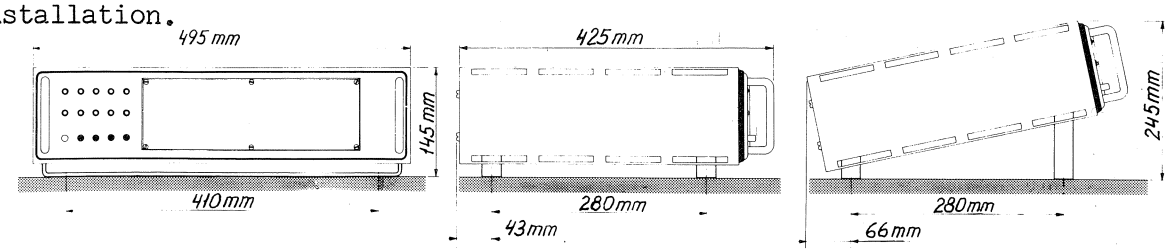


Deck head installation.



Bulkhead installation.

Desk top installation.



SECTION 1

GENERAL INFORMATION

1.1. INTRODUCTION

This manual provides instructions for installing, configuring and testing the H1240 Radiotelex Modem.

A varity of options and accessories may be linked together with the H1240, and specific installation- and configuration instructions and circuit descriptions may be found in the relevant Reference Manuals.

Section 2 includes a detailed installation description with specification of all input/output connections, and strap-configuration of available console Baud-rates, alphabet types, and data formats. For System Generation instructions please refer to H1240 System Operation Reference Manual, Section 8.

The Performance Verification, built into the H1240, is described in Section 3. If a possible system fault has been detected, a performance verification may show very useful in order to isolate the problem area and follow-on fault finding.

Section 4 includes a first level fault diagnosis, describing possible faults linked to installation and/or configuration errors. This Section may be useful both for the system operator and the trained service technician.

More detailed fault finding informations are found in Section 5, listning all relevant electrical parameters for the circuits and PC-boards in the H1240. Together with circuit description in Section 6, the trained technician may perform fault finding down to component level.

1.2. INTERFACE CONNECTIONS

On the rear panel are five sockets. These are the RX-Line, the TX-Line, the Console, the Remote, and the Mains connectors.

X1
RX-Line — This connector is used for receiver interface. It carries all the signals required to control and monitor the receiver from the Radiotelex Modem, including the 600 ohm line input and the mute control.

X2 — This connector is used for transmitter interface. It carries all the signals required to control and monitor the transmitter from the Radiotelex Modem, including the 600 ohm line output, the High-Tension control and the transmitter Key signal.

X3 Console	This connector is used for system terminal interface. This connector and its signals are compatible with the CCITT V24/28 (EIA RS-232C) standard which means that the terminal may be connected to the Radiotelex Modem via modem circuits. If the terminal has a current-loop interface (telex machine), the Model TT-1580-A Universal Teleprinter Interface must be installed between the Radiotelex Modem and the teleprinter.
X4 Remote	This connector is a multipurpose connector used for optional printer connection and/or fully automatic control of receivers, transmitters and other equipment via the T-BUS. The remote connector provides the necessary interface to extend the remote control via CCITT V24/28 (EIA RS-232C) equipment, including modems.
X5 Mains	This connector is used for connecting the Radiotelex Modem to the power source. The connector includes a ground connection.
X14 DC-supply	This connector is used for connecting the Radiotelex Modem to the DC power source.

SECTION 2

INSTALLATION

2.1. INTRODUCTION

This section provides specific information enabling you to install the model H1240 Radiotelex Modem into your own radio system, with minimal effort. The default, or factory configuration is described, together with procedures for altering the default configuration.

The section also includes information about initial inspection and performance verification.

We recommend reading the entire chapter before installation and use.

2.2. QUICK SYSTEM CONNECT AND CHECKOUT

The following brief outline may be used to get the model H1240 Radiotelex Modem up and running.

- Unpack system components.
- Ensure that the voltage is set for the voltage range of the nominal line voltage in your area.
- Install the correct jumpers for the console type and baud rate.
- Connect the H1240 with the console. Use the TT-1580A teleprinter interface if the console is a telex machine.
- If not ordered from the factory, program all the parameters for your configuration.
- Connect printer to the Radiotelex Modem (if supplied).
- Connect the receiver and transmitter to the Radiotelex Modem.

2.3. INITIAL INSPECTION

WARNING

To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the front or rear panel or outer covers. Read the safety summary at the front of this manual before installing or operating the H1240 Radiotelex Modem.

Inspect the shipping carton immediately upon receipt for evidence of mishandling during transit. If the shipping carton is severely damaged or waterstained request that the carrier's agent be present when the carton is opened. Save the carton packing material for future use.

Contents of the shipment should be as listed in the packing-list supplied. If the contents are incomplete, if there is mechanical damage or defect, or if the Radiotelex Modem does not pass the performance verification, notify your dealer.

After you unpack the Radiotelex Modem, inspect it thoroughly for hidden damage and loose components or fittings.

- Inspect the cable harnesses for stress, loose or broken wires, or broken cable ties.
- Examine all the components for loose or missing hardware. Tighten all loose hardware.
- Clean loose debris from the cabinet interior.

2.4. STORAGE

The H1240 Radiotelex Modem may be stored or shipped in temperatures within the limits -40°C to +75°C. It is advisable to protect the Radiotelex Modem from extreme temperature variation which can cause excessive condensation. It is recommended that the Radiotelex Modem is unpacked immediately on delivery.

2.5. REPACKING FOR SHIPMENT

The shipping carton for the model H1240 has been carefully designed to protect the Radiotelex Modem and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, model number and full serial number. Mark the carton FRAGILE to ensure careful handling.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material:

- Wrap the Radiotelex Modem in heavy paper or plastic. Attach a tag indicating the type of service required, return address, model number and full serial number.
- Use a strong shipping container e.g. a double walled carton of 160 kg test material.
- Protect the front panel and the rear panel with cardboard and insert a 7 cm to 10 cm layer of shock absorbing material between all surfaces of the equipment and the sides of the container.
- Seal the shipping container securely.
- Mark the shipping container FRAGILE to ensure careful handling.

2.6. MOUNTING INFORMATION

The radiotelex Modem H1240 is designed to fit into SAILOR 19" rack system, which is used in the SAILOR Short Wave Programme 1000. See fig. 2.6.A.

The Radiotelex Modem H1240 can also be mounted separately in the compact cabinet H1225. See fig. 2.6.B.

2.7. POWER REQUIREMENTS

H1240 Power Requirements:

H1240	115/127/220/240V AC, +/- 10%, 50/60 Hz 24V DC -10/+30%
TT-1580A	117/220V AC, +/- 20%, 47 to 400 Hz

2.7.1. CONFIGURING POWER OPTIONS

Make sure each component in the system is configured for the correct voltage.

The Mains supply is connected to a three-terminal socket, X5 as follows:

X5-Ground	to	Safety Ground
X5-1	to	Mains Phase 1
X5-2	to	Mains Phase 2

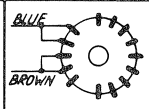
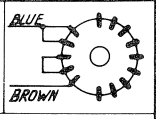
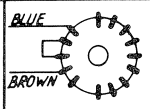
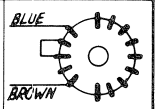
The battery supply is connected to a six-terminal socket, X-14 as follows:

X14-3	to	Battery Supply, + terminal
X14-5	to	Battery Supply, - terminal

When leaving the factory, the equipment is wired for 220V AC Mains supply and 24V DC operation. To change this standard voltage setting, proceed as follows:

- Remove the equipment top cover
- Remove the power supply top cover
- Relocate wires on the Mains transformer as shown in table 2.1.
  Replace relay RE701 with the one in question as shown in table 2.1.
- Relocate top covers on power supply and equipment
- Change Mains fuse to the correct value

Table 2.1. Power Options

MAINS VOLTAGE	110 V AC	127 V AC	220 V AC	237 V AC
CONNECTIONS ON TR801				
F 901	0.5A TIME-LAG		0.315A TIME-LAG	
RE 701	WSU/GD-6-C BV 1062		WSU/GD-7-C	

2.7.2. FUSES

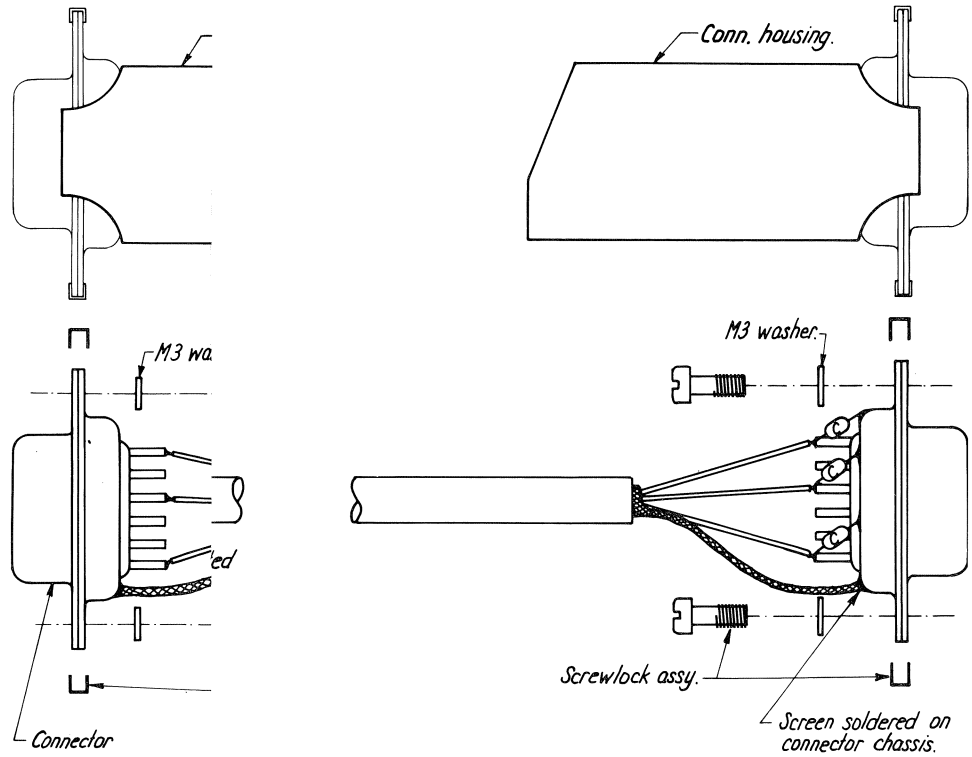
The Mains fuse, located on the equipment rear panel:

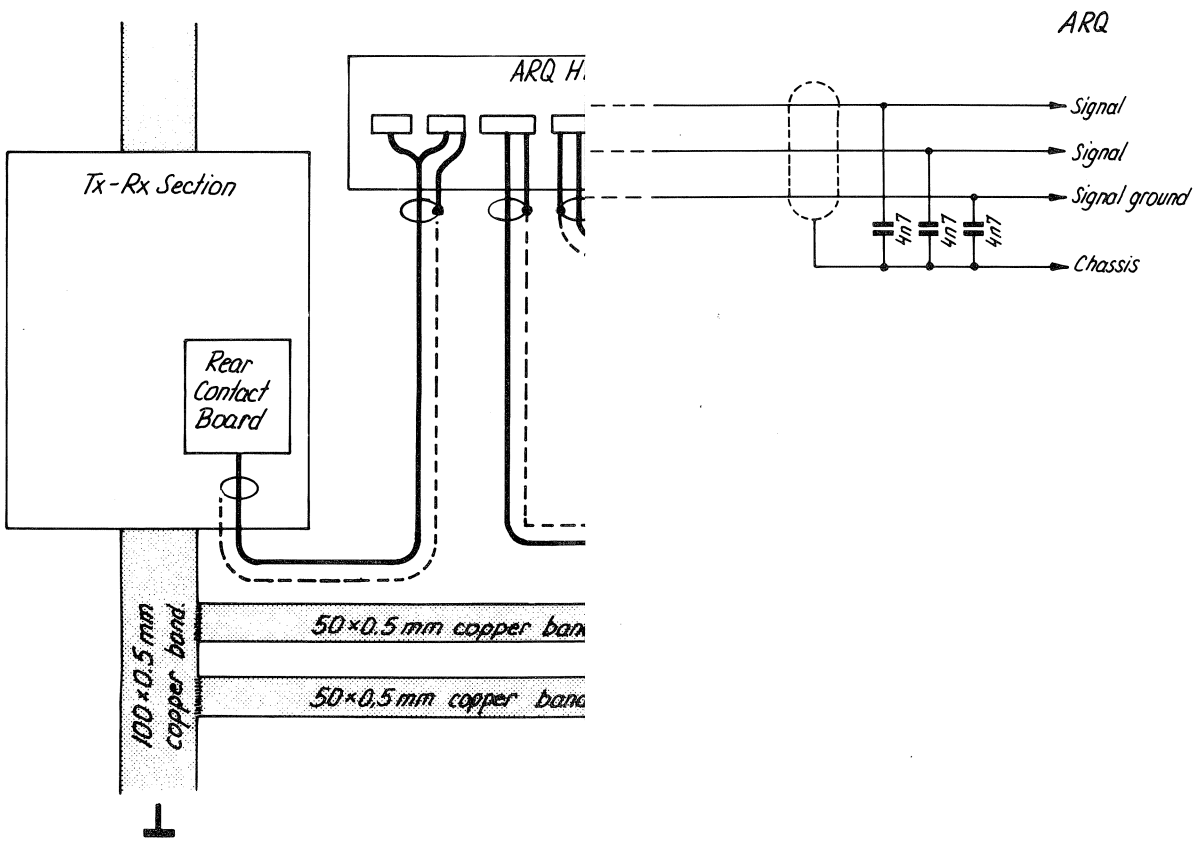
- 110V fuse should be 500 mA, medium timed
- 220V fuse should be 315 mA, medium timed
- 24V fuse should be 2.5 A , medium timed

2.7.3. GROUNDING

The H1240 is equipped with three-terminal power connector which, when connected to appropriate power receptacles, grounds the system. The safety ground is connected to the metal frame in the H1240 to provide a return path for fault currents due to equipment malfunction or external faults such as lightning faults. Do not operate the system from an AC power outlet which has no ground connection.

RF-grounding of the H1240 requires special attention. Each equipment shall have its own individual low-inductance earth connection. The use of a common busbar for grounding is not recommended as this can lead to unwanted common-mode coupling effects. Interconnection cables must be well screened.





NECTION WITH BAD GROUNDING AND HEAVY

2.7.3. A CABLE INTERCONNECTION Æ EX. IN LAND BASED INSTALLATION

2.7.4. CONVENIENCE OUTLETS

Power outlets for janitorial maintenance (vacuum cleaners, floor buffers, etc.) must be wired on a separate circuit breaker from the model H1240. If these precautions are not taken, operation of janitorial equipment will induce noise transients on the system power lines, which can cause abnormal operation of the system.

2.7.5. ISOLATION TRANSFORMERS

Switching heavy electrical machinery loads or operating certain types of equipment near the system can cause problems, even though the source is on a different circuit breaker. In extreme cases of severe electrical noise, it may be necessary to install an isolation transformer.

2.7.6. POWER LINE NOISE

Power from a typical AC power line is inherently noisy, and fluctuations can typically be caused by:

a. Land installations:

- Utility power company switching, circuit breakers tripping, air conditioning equipment, electrical welders, elevators, copying machines, and start-up of large electrical motors.

b. Ship installations:

- Semiconductor rectifier installations, power conversion plants, deck machinery, household appliances and fluorescent lightning.

- Radar and sonar installations.

- Switchgear and controlgear, automatic steering installations, gyrocompass navigational instruments, kitchen thermostats and heating plants.

Even though you cannot control or prevent disruptions from these items, remember to avoid connecting the model H1240 on the same circuit breaker with any of the other named equipment.

2.8. GENERAL INTERCONNECT INFORMATION

All external connectors are of the Cannon D-type. A complete set of connectors are delivered together with the Radiotelex Modem. Extra connector kits may be purchased separately.

For applications where cables will be made by the customer, it is important to note that the connector and the cable screen are fastened to the sockets on the Radiotelex Modem by means of two screws.

2.8.1. RX-LINE (X1)

The RX-Line connector carries all the signals required to control and monitor the receiver, including the 600 ohm line input circuit. The cable connector is a 9 pole, male type D-connector. Pin assignments and signal names are listed in table 2.2.

Table 2.2. RX-Line (X1) pin identification

Pin	Signal		Direction
1	600 ohm bal. line input	(AF)	Input
2	-		
3	600 ohm bal. line input	(AF)	Input
4	Line input center tap		Input
5	External demodulator	(RS-410-N)	Input
6	Receiver Muting	(RS-410-N)	Output
7	Signal ground		I/O
8	-		
9	Crypto	(RS-410-N)	Input

2.8.2. TX-LINE (X2)

The TX-Line connector carries all the signals required to control and monitor the transmitter, including the 600 ohm line output circuit.
The cable connector is a 9 pole, female type D-connector. Pin assignments and signal names are listed in table 2.3.

Table 2.3.: TX-Line (X2) pin identification

Pin	Signal		Direction
1	600 ohm bal. line output	(AF)	Output
2	Morse key	(RS-410-N)	Input
3	600 ohm bal. line output	(AF)	Output
4	Line output center tap		Output
5	Transmitter key signal	(RS-410-N)	Output
6	Transmit Time	(RS-410-N)	Output
7	Signal ground		I/O
8	High Tension on	(RS-410-N)	Output
9	Transmitter Ready	(RS-410-NM)	Input

2.8.3. CONSOLE (X3)

The console connector conforms to the CCITT V.24/V.28 (EIA RS-232C) Interface standard. This specifies a 25-pin D-type connector with lettered pin assignments for ground, data, control and timing circuits. It provides a common meeting ground, allowing interaction between many types of equipment and manufacturers, providing a great flexibility in the selection of system console.

The cable connector is a 25 pole, male D-connector. While the V.24/V.28 designates 23 circuits, the number actually in use depends upon the type of console or modem. Pin assignments and signal names are listed in table 2.4.

Table 2.4.: Console (X3) pin identification

Pin	Name	Signal	Direction
1	FG	Frame Ground	I/O
2	TXD	* # Transmitted Data	Input
3	RXD	* # Received Data	Output
4	RTS	# Request To Send (DIRC)	Input
5	CTS	# Clear To Send (Tape rdr.)	Output
6	DSR	Data Set Ready	Output
7	SG	* # Signal Ground	I/O
8	RLSD	Received Line Signal Det.	Output
9	-		
10	-		
11	+12	+12V Power	Output
12	-		
13	-		
14	CW	Morse key (RS-410-N)	Input
15	TXC	Transmit Clock	Output
16	-		
17	RXC	Receive Clock	Output
18	-12	# -12V Power	Output
19	CRY	Crypto (RS-410-N)	Input
20	DTR	* Data Terminal Ready	Input
21	-		
22	ALRM	External alarm (RS-410-N)	Output
23	-		
24	-		
25	+5	# +5V Power	Output

For standard installations, where a terminal is connected to the Radiotelex Modem, only those connections marked with an "*" are used.

For current loop installations, where a telex machine is connected to the Radiotelex Modem, the connections marked with an "#" are used.

If your application requires a current loop interface (telex interface) please refer to section 2.8.5.

2.8.4. REMOTE (X4)

The remote connector is a multipurpose input/output used for a number of applications. In standard installations, without remote control of receiver and transmitter, a printer may be connected directly to the connector. If remote control of equipment is used, the connector is used for the T-BUS (Internal Time Division Command/Response Data Bus), controlling up to 31 different types of equipment via a single coaxial cable.

The Remote connector conforms to the CCITT V.24/V.28 (EIA RS-232C) Interface Standard. This specifies a 25-pin D-type connector with lettered pin assignments for ground, data, control and timing circuits. It provides a common meeting ground, allowing interaction between many types of equipment and manufacturers, providing a great flexibility in the selection of system components.

The cable connector is a 25 pole, male type D-connector. While the V.24/V.28 designates 23 circuits, the number actually in use depends upon the type of equipment that are used. Pin assignments and signal names are listed in Table 2.5.

Table 2.5.: Remote (X4) pin identification

Pin	Name		Signal	Direction
1	FG		Frame Ground	I/O
2	TXD		Transmitted Data	Input
3	RXD	*	Received Data	Output
4	RTS		Request To Send	Input
5	CTS		Clear To Send	Output
6	DSR		Data Set Ready	Output
7	SG	*	Signal Ground	I/O
8	RLSD		Received Line Signal Det.	Output
9	-			
10	-			
11	+12		+12V Power	Output
12	-			
13	-			
14	-			
15	TXC		Transmit Clock	Output
16	-			
17	RXC		Receive Clock	Output
18	-12		-12V Power	Output
19	-			
20	DTR	*	Data Terminal Ready	Input
21	-			
22	-			
23	-			
24	-			
25	+5		+5V Power	Output

For standard installations, where a printer is connected to the Radiotelex Modem, only those connections marked with an "*" are used.

If your application requires remote control of receivers, transmitters, or other types of equipment, refer to the T-Bus reference manual.

2.8.5. CURRENT LOOP TELEPRINTER INTERFACE

To adapt your H1240 to current loop interface, optional jumper connections are required. In addition, the model TT-1580A Teleprinter Interface must be installed between the board and the serial peripheral.

The necessary jumper connections are as follows:

- Install jumper W16 (provides -12V to interface).
- Install jumper W17 (provides +12V to interface).
- Install jumper W18 (provides +5V to interface).

WARNING

Current limiting is not provided for these outputs. If improperly connected, damage to the board and power supply could result.

The optimal modem TT-1580A Teleprinter Interface converts the Radiotelex Modems V.24/V.28 signal levels to a current loop interface and provides signal translation for transmitted data, received data and a teletypewriter tape reader relay.

2.8.6. H1249 KEYBOARD PROCESSOR

To adapt your H1240 to drive the H1249 Keyboard Processor, optional jumper connection is required.

- Install jumper W14 (provides +12V to interface).

WARNING

Current limiting is not provided for these outputs. If improperly connected, damage to the board and power supply could result.

2.9. JUMPER CONFIGURATIONS

Much of the flexibility of your H1240 Radiotelex Modem is due to the use of operator controlled configurations, which means that the Radiotelex Modem can be adjusted for your specific application. Most of this information in contained in a single integrated circuit, that stores the parameters needed for local configuration. Some parameters, however, must be set by jumpers on the main PC-board. These jumper connections may easily be altered from their factory configurations to suit your particular application.

2.9.1. DEFAULT CONFIGURATION

Table 2.6. summarises the jumper configurations and their use.

Table 2.6.: Numerical listing of jumpers

Jumper	Function	Text ref.
*W1	Reserved	None
*W2-4/5	Interconnect aux. modem board	None
W3	Not used	None
W4	Reserved	None
*W5	Reserved	None
W6	Reserved	None
W7	Connect +5V to battery back-up	None
W8	Disable EEPROM programming	9.1.
W9	Reserved	None
W10	Enable service Reset	None
*W11	Line input level	2.10.1.
W12	Line input level	2.10.1.
W13	-12V to Remote socket (X4)	2.8.6.
W14	+12V to Remote socket (X4)	2.8.6.
W15	+5V to Remote socket (X4)	2.8.6.
W16	-12V to Console socket (X3)	2.8.5.
W17	+12V to Console socket (X3)	2.8.5.
W18	+5V to Console socket (X3)	2.8.5.
*W19-0	Console Baud rate	2.9.2.
W19-1	Console Baud rate	2.9.2.
W19-2	Console Baud rate	2.9.2.
W19-3	Console Baud rate	2.9.2.
*W19-4	Console character length	2.9.2.
W19-5	Console stop bit length	2.9.2.
W19-6	Console alphabet selection	2.9.2.
W19-7	System start-up mode	2.9.3.
*W20	Select Line input from RX	2.10.1.
W21	Select V28 input from RX	2.10.1.
W22	Reserved	None
*W23	Reserved	None

Factory installed jumpers.

2.9.2. CONSOLE SELECTION

A set of jumpers denoted W19-0 through W19-7 allow you to configure the Radiotelex Modem to operate according to the requirements of your terminal. This section described these jumpers.

The conditions controlled by these jumpers are:

- Baud rates. You can select any of 16 Baud rates.
- Character length. You can select 2 char lengths for ASCII terminal.
- Stop bit length. You can select 2 different types of stop bits.
- Alphabet selection. You can select ASCII or Baudot codes.

Table 2.7. summarises the jumpers and their settings.

Table 2.7.: Console jumper settings

Jumper	Pos.	Function
W19-0		Baud rate; see table 2.8.
W19-1		Baud rate; see table 2.8.
W19-2		Baud rate; see table 2.8.
W19-3		Baud rate; see table 2.8.
W19-4	Out	Character length 8-level (ASCII)
	In	Character length 7-level (ASCII)
W19-5	Out	Baudot: 1.5 stop bit ASCII: 2 stop bits
	In	1 stop bit
W19-6	Out	ASCII (CCITT-5) alphabet
	In	Baudot (CCITT-2) alphabet

NOTE

The following combination is illegal and will be rejected by the Radiotelex Modem:

ASCII: 8-level, 2 stop bit, 75 Baud

The following combination will be modified during FEC reception:

Baudot: 1.5 stop bit, 50 Baud will be modified to
1 stop bit, 50 Baud during RX

The Baud rate settings depend on the alphabet selected. Table 2.8. summarises the baud rates. You should use the column appropriate for your alphabet selection.

Table 2.8. Baud rate settings.

Jumper W19 —				Baud rate	
0	1	2	3	ASCII	Baudot
In	In	In	In	75	50
Out	In	In	In	110	56.52
In	Out	In	In	134.5	75
Out	Out	In	In	150	100
In	In	Out	In	200	110
Out	In	Out	In	300	112.5
In	Out	Out	In	600	127,5
Out	Out	Out	In	1200	150
In	In	In	Out	1800	165
Out	In	In	Out	2000	200
In	Out	In	Out	2400	225
Out	Out	In	Out	3600	300
In	In	Out	Out	4800	600
Out	In	Out	Out	7200	1200
In	Out	Out	Out	9600	1800
Out	Out	Out	Out	-	2000

2.9.3. AUTOMATIC CONTROL OF TAPE READER/PUNCHER

A tape reader/puncher inserted between the Radiotelex Modem and the console may be controlled automatically from the Radiotelex Modem.

Special ASCII characters are used to start or stop the reader or puncher by remote control. These characters are known by various names.

Table: 2.9.: Tape reader/puncher control characters

Names			Function
DC1,	X-ON,	Ctrl-Q	Reader ON
DC2,	TAPE,	Ctrl-R	Punch ON
DC3,	X-OFF,	Ctrl-S	Reader OFF
DC4,	NO TAPE,	Ctrl-T	Punch OFF

2.10. ADJUSTMENT OF LINE LEVELS

The modem signal lines connected to the transmitter and the receiver are factory set for an input/output level of 0 dBm in 600 ohm.

The modulator line output level and the demodulator sensitivity may be adjusted to match other nominal levels. These levels may be measured in either dBm, voltage rms or voltage peak-peak. Table 2.10. can be used to translate between these forms.

Table 2.10.: Line levels in dBm, Vrms and Vpp

dBm	Vrms	Vpp
+16	4.902	13.863
+13	3.466	9.803
+10	2.451	6.932
+ 6	1.550	4.384
+ 3	1.096	3.100
0	0.775	2.192
- 3	0.548	1.550
- 6	0.388	1.096
-10	0.245	0.693
-13	0.173	0.490
-16	0.123	0.347
-20	0.0775	0.219
-23	0.0548	0.155
-26	0.0388	0.1096
-30	0.0245	0.0693
-33	0.0173	0.0490
-36	0.0123	0.0347

2.10.1. INPUT LEVEL ADJUSTMENT

The source of input may be selected from the 600 ohm line input or from a V24 digital signal level.

- Install jumper W20 to select input from 600 ohm line
- Install jumper W21 to select input from V24 digital signal

Both inputs are available on the RX-Line connector (X1).

Jumpers W11 and W12 are used to adjust the 600 ohm line input to the nominal input signal level. Install the jumpers as follows:

- Nominal input level 0 dBm: Install jumper W12
- Nominal input level -10 dBm: Install jumper W11

2.10.2. OUTPUT LEVEL ADJUSTMENT

The modulator output level may be adjusted by the variable resistor located between the two line transformers (R232). The level may be set from -30 dBm to +10 dBm.

2.11. SYSTEM GENERATION

As part of the installation procedure, the H1240 Radiotelex Modem must be configured for your receiver and transmitter. The station identity (answer-back, ARQ call-code and FEC call-code) must also be programmed. This is done during the system generation. For standard installations, only a few constants need to be adjusted.

For a detailed description of system generation, refer to section 8 in the H1240 System Operation Reference Manual.

2.12. INSTALLATION CHECKOUT

Before using the H1240 Radiotelex Modem for normal operation for the first time, chech each of the following:

- Voltage is set for the nominal line voltage.

- Proper fuses are installed.

- The following cables are properly wired and fastened:

  a. Power cable.
  b. Terminal or TT-1580A connected to console socket.
  c. If TT-1580A is used, cable from this unit to teleprinter.
  d. Printer connected to remote socket, if needed.
  e. Receiver connected to RX-Line socket.
  f. Transmitter connected to TX-Line socket.
  g. HF-earthing of all equipment.

- Correct jumpers are installed.

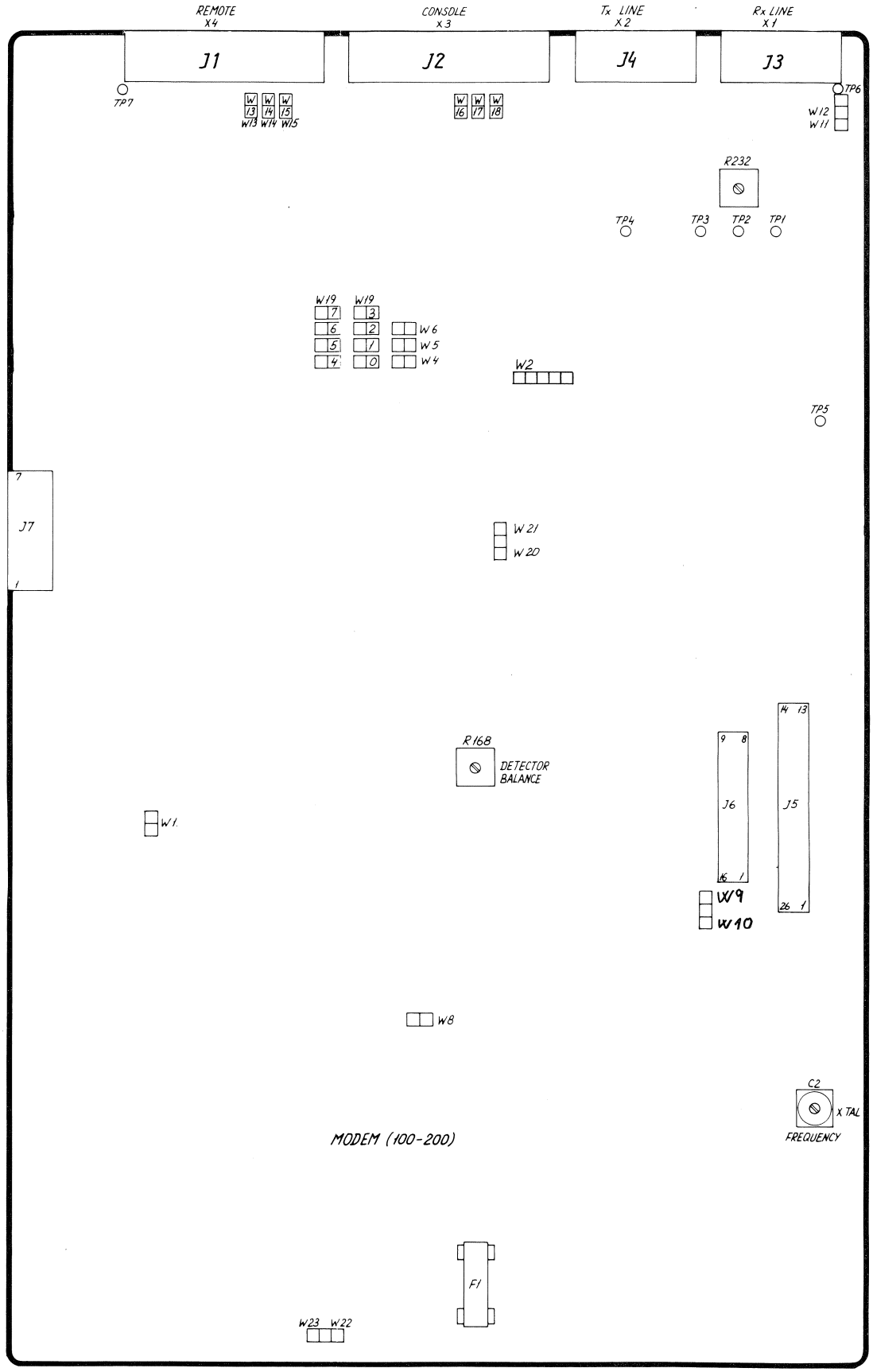
- Baud rate set ? Character length ? Stop bits ? Alphabet ?

- Desired constants programmed during System generation.

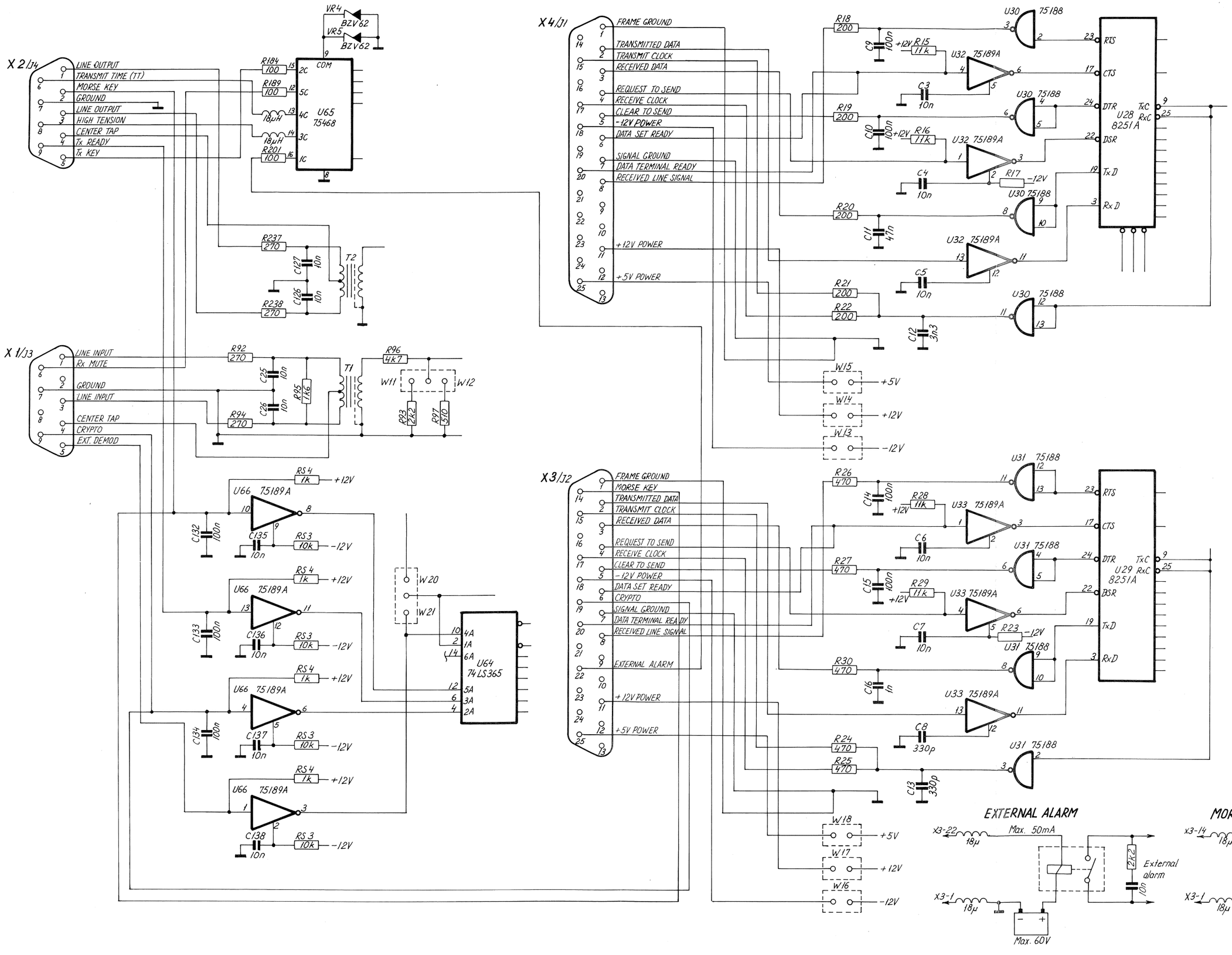
- ARQ call-code ? FEC call code ? Answer-back ?

- Correct keying level.

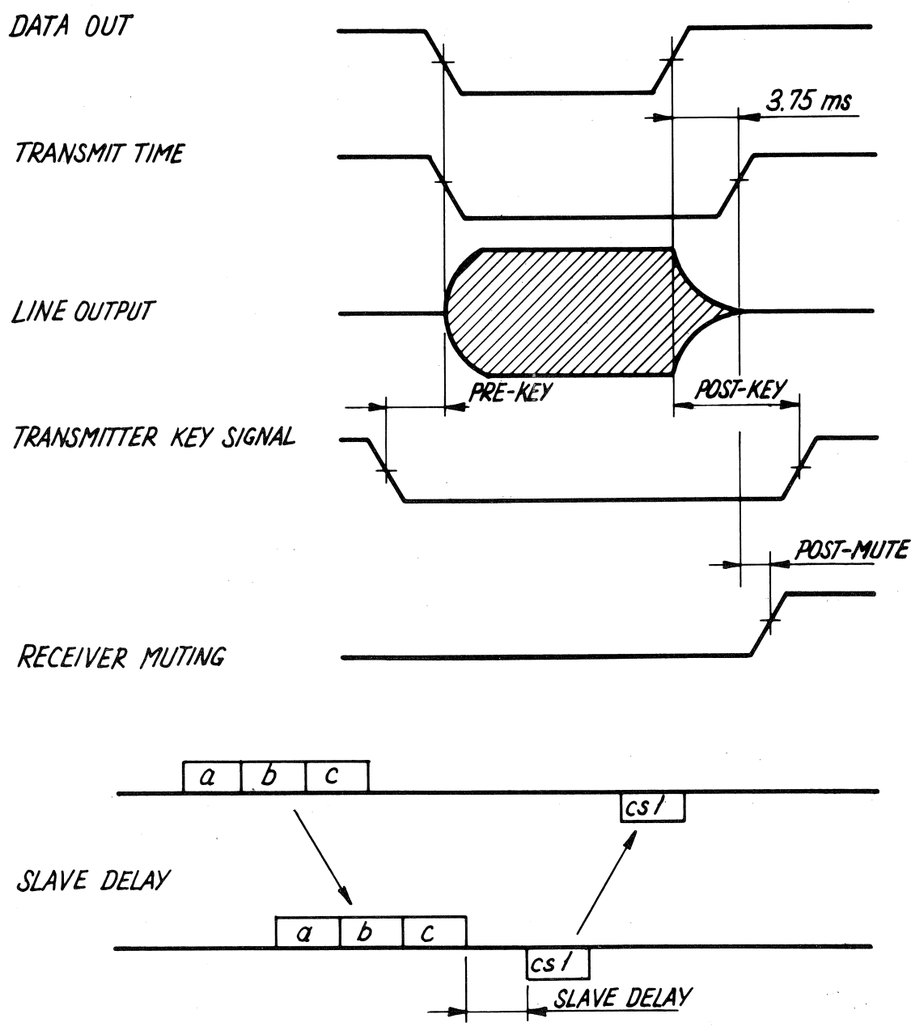
If test cables are delivered as part of the order, a performance verification should be done prior to normal system operation. Refer to section 3 for a detailed description.



2.13. MECHANICAL LAYOUT (100-200) MODEM BOARD H1240


X 2/J4
LINE OUTPUT
TRANSMIT TIME (TT)
MORSE KEY
GROUND
LINE OUTPUT
HIGH TENSION
CENTER TAP
Tx READY
Tx KEY
VR4 BZV62
VR5 BZV62
R184 100
R189 100
18µH
18µH
R201 100
COM
U65 75468
2C
5C
4C
3C
1C
R237 270
C127 10n
C126 10n
R238 270
T2
X 1/J3
LINE INPUT
Rx MUTE
GROUND
LINE INPUT
CENTER TAP
CRYPTO
EXT. DEMOD
R92 270
C25 10n
R95 1K6
C26 10n
R94 270
T1
R96 4K7
W11
W12
R93 2K2
R97 510
RS 4 1k +12V
U66 75189A
C132 100n
C135 10n
RS 3 10k -12V
C133 100n
C136 10n
C134 100n
C137 10n
C138 10n
W20
W21
U64 74LS365
X4/J1
FRAME GROUND
TRANSMITTED DATA
TRANSMIT CLOCK
RECEIVED DATA
REQUEST TO SEND
RECEIVE CLOCK
CLEAR TO SEND
-12V POWER
DATA SET READY
SIGNAL GROUND
DATA TERMINAL READY
RECEIVED LINE SIGNAL
+12V POWER
+5V POWER
R18 200
R19 200
R20 200
R21 200
R22 200
C9 100n
C10 100n
C11 47n
C12 3n3
R15 11k
R16 11k
R17 -12V
C3 10n
C4 10n
C5 10n
U30 75188
U32 75189A
U28 8251A
RTS
CTS
DTR
DSR
TxD
RxD
TxC
RxC
W15 +5V
W14 +12V
W13 -12V
X3/J2
FRAME GROUND
MORSE KEY
TRANSMITTED DATA
TRANSMIT CLOCK
RECEIVED DATA
REQUEST TO SEND
RECEIVE CLOCK
CLEAR TO SEND
-12V POWER
DATA SET READY
CRYPTO
SIGNAL GROUND
DATA TERMINAL READY
RECEIVED LINE SIGNAL
EXTERNAL ALARM
+12V POWER
+5V POWER
R26 470
R27 470
R30 470
R24 470
R25 470
C14 100n
C15 100n
C16 1n
C8 330p
C13 330p
R28 11k
R29 11k
R23 -12V
C6 10n
C7 10n
U31 75188
U33 75189A
U29 8251A
W18 +5V
W17 +12V
W16 -12V
EXTERNAL ALARM
x3-22
18µ
Max. 50mA
2k2
External alarm
10n
x3-1
18µ
Max. 60V
MORSE KEY
x3-14
18µ
2k2
10n
Morse key
x3-1
18µ

2.15. INTERFACE SIGNAL WAVEFORMS H1240



SECTION 3

PERFORMANCE VERIFICATION

3.1. INTRODUCTION

Each time the H1240 is switched on, the system automatically runs through a sequence of ROM/RAM test routines. During these tests a blinking pattern will be visible on the front panel indicators.

During the first test, the "Lock" indicator is on. This test is a short ROM test which ensures that enough of the ROM code is working to enable the use of the long ROM test's diagnostic capability. This is accomplished by doing a checksum of the first ROM code. If the checksum is good, the initial test proceeds to the short RAM test; otherwise, the short ROM test loops and the "Lock" indicator is kept steadily on.

The short RAM test reads ROM data and writes this information to RAM addresses. This includes all the static RAM area. The test then XOR's the ROM and RAM data. The ROM data is read again, complemented and stored in RAM. The RAM data is then XOR'd with complemented ROM data. If ROM and RAM is identical, the XOR's will result in all zeros and the test will pass. Any difference between ROM and RAM data gives nonzero result which causes the test to repeat. The "Message" indicator is on during this test.

The long ROM test is similar to the short ROM test in that it verifies checksums. However, the long ROM test does a checksum each of the remaining ROM's in sequence. The long ROM test is repetitive, and will display an error message if there are any failures.

After these tests the Mark and/or the Space indicator should light. If a problem is found during this short test, neither of these indicators will be on. Instead one of the following error indicators will light steadily:

Lock	ROM # 1 checksum error
Track	ROM # 2 checksum error
Data in	ROM # 3 checksum error
Data out	ROM # 4 checksum error
Error in	ROM # 5 checksum error
Error out	ROM # 6 checksum error
Message	Static RAM test error

Replacement of ROM code (software change) will result in a checksum error. After each replacement, the operator must run a Performance Verification to update the checksum.

There are two methods of running the Performance Verification.

- When the modem is in the standby mode, type

  TEST (RETURN)

or

- Insert strap W19-7, wait for the System Generation message, and press "3" to start the Performance Verification.

An initial message is displayed:

```
---------- Performance verification ----------
      S: Start    C: Cycle      E: End
                            no.tests   no.fail
  ROM checksum test:
```

Press "S" to start the test. This will start the particular test and repeat it, until a key is pressed. Press Carriage Return to select the next test.

If all tests are to be performed, press "C". This causes the tests to be run in sequence. For all tests to pass, the indicator for "no.fail" should be 0 (zero) or N/A (Not Applicable). The cycle test can also be used to check the system for intermittent failures since any failure will be permanently recorded. The EEPROM- and the keyboard-tests are not included in the Cycle test.

Pressing "E" terminates the Performance verification.

3.2. ROM CHECKSUM TEST/UPDATE

Verifies ROM operation. This test compares the checksum of each ROM to its expected value. If all checksums are correct, the test will pass. Otherwise, it will give the operator the choice of updating the expected values, to reflect the actual value by the question:

Update checksum (Y/N)?

Jumper W8 must be removed during checksum update.

3.3. CPU TEST

Verifies all the CPU instructions, including conditional branches and arithmetic functions.

3.4. DYNAMIC RAM TEST

Verifies operation of the dynamic text memory. The test consists of writing walking 1's and 0's patterns to each RAM address and reading them back again. The test takes approximately 10 seconds for the 16 kbyte version, and 40 seconds for the 64 kbyte version.

The dynamic RAM test erases the contents of the textbuffer.

3.5. STATIC RAM TEST

Verifies operation of the static RAM. The test is divided into two steps. Part of the RAM contains information that must be stored in the text memory prior to the test. The test itself consists of writing walking 1's and 0's patterns to each RAM address and reading them back again.

3.6. TIME INTERRUPT TEST

An internal timing circuit is used to interrupt the CPU so that it can keep track of time and synchronise properly with the other modem during a connection. This test verifies that an internal signal causes this interrupt, at a rate of 1.25 ms and that the CPU can correctly read and respond to the interrupt.

3.7. EEPROM TEST

Verifies that the EEPROM operates properly and that the PROM programmer is capable of erasing and programming the EEPROM.

The test takes approximately 20 minutes and erases the entire contents of the EEPROM. This means that the operator must perform a complete System Generation after the EEPROM test.

3.8. MODEM TEST

Verifies operation of the tone modulator/demodulator and associated filtering and timing circuitry.

3.9. SERIAL I/O TEST

Verifies operation of the "Remote" USART and associated I/O circuitry.

There are a number of pins on the X4 connector that have to be connected before the test can run. These are:

X4-2	to	X2-3
X4-6	to	X2-20
X4-4	to	X2-5

3.10. PARALLEL I/O TEST

Verifies operation of the receiver and transmitter I/O circuitry.

There are a number of pins on the X1 and the X2 connectors that must be connected before the test can run. These are:

X1-5	to	X2-8
X1-6	to	X2-9
X1-9	to	X2-5
X2-2	to	X2-6

Also, the jumper pair W20/W21 must be set in position W21 before the test can run correctly. Remember to reinstall the jumper in the correct position after the test.

3.11. KEYBOARD TEST

Verifies functional operation of all front panel keys. Press "S" to start the test. Press the keys in sequence. If a key is pressed out of sequence or if two keys are pressed at the same time, a "Failed" message will be displayed.

OBS! not in function.

SECTION 4

FIRST LEVEL FAULT DIAGNOSIS

4.1. INTRODUCTION

If a malfunction in a system has been traced down to the H1240 Radiotelex Modem, a simple fault diagnosis may be carried out by the operator.

Before this diagnosis is carried out, the operator should run through a System Generation to verify that the modem is set correctly. Please refer to the H1240 System Operation Reference Manual.

4.2. FAULT DIAGNOSIS

Trouble	Probable cause
After power-on, no front-panel LED's turn on.	Check that the Mains/Battery has been connected, and that the supply fuses are not blown. When connected to Mains, a green LED, located inside the power-supply assy. should turn ON. When equipped with option 001, the battery back-up LED's should turn equally ON.
After power-on switching, the lamp test halts before Mark/Space LED's turn on.	ROM/RAM error. This condition will always appear after the programme memory has been changed, without a PROM update. Please refer to the performance verification section of this manual.
Continuous lamp test or flashing LED's.	This condition indicates a watchdog reset error. Please refer to second level fault diagnosis.
No communication or erroneous communication with the console device.	Check, that the modem has been set for correct alphabet, character speed, data length, and number of stop-bits. If using the TT-1580A Universal Teleprinter Interface, or the H1249 Keyboard-Processor, check that the power supply straps W16-W17-W18 have been installed. Also check, that the cable to/from the console device is conforming to the specifications, and that the console or console interface is working properly.
No copy of text when typing on console.	Check that both modem (System Generation) and Console is set for either half-duplex or full duplex operation.

Trouble	Probable cause
No line feeds when typing from console.	Check that Auto-linefeed is set correct during System Generation.
Missing soft-key commands when operating with H1249 Keyboard-Processor.	Check that the console is set for T+T during system generation.
When operating the modem, Soft Error 1, or Soft Error 2 appears on the console.	This condition indicates that the text memory has not been formated after loading of new soft-ware in the system, or an hardware error in the dynamic RAM memory. Please refer to the System Generation for memory formats and the second level fault diagnosis.
The console writes "cannot programme EEPROM".	This condition may indicate, that the +5V supply to the programmer is below rating, check that strap W1 is installed in the power supply assy., when operating with option 001, Text Memory Battery Back-Up, and that F1 on the main modem board is not blown.
No hard-copy printer output.	Check that the printer cable is installed correct and that power is applied to the printer.
Printer output terminates after 2-3 lines of information.	Missing printer status information. Check that the printer cable is installed correct (not twisted 180 degrees.
Erroneous print-out with graphic symbols between the characters.	Check that the printer is set for correct speed and character specifications, that the modem printer speed (system generation) is set equivalent, and that remote control (system generation) is switched off if the printer is not using the H1285 T-BUS/Centronics Interface.
Unable to recall messages stored in memory.	Check by using the DIR if messages are stored as secret files.
No transmitter signal when commanding FEC transmission.	Missing High-Tension or Transmit Key line to transmitter, or AF-tones from modem unable to drive transmitter. Check interface cabling and readjust AF output level is necessary.

Trouble	Probable cause
During FEC transmission, the Data Out LED flashes randomly.	Strong interfering RF-radiation. Reconfigure the installation and add ground busbares appropriate.
Unable to receive FEC or ARQ signals.	Check Mark/Space tone programming, selcall codes, AF-tone levels to modem, and correct strapping of the main modem board.
May receive FEC and ARQ, but only when the AF signals are weak.	One of the Mark/Space tones are adjusted to wrong frequency.
May run ARQ but not FEC.	The FEC specifications, adjusted during System Generation is set off, set to wrong diversity period, or to FEC error rate % = 0.
May run FEC but not ARQ.	Receiver, Post-Mute, Transmitter Pre-Key, Transmitter Post-Key, or Slave delay, adjusted during System Generation, set to wrong configuration. Check that Transmit Key is used as keying signal and not Transmit Time.
May run ARQ when operating as Master, but not when operating as Slave.	Adjust Slave delay to e.g. 10 x 1.25 msec.
Unable to transmit messages stored in memory.	The carriage return button may have been hit twice after the message transmission has been requested.
May transmit ARQ but not receive ARQ.	This condition may indicate that the morse-key input is grounded.
Transmitting constant Mark or Space tone when operating in DIRC or DIRCA mode.	Console connector X3 pin-2 and pin-4 should be wired together.

SECTION 5

SECOND LEVEL FAULT DIAGNOSIS

5.1. INTRODUCTION

This section of the manual includes more detailed information regarding the special test PROM (optionally supplied), wave-forms, signal levels, and bandpass characteristics, enabling the trained technician to perform component-level fault diagnosis and repair. A detailed circuit schematic description is found in Section 6 of this manual.

Second level fault finding should always be preceeded by the Performance Verification (Section 3) and the First Level Fault Finding (Section 4).

If a possible fault is unsolved after the following second level fault finding has been performed, any symptoms detected during the fault finding procedure should be forwarded to S. P. Radio A/S, enabling prompt and documented assistance.

WARNING

Second level fault finding should only be performed by trained technicians.

Unqualified component-level fault finding may result in permanent damage to the H1240.

5.2. TEST PROM

A special test PROM, to be installed in PROM socket U34, may be supplied (optionally), enabling a step-by-step exercise of all digital- and analog circuits in the H1240 Radiotelex Modem.

The following tests are included:

- EEPROM test.
- Parallel Input/Output test (ref. section 3.10.)
- Static RAM test.
- Dynamic RAM test.
- Printer port test (ref. section 3.9.)
- Display/switch control test.
- Modem test (continuous rx- and tx-tones).
- Memory manipulation.
- CPU register display.

Major parts of these tests may also be carried out by the performance verification as described in Section 3.

To perform a modem test without above test PROM, select appropriate Mark- and Space tones for the test (System Generation), and run through the RX test. To perform the TX test, select the FEC mode of operation (the TX-section will be modulated with the FEC information).

5.3. DEMODULATOR/MODULATOR SPECIFICATIONS

The demodulator/modulator part of the H1240 should perform to the following specifications:

Test conditions: 600 ohm reference level, input attenuator in pos. W12, all levels measured with high impedance multimeter, TX-output levels measured with 600 ohm load.

- RX-input clipper level (W12 installed) : +10 dBm
- Input filter 3 dB cut-off (test point 1) : 40 Hz -3.4 kHz
- Input attenuator balance : 1 dB
- Max. test point noise level (TP1 - TP5) : -40 dBm
- RX center frequency deviation (TP3 - TP4) : 15 Hz (without frequency tracking)
- RX filter bandwidth (TP3 - TP4) : 70 Hz - 90 Hz
- RX filter amplification :
  from input to TP1 -12 dB +/- 1 dB
  from input to TP2 and TP5 - 6 dB +/- 1 dB
  from input to TP3 and TP4 + 4 dB +/- 1 dB
- RX filter unbalance (TP3 - TP4) : 1 dB
- 0 dBm Mark-tone detector (U62 pin 7) : 2 Vdc
- 0 dBm Space-tone detector (U62 pin 7) : -2 Vdc
- TX-tone dynamic range (output connector) : -40 dBm to +10 dBm
- TX-tone filter level (TP3 - TP4) : +8 dBm +/- 1 dB
- 1 kHz to 3 kHz TX-tone level stability : +/- 0.5 dB

- TX-tone key-off level (output connector) : -40 dBm
- TX-filter bandwidth (output connector) : 310 Hz +/- 20 Hz
- Filter switch frequencies : approx. 10 times the selected tone freq.

5.4. QUICK REFERENCE FAULT FINDING

5.4.1. NO LED'S TURNS ON

Check fuses in the H1240, and correct +5V, +12V, and -12V supply to the main PC-board from the power supply assy.

5.4.2. CONSTANT FLASHING OF FRONT-PANEL LED'S

This failure indicates a continuous watchdog reset to the CPU circuit. The failure may occur after programme circuit replacement, and correct insertion of the PROM's should be checked.

The CPU clock circuit should be verified by measuring correct 9,216 MHz clock signals on pin 1 and 2 on the CPU, U1.

The fault may indicate circuit failure of the CPU U1, the watchdog U18, or the oscillating capacitor C23.

Check correct 1.4 msec. watchdog inhibit signals on U17 pin 10, correct +5V supply voltage to the PC-board, and correct adjustment of the voltage monitoring resistor R56 (should be turned fully CW).

5.4.3. NO COMMUNICATION WITH THE CONSOLE

Check that the console interface format is adjusted for correct alphabet type, baud-rate setting, and character/stop-bit length.

The fault may indicate an error in the V.24/V.28 driving circuits U31 and U33, in the USART U29, or in the timer circuit U26.

5.4.4. EEPROM TEST FAILURE

When the EEPROM test fails, and/or when the system displays the error text "cannot programme EEPROM", the possible fault should be traced to components in the EEPROM voltage step-up converter. (be sure that the strap W8 has been removed before the test is performed, and that strap W1 in the power supply assembly has been installed after an option 001. Text Memory Battery Back-Up has been installed).

Check correct operation and frequency of the step-up converter and ensure that the fail-safe transistor Q4 is switched off during EEPROM programming.

5.4.5. PARALLEL INPUT/OUTPUT TEST FAILURE

Faults detected during the parallel I/O test should be traced to the RS-410N driving circuits U65 and U66.

5.4.6. STATIC RAM TEST FAILURE

Static RAM test failure indicates that the RAM circuit U40 is defect. Before the circuit is replaced with a new circuit, a dynamic RAM test should be performed to verify correct operation of the dynamic RAM.

5.4.7. DYNAMIC RAM TEST FAILURE

Dynamic RAM test failure indicates an error in the dynamic RAM citcuits U46 to U53, or in the refresh circuits ensuring correct operation of the dynamic RAM.

The advanced technician may trace a dynamic RAM failure by using the memory manipulation commands included in the optional test PROM, reloading test patterns from the static RAM to the dynamic RAM.

Generally, a dynamic RAM failure should result in systematic circuit replacement, until the fault has been traced.

5.4.8. PRINTER PORT TEST FAILURE (SERIAL I/O TEST)

Printer port test failure should be traced down to the V.24/V.28 driving circuits U30 and U32, and the USART circuit U28.

5.4.9. DISPLAY/SWITCH CONTROL TEST FAILURE

Faults during this test indicated that the driving circuits for the front panel, U54 or U55 should be replaced.

5.4.10. MODEM TEST

The modem test is a special test, enabling the technician to control the Mark- and Space frequencies in the modem, as well as to control for continuous Mark- or Space tone transmission.

When a fault in the H1240 has been traced down to the modem section, this section should first be verified for correct operation in the RX-mode.

Without any input signal, the DC-voltage levels on the five test points TP1 to TP5 should be approx. OV. Any divergence from this steady-state condition, indicates a failure in one of the capacitors in the filter section preceeding the relevant test point.

Apply a constant 0 dBm tone signal to the RX-input, and measure the modem section for correct amplification and detection through TP1, TP2, TP3, TP4, TP5, and integrator output U62 pin 7.

During this test, the tone signal to the input should be adjusted to the center frequency of the relevant filters.

On TP2 and TP5, the signals are sampled, resulting in that the signal appears as staircase curves.
The TX section may now be tested by operating the modem in TX-mode (alternatively in FEC mode), measuring signal levels on TP3, TP4 and at the 600 ohm loaded TX-output.

During transmission, the circuits including test points TP1, TP2, and TP5 have been isolated from the TX section, and signal levels measured on these points are related to signals on the RX-input socket.

The filter switch frequencies, approx. 10 times the selected tone frequency with an amplitude of +/- 7V, should be measured at the driving circuit U76 pin 3-6-8-11.

SECTION 6

CIRCUIT DESCRIPTION

6.1. INTRODUCTION

The following part of the manual will give a description of the circuit principles on the main modem board and the power supply assy., referring to the circuit schematics and component lists, included at the back of this manual.

6.2. H1240 RADIOTELEX MODEM MAIN BOARD, DRAWING NO.

The main board includes the most processor circuits for the complete radiotelex system including 48-64 kbyte of programme memory, 2 kbyte workspace memory, 2 kbyte system configuration memory, and 64 kbyte combined text- and input/output buffer memory.

The main board also includes two CCITT V.24/V.28 serial input/output circuits, the tone modulator/demodulator with dynamic threshold adjustment and frequency control for the receive- and transmit tones, and various RS-410N control- and status lines for receiver/transmitter interface.

6.2.1. CIRCUIT SCHEMATIC PAGE 1 OF 8

The CPU used on the main board is an 8-bit 10 MHz 8085 processor with multiplexed data and lower address bits.

The CPU clock frequency is generated by an external crystal controlled clock oscillator, and connected in direct and inverted format to the CPU. The CPU input clock is 9,216 MHz, divided-by-two internally in the processor to form a 4,608 MHz clock for periferal circuits.

Control signals from the CPU are buffered in U3 and the data bits and lower address bits demultiplexed in U2 by means of the ALE signal.

The resulting 16 address bits are routed to various circuits in the system, while the 8 data bits are divided into memory mapped data information to/from the various memory circuits and I/O mapped data information for the periferal circuits. Two gates in U12 senses I/O mapped read- and write information, controlling the I/O mapped data through U4.

The data information direction through U4 is controlled by the advanced S1 status signal from the CPU.

U5 and U6 forms the chip-select signals for the memory and the peripheral circuits on the main board. Control signals to the two circuits ensure that memory mapped chip-selects and I/O mapped chip-selects are enabled correctly, and that all select signals are disabled during hardware reset.

The dynamic RAM text memory uses the full 64 kbyte address range from the CPU, and a special control signal (DRAM) to U6, routed via U12, disables the chip-select signals to the programme- workspace- and system generation memory during read/write operations in the dynamic RAM text memory.

When addressing the dynamic RAM memory, two special commands are used, the LDAX B and the STAX B commands. These two commands are decoded by the circuit formed by U10 and U14 generating the INSTR signal to the dynamic RAM controller on schematic page 2.

The advanced SO status signal from the CPU and the read control signal is combined in U12 to decode the presence of a fetch instruction on the data bus, generating the FETCH signal to the dynamic RAM controller.

U9 samples the INSTR signal at the leading edge of the fetch instruction. This signal is gated together with the SOD output from the CPU in U12, generating a DRAM select signal for the dynamic RAM when SOD is set to "1" and the fetch instruction is either an LDAX B or an STAX B.

A special watchdog circuit ensures correct operation of the processor software. During power-on switching comparator U18 and VR3 generates a reset to the processor for correct start of the system. During normal operation the processor issues a WATCHD stand-by signal approx. every 1,4 msec via U17-CR4-CR5, resetting the watchdog oscillator formed by U18 and C23-R68-R66-R67.

If a programme failure occurs this circuit will start oscillating with a period time of approx. 200 msec., generating a reset signal to the processor and disabling any dynamic RAM access and EEPROM programming (EEPROM INH).

An optional manual reset is routed via C50-R61 to the watchdog oscillator, forcing the circuit to generate reset.

The DRAM signal for the dynamic RAM circuit disables the watchdog (Q5) during dynamic RAM access.

A special circuit formed by U19-Q8 issues a HLTACK clear signal via U15 and the flip-flop U7 to the dynamic RAM, disabling any read/write operations to the dynamic RAM. The clear signal from U19 is enabled by a watchdog reset signal or when the EEPROM voltage supply generates an EEPROM ACK INH signal, and is disabled by the first watchdog stand-by signal issued by the CPU after disappearance of the enabling signals.

The flip-flop U7 monitors the advanced SO and S1 signals from the CPU and the ALE multiplex signal, releasing the HLTACK signal for the dynamic RAM, when the first instruction fetch is detected after clearing of U19.

The wait-state circuit formed by U9-U19-U22-U23 generates normally one wait state every time a read/write operation is performed.

The leading slope of the ALE signal sets the RS flip-flop U19 to a "1" output, switching the flip-flop U9 active at the next clock cycle. The inverted output from U9 resets the RS flip-flop U19, and U9 is again reset at the succeeding clock cycle, whereby a wait state of total two clock cycles are routed to the processor via U22.

During dynamic RAM access, the DRAM ACK signal presets U9, and the wait state is active until the dynamic RAM access is terminated, or until the 4 msec. one-shot, formed by U23 times out.

When the EEPROM programming takes place, the EEPROM ACK INH signal will generate continuous wait state, and a special TIMEOUT INH signal from the EEPROM switching power supply will inhibit the 4 msec. one-shot from generating timeout to U9.

When the programme memories ROM1 and ROM2 are addressed and strap W1 is installed, the wait state is omitted, whereby the overall processor speed is increased.

6.2.2. CIRCUIT SCHEMATIC PAGE 2 OF 8

The main clock reference generator is formed by the 9,216 MHz crystal controlled oscillator Y1-U15. Correct timing of all the processes is the modem, as well as frequency accuracy of the tone modulator/demodulator is depending on the correct oscillator adjustment, C2.

The resulting 9,216 MHz signal is routed to CPU as the clock frequency, to the dynamic RAM refresh generator and to the programmable tone modem timer.

U25 divides the reference signal down to 921,6 kHz used by the two serial port USART's and the programmable timer generating the RTEINT interrupt signal and the clock signals for the USART's. A reset signal to the divider is derived from the dynamic RAM refresh circuit, ensuring correct refresh-cycle period after any read/write of refresh-cycle operation to the dynamic RAM.

The dynamic RAM consists of the RAM circuits U46-U47-U48-U49-U50-U51-U52-U53, each organized as 1x64 kbit, the read/write row/column address gate circuits U41-U42, the refresh row address counter U43 with gate circuit U44, the row/column select shift register U24, the data read output buffer U45, and the dynamic RAM refresh logic U7-U8-U11-U15-U17-U21-U22.

During normal dynamic RAM read/write operation, U8 is set by the DRAM signal and the read/write signal, and the RAM ACK signal holds the wait state circuit. The output of U8 enables shift operation in U24 via U11, and the read/write row/column address gate U41/U42 is enabled.

The 108 msec. clock signal starts to shift a "0" through U24, the row address is loaded into the RAM, the address gates are shifted to the column addresses by the ROW signal and the column addresses are loaded into the RAM.

Simultaneous the presense of a write signal is detected by the RAM circuits as well as by the data output gate (via U21), and data is read to or written from teh RAM.

At the trailing slope of the read/write signal, U11-U15-U17 clears the flip-flop U8, the shift register is reset to all-ones, the DRAM CLR signal resets the DRAM decoder flip-flop U9 (on schematic 1), the DRAM ACK signal returns to idle state, and address- and data buffers U41-U42-U45 are released, simultaneous as the refresh address gate U44 is selected.

During a normal instruction where the RAM is not addressed, the INSTR line is disabled to "0" and U7 is reset by the trailing slope of the instruction read command by the FETCH line. The output of U7 sets flip-flop U8, and a refresh cycle is initiated. The shift register U24 is set to shift mode by U11, and refresh counter U43 is updated one count.

The updated refresh count is connected to the RAM address inputs via U44, and the address is sampled by the RAM on the leading slope of the RAS signal from U24. Due to the RAM circuits used, only the lower 7 row addresses need refresh cycles to refresh all 64 kbyte of memory.

When the ROW signal from U24 is shifted low, U7-U8 is cleared whereby the refresh cycle is terminated. The next CPU instruction not addressing the dynamic RAM, will initiate a new refresh cycle with the refresh address updated one count.

During a HLTACK condition (the CPU is halted, the watchdog initiates reset signals or the EEPROM is programmed), a clock signal from U25 is routed via gate U21 to the refresh flip-flop U8, enabling auto-refresh every 10,85 usec.

6.2.3. CIRCUIT SCHEMATIC PAGE 3 OF 8

The six programme memory chips U34-U35-U36-U37-U38-U72 each including 8 to 16 kbyte, the workspace memory U40 including 2 to 4 kbyte, and the EEPROM system generation memory U39 including 2 kbyte memory are located on this schematic.

The memory size of the workspace memory may be selected to 2 kbyte (strap location W23) or to 4 kbyte (strap location W22).

The switch-mode supply to the EEPROM memory is formed by the timer U20 with switching components Q2-L1-CR1 and the feed-back components VR2-VR6-VR7-Q3.

Under normal conditions, the oscillator U20 is reset by connecting a "0" signal via U16-U17 to terminal 4 of U20. A second buffer U17 forces the base of Q4 below +5V, whereby the programming voltage to the EEPROM is clamped to +5V even during an oscillator control failure.

When EEPROM programming is taking place, the RS flip-flop U19 is first reset by the decoded LOBYTE-WR information, whereby the RTE-timer is gated off (GATE 1 signal). Following this process, the RTE clock is reprogrammed from 1.25 msec. to 20 msec. or 50 msec., and the switch mode supply enabled by the decoded EEPROM-WR information.

This signal generates directly the EEPROM ACK INH signal forcing constant wait states in the CPU during EEPROM programming, sets the RS flip-flop U19 to gate the RTE-timer, and via the reprogrammed RTE clock the release signal for the timer U20.

The timer starts oscillating, and the TIMEOUT INHIBIT signal resets the one-shot timeout generator in the CPU wait state circuit.

The timer U20 will continue to oscillate during one negative period of the reprogrammed RTE clock, and any CPU action is halted. After the programming cycle has commenced, the RTE signal returns to high state, the timer U20 is cleared, the CPU continues to operate after the 4 msec. wait state timeout, and the EEPROM ACK INH signal is reset.

The watchdog signal is decoded from the HIBYTE-WR command, and the RTE gate control circuit U19 ensures that the RTE signal is disabled until the first watchdog signal is generated by the CPU.

The EEPROM INH control signal disables EEPROM programming during watchdog reset via Q1. To ensure maximum security against erroneous EEPROM programming during normal operation, address bit A10 is connected in parallel to the EEPROM INH signal, whereby only the upper half of the 2 kbyte EEPROM may be programmed. During system generation, strap W8 is removed and the full address range of the EEPROM memory may be programmed.

The EEPROM switch mode supply oscillates on approx. 100 kHz, switching Q2 and thereby the current through C1. A high frequency compensation feed-back is coupled via C19 to the control input of U20. The step-up voltage on C20 is low frequency filtered in L2-C21, and connected via VR2-VR6-VR7 to the same control input for DC-compensation.

The control input varies the duty-cycle of the oscillation, and thereby the step-up voltage for the EEPROM memory. During programming, Q4 is switched off (base of Q4 switched to high impedance state). VR1-C22-R50 introduces an additional time constant when the leading slope of the programming voltage exceeds 17V.

The overall curve shape of the programming voltage is essential for the correct operation of the EEPROM memory, and should fulfil the following requirements:

Programme voltage period:		50 msec. for Intel 2815 20 msec. for Intel 2816
Leading slope to 15.5V	:	450 usec. to 750 usec.
Trailing slope	:	100 usec. max.
Programming voltage	:	21V +/-1V.

6.2.4. CIRCUIT SCHEMATIC PAGE 4 OF 8

The main programmable timer U26 receives the 1,085 usec. (921,8 kHz) clock from the clock generator, and generates three auxiliary clock signals, one for the RTE interrupt to the CPU and the EEPROM voltage supply, and one for each of the serial USART'S.

The RTE clock runs normally with a time period of 1,25 msec. but during EEPROM programming, the timer is reprogrammed to 20 msec. or 50 msec., depending on the EEPROM memory used.

The two USART clocks equal 16 times the baud-rate selected for the relevant USART.

The two USART's U28-U29 serve the Console- and Remote CCITT V.24/V.28 serial input/outputs, and interface circuits U30-U31-U32-U33 perform the conversion between the TTL-levels to/from the USART's and the V.24/V.28 levels.

Straps W13-W14-W15-W16-W17-W18 select optional +5V and +/-12V voltage supply to the V24/V.28 connectors. Attention should be paid when using these voltage outputs, as no current limiting is performed.

Console interface configuration and enabling of system generation are controlled by selecting strap positions W19. These positions are sampled by the system data bus via latch U27.

The front-panel/diagnostic-panel interface is formed by U54-U55-U71. LED information is latched by buffer U55, and routed to the LED's via current limiting resistors. U71 gates the Mark/Space information from the tone demodulator together with a Mark/Space LED on/off signal from U55.

The front-panel/diagnostic-panel switches are sampled by the system data bus via U54. Strap W10 should be inserted to enable front-panel hardware reset.

Front-panel/diagnostic-panel interface is performed via a 16-pole Molex connector J6 on the PC-board.

Auxiliary control input/output is performed via the 26-pole Molex connector J5 on the PC-board. This interface connection is used by e.g. the Option 005, 100 Baud slave modem board.

6.2.5. CIRCUIT SCHEMATIC PAGE 5 OF 8

The RX-line signal is routed to a balancing transformer T1, followed by a switchable 0 dB/10 dB/20 dB attenuator (W11/W12).

In U56, the received tones are low-pass filtered to approx. 3.3 kHz and limited to 1.4 V peak by CR6 and CR7. The conditioned signals are available on TP1.

The Mark- and Space-tone filtering is performed in 2 individual filter chains, each consisting of 2 stagger-tuned second-order bandpass filters.

Each second-order filter is realized as switch capacitor filters, where the normal frequency depending resistors have been replaced by switching capacitors.

As an example, the circuit included between TP1 and TP2 forms one filter section, where C32-U59 realizes a variable resistor (U59 is an analog switch) linear to the period time of the switch frequency, and C31-C52-U58 realizes an inverting variable resistor linear to the period time of the switch frequency.

By changing the switch frequency to the filter sections, each section will vary the resonant frequency linear to the change while maintaining the bandwidth of the filter.

The second stage of each filter chain is controlled by the same switch frequency as the relevant first section, but the center frequency has been shifted +45 Hz by means of the additional circuit components R114-R115 (Mark filter) and R133-R134 (Space filter).

The switch frequency for each filter chain is approx. 11.1 times the selected center frequency for the chain.

The overall bandwidth for each filter chain is 75-85 Hz (3 dB bandwidth).

The bandpass filtered receive signal is finally low-pass filtered in U57-C40-C41 (Mark filter) and U57-C120-C121 (Space filter) before final signal detection.

During transmission, the control transistor 22 turns the three FET's Q21-Q25-Q26 off, whereby the first stages of the filter chains are isolated from the second stages, and the 2 second stages are connected in series for TX-tone filtering.

Because parts of the second stage bandwidth defining resistors are located on the primary side of Q21-Q26 (R109-R128), the overall bandwidth of the series connected filters is changed to approx. 310 Hz for transmit spectrum shaping.

The transmit tone pulses are routed to the filter section via U77 with step-down resistors.

The bandpass filtered transmit tones are low-pass filtered in U57-C40-C41, before final amplification.

6.2.6. CIRCUIT SCHEMATIC PAGE 6 OF 8

The filtered receive tones are full-wave rectified in U62-CR10-CR11 (Mark tone) and U62-CR12-CR13 (Space tone), combined with inverted polarity and integrated in U62-C46 (100 Hz low pass), and converted to TTL-level in U63.

U61-Q14-Q15 forms the dynamic threshold adjustment for the tone detection. This circuit injects under software control positive or negative compensation current to the tone integrator for adjustment of the detector balance. Under normal conditions, the medium voltage level on U61 pin 8 should be 0 V.

The sine-to-TTL converter U63-R137-R145-R214-R215 monitors the space tone duration, used by the reciprocal counter for frequency tracking.

Auxiliary control input functions are realized via the RS-410N input circuit U66, latched via buffer U64 to the system data bus. By strap selection W20/W21, the demodulated tone signal may be selected from either the internal demodulator, or from an external demodulator, connected in between the HF-receiver and the Radiotelex modem.

6.2.7. CIRCUIT SCHEMATIC PAGE 7 OF 8

The tone output signal is final amplificated and low-pass filtered in U62-R64-Q23-Q24, where variable resistor R64 determines the tone output level, and Q23-Q24 controls the on/off switching of the final stage (switched off during reception).

The switch frequencies used for controlling the Mark- and Space-tone filters are generated in the programmable divider U68. The clock frequency for this divider is derived from the CPU-clock, via dividing circuit U69. The basic clock frequency diversion is factory selected to 1 (W4), 2 (W5) or 3 (W5 and W6).

U77-U76 converts the Mark- and Space filter switch frequencies to +/- 7V levels for the CMOS switch circuits.

The third counter circuit in U68 generates the transmit-tone frequency during transmission, and measures the Space-tone duration during reception.

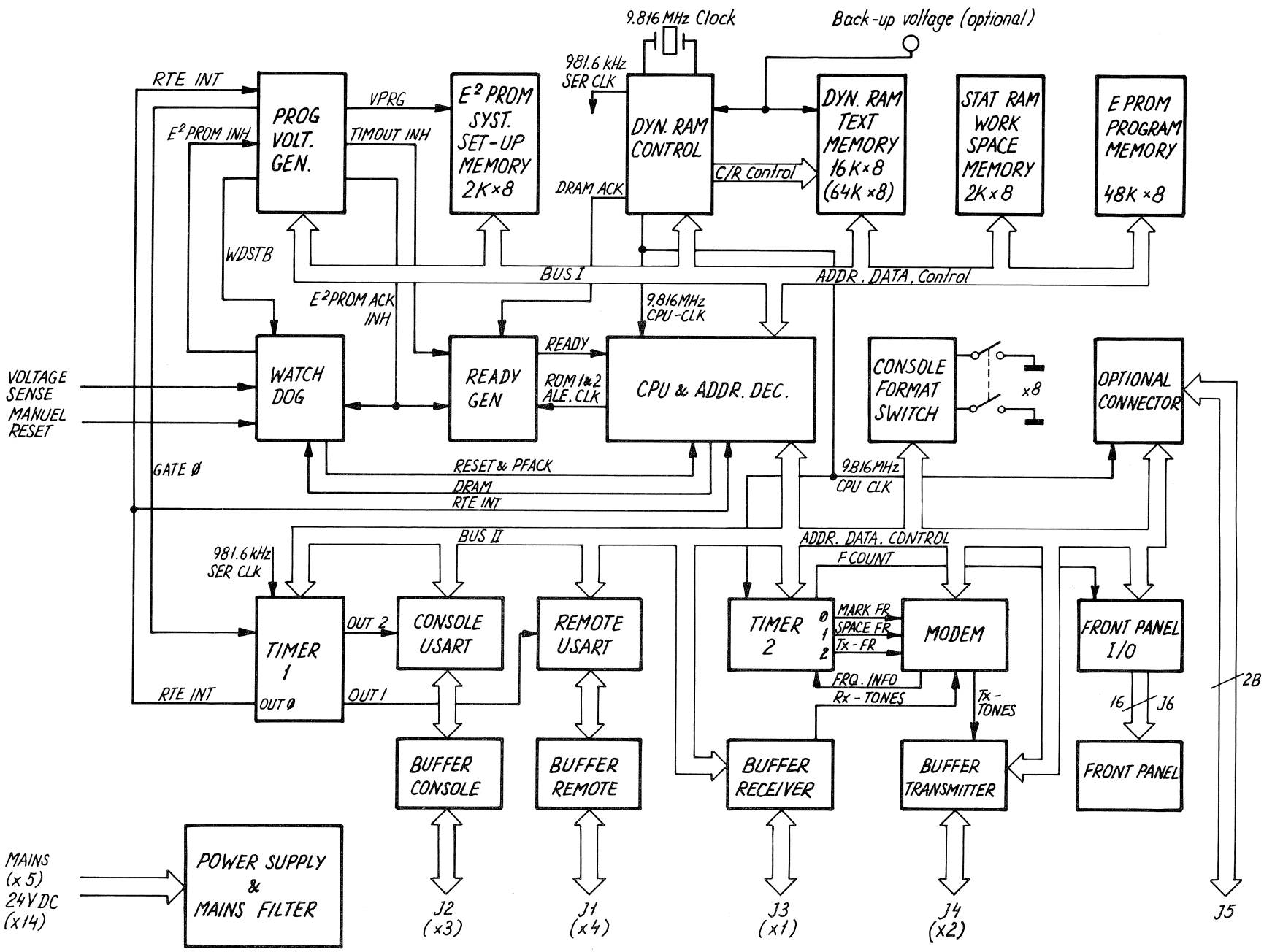
U67 receives the converted Space-tone (TTL-level), and gates counter three in U68 for one Space-tone period, every time U67 is enabled for a measurement. The resulting period information is monitored by the software and inverted for the frequency tracker function.

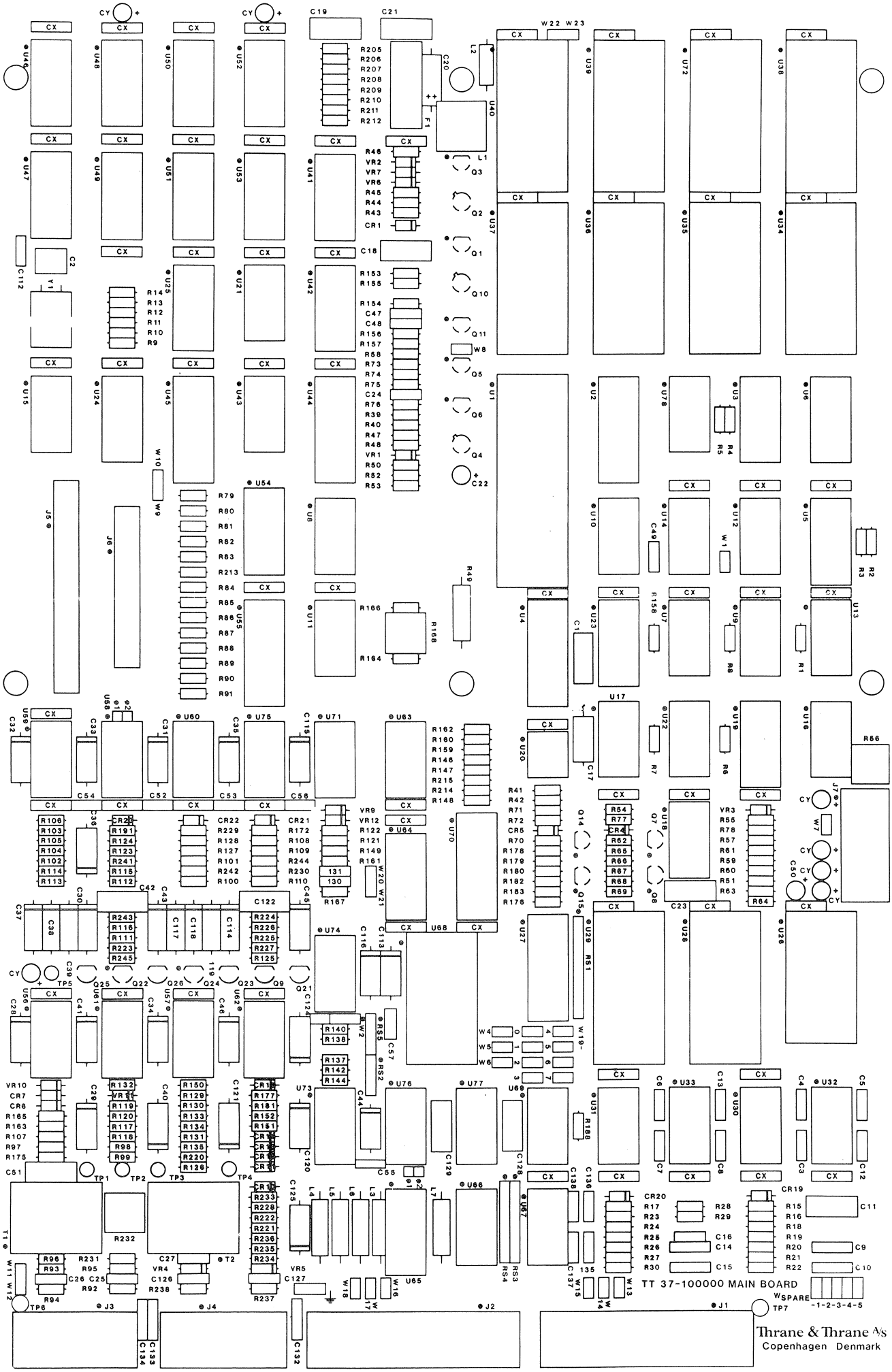
Auxiliary control output functions are realized via the RS-410N open collector darlington drive output circuit U65 and the bus buffer U70. The maximum output voltage is limited by VR4 and VR5 to approx. 62V.

6.2.8. CIRCUIT SCHEMATIC PAGE 8 OF 8

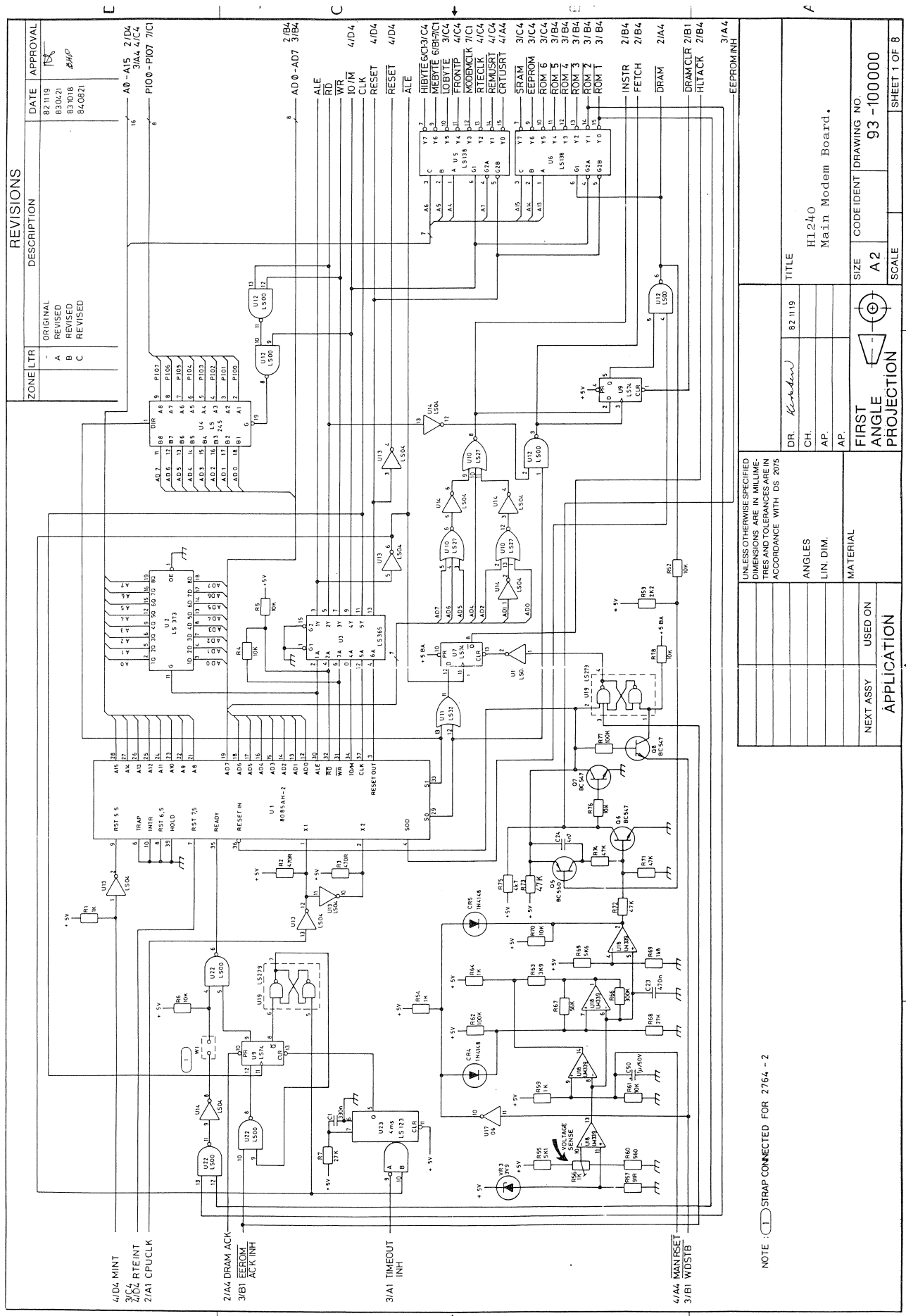
This circuit schematic shows all supply lines to the various IC-circuits on the main modem PC-board.

FUNCTIONAL BLOCK DIAGRAM H1240




TT 37-100000 MAIN BOARD
Thrane & Thrane A/S
Copenhagen Denmark

6A2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SIZE A2
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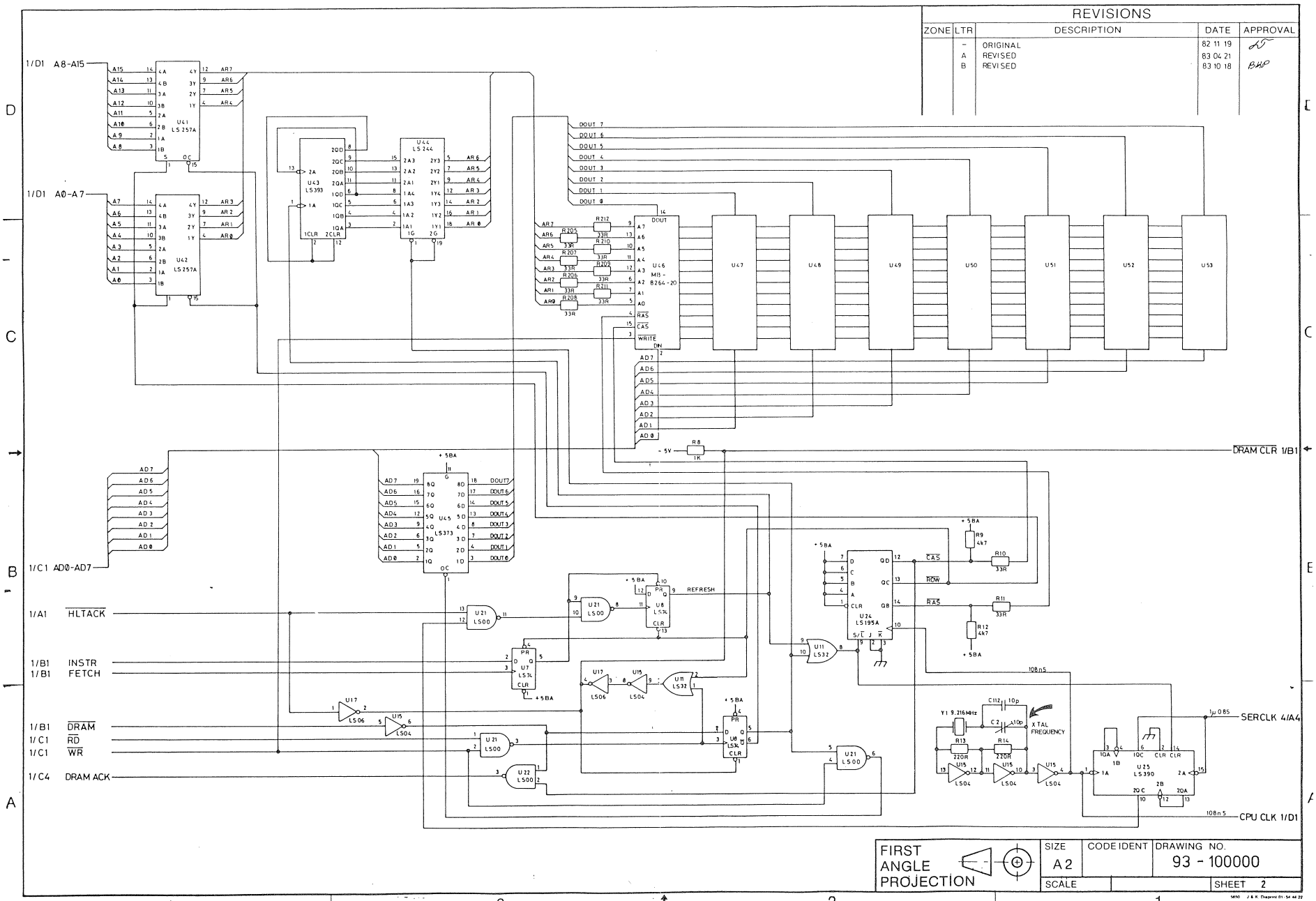
DRAWING NO. 93-100000
SCALE
SHEET 1 OF 8
DR.
CH.
AP.
FIRST ANGLE PROJECTION
MATERIAL
ANGLES
LIN. DIM.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075
NEXT ASSY
USED ON
APPLICATION
NOTE : (1) STRAP CONNECTED FOR 2764 - 2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1/C1 AD0-AD7
1/A1 HLTACK
1/B1 INSTR FETCH
1/B1 DRAM
1/C1 RD
1/C1 WR
1/C4 DRAM ACK
DRAM CLR 1/B1
SERCLK 4/A4
CPU CLK 1/D1
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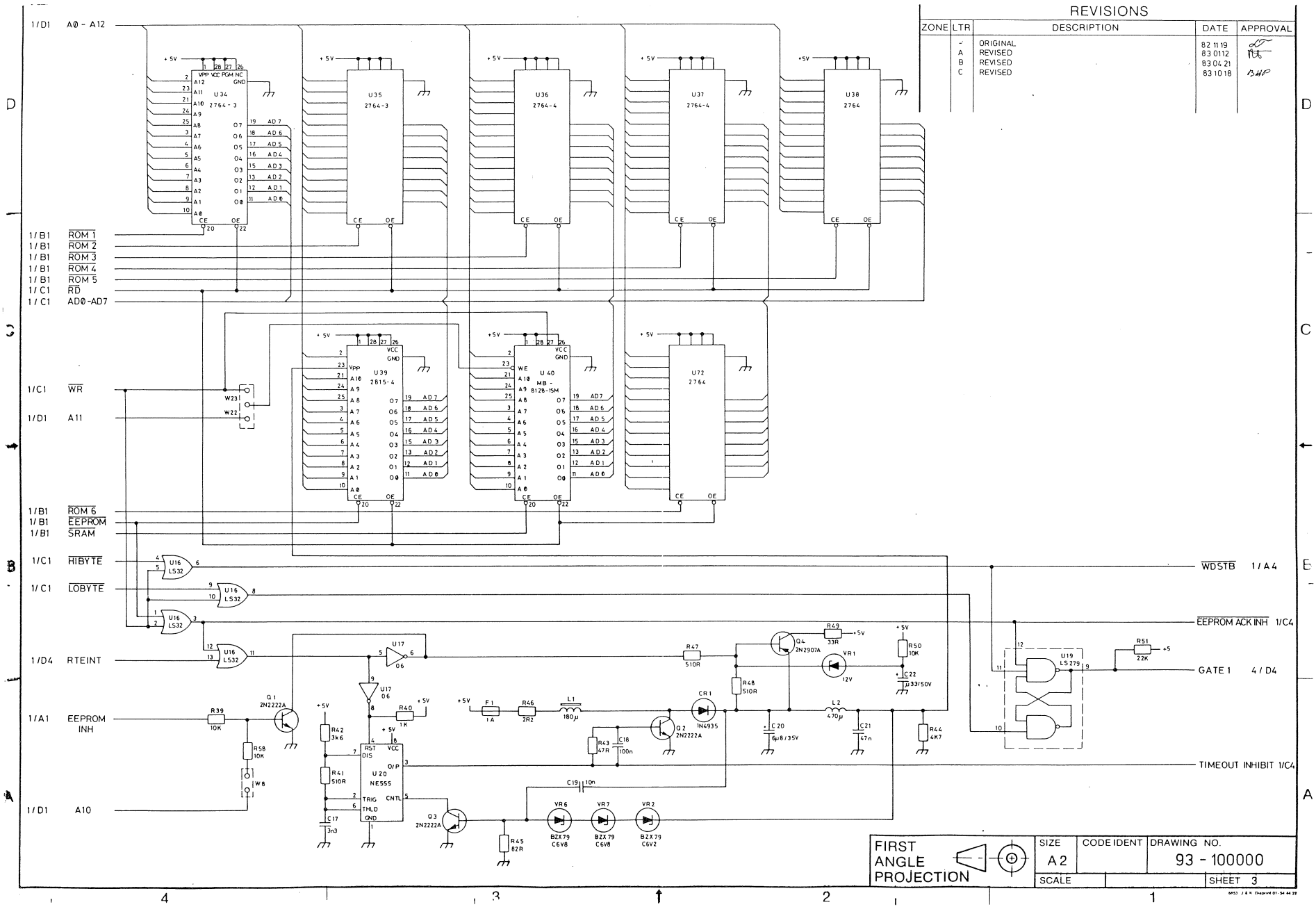
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1/B1 ROM 2
1/B1 ROM 3
1/B1 ROM 4
1/B1 ROM 5
1/C1 RD
1/C1 AD0-AD7
1/C1 WR
1/D1 A11
1/B1 ROM 6
1/B1 EEPROM
1/B1 SRAM
1/C1 HIBYTE
1/C1 LOBYTE
1/D4 RTEINT
1/A1 EEPROM INH
1/D1 A10
U34 2764-3
U35 2764-3
U36 2764-4
U37 2764-4
U38 2764
U39 2815-4
U40 MB-B128-15M
U72 2764
U20 NE555
U16 LS32
U17 06
U19 LS279
Q1 2N2222A
Q2 2N2222A
Q3 2N2222A
Q4 2N2907A
CR1 1N4935
VR1 12V
VR6 BZX79 C6V8
VR7 BZX79 C6V8
VR2 BZX79 C6V2
WDSTB 1/A4
EEPROM ACK INH 1/C4
GATE 1 4/D4
TIMEOUT INHIBIT 1/C4
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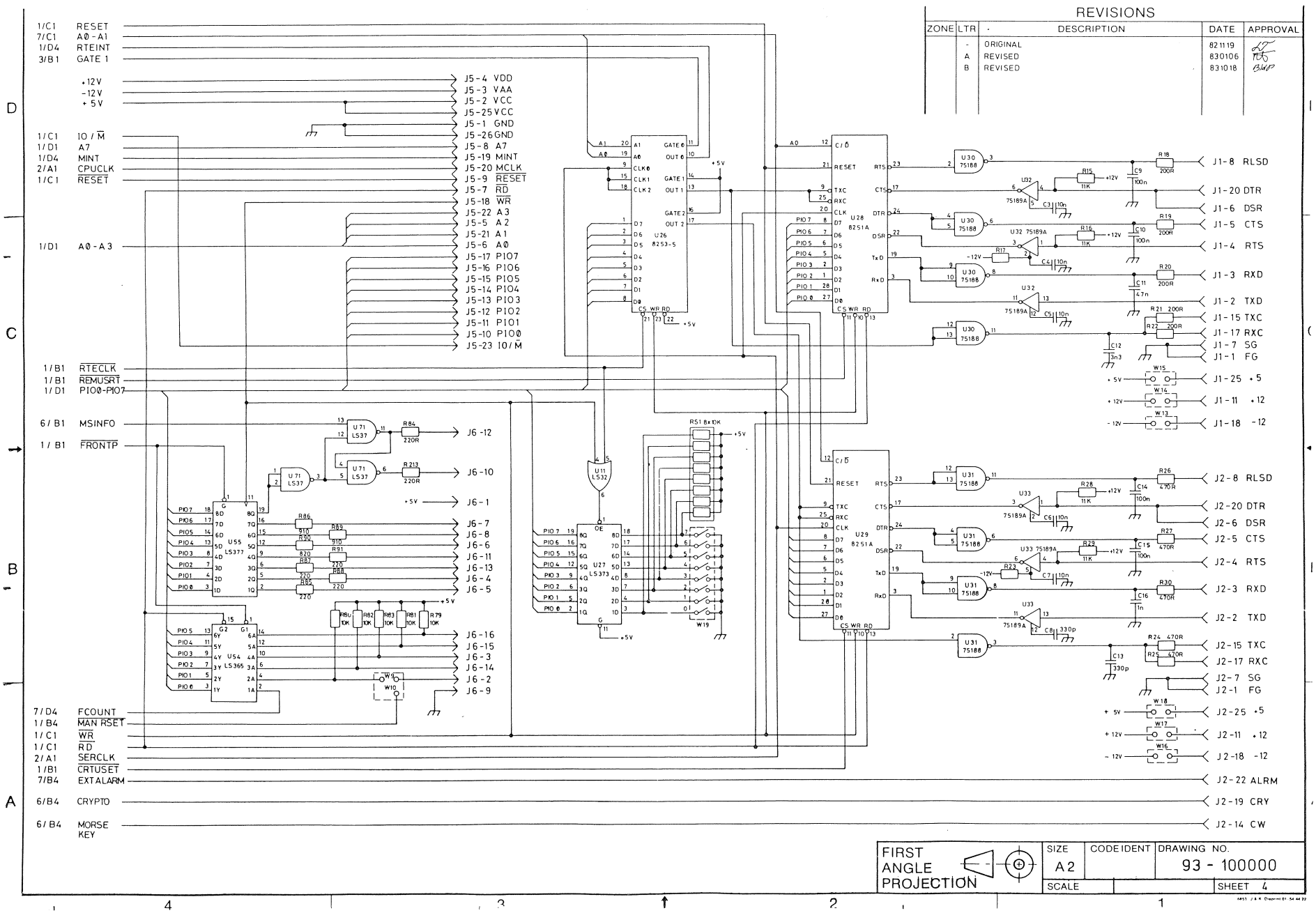
SCALE
SHEET 3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3/B1 GATE 1
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-12V
+5V
1/C1 IO/M
1/D1 A7
1/D4 MINT
2/A1 CPUCLK
1/C1 RESET
1/D1 A0-A3
1/B1 RTECLK
1/B1 REMUSRT
1/D1 PIO0-PIO7
6/B1 MSINFO
1/B1 FRONTP
7/D4 FCOUNT
1/B4 MAN RSET
1/C1 WR
1/C1 RD
2/A1 SERCLK
1/B1 CRTUSET
7/B4 EXTALARM
6/B4 CRYPTO
6/B4 MORSE KEY
J5-4 VDD
J5-3 VAA
J5-2 VCC
J5-25 VCC
J5-1 GND
J5-26 GND
J5-8 A7
J5-19 MINT
J5-20 MCLK
J5-9 RESET
J5-7 RD
J5-18 WR
J5-22 A3
J5-5 A2
J5-21 A1
J5-6 A0
J5-17 PIO7
J5-16 PIO6
J5-15 PIO5
J5-14 PIO4
J5-13 PIO3
J5-12 PIO2
J5-11 PIO1
J5-10 PIO0
J5-23 IO/M
J6-12
J6-10
J6-1
J6-7
J6-8
J6-6
J6-11
J6-13
J6-4
J6-5
J6-16
J6-15
J6-3
J6-14
J6-2
J6-9
J1-8 RLSD
J1-20 DTR
J1-6 DSR
J1-5 CTS
J1-4 RTS
J1-3 RXD
J1-2 TXD
J1-15 TXC
J1-17 RXC
J1-7 SG
J1-1 FG
J1-25 +5
J1-11 +12
J1-18 -12
J2-8 RLSD
J2-20 DTR
J2-6 DSR
J2-5 CTS
J2-4 RTS
J2-3 RXD
J2-2 TXD
J2-15 TXC
J2-17 RXC
J2-7 SG
J2-1 FG
J2-25 +5
J2-11 +12
J2-18 -12
J2-22 ALRM
J2-19 CRY
J2-14 CW
U26 8253-5
U28 8251A
U29 8251A
U27 LS373
U11 LS32
U55 LS377
U54 LS365
U71 LS37
U30 75188
U31 75188
U32 75189A
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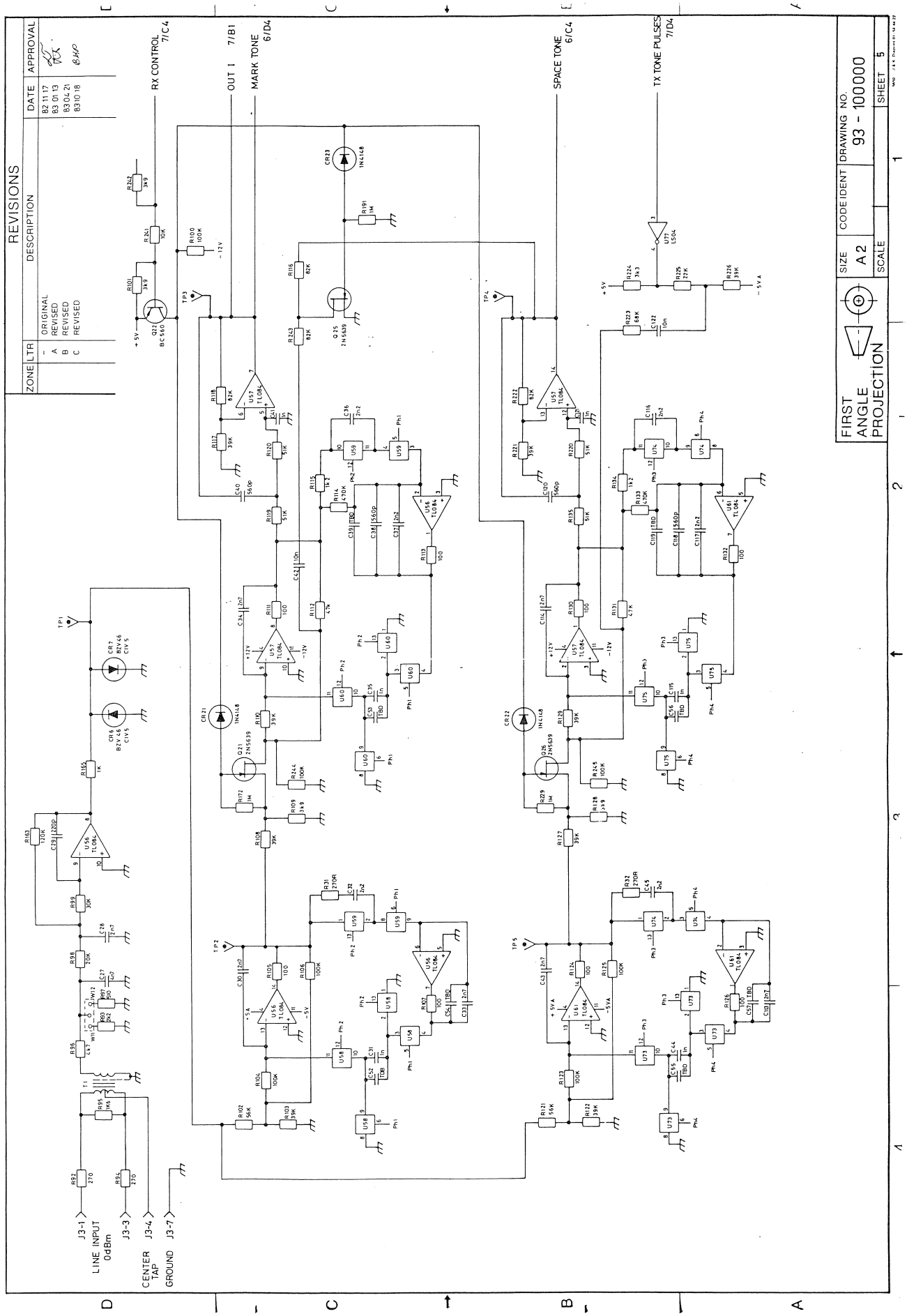
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TX TONE PULSES 7/D4
LINE INPUT 0dBm
CENTER TAP
GROUND
J3-1
J3-3
J3-4
J3-7
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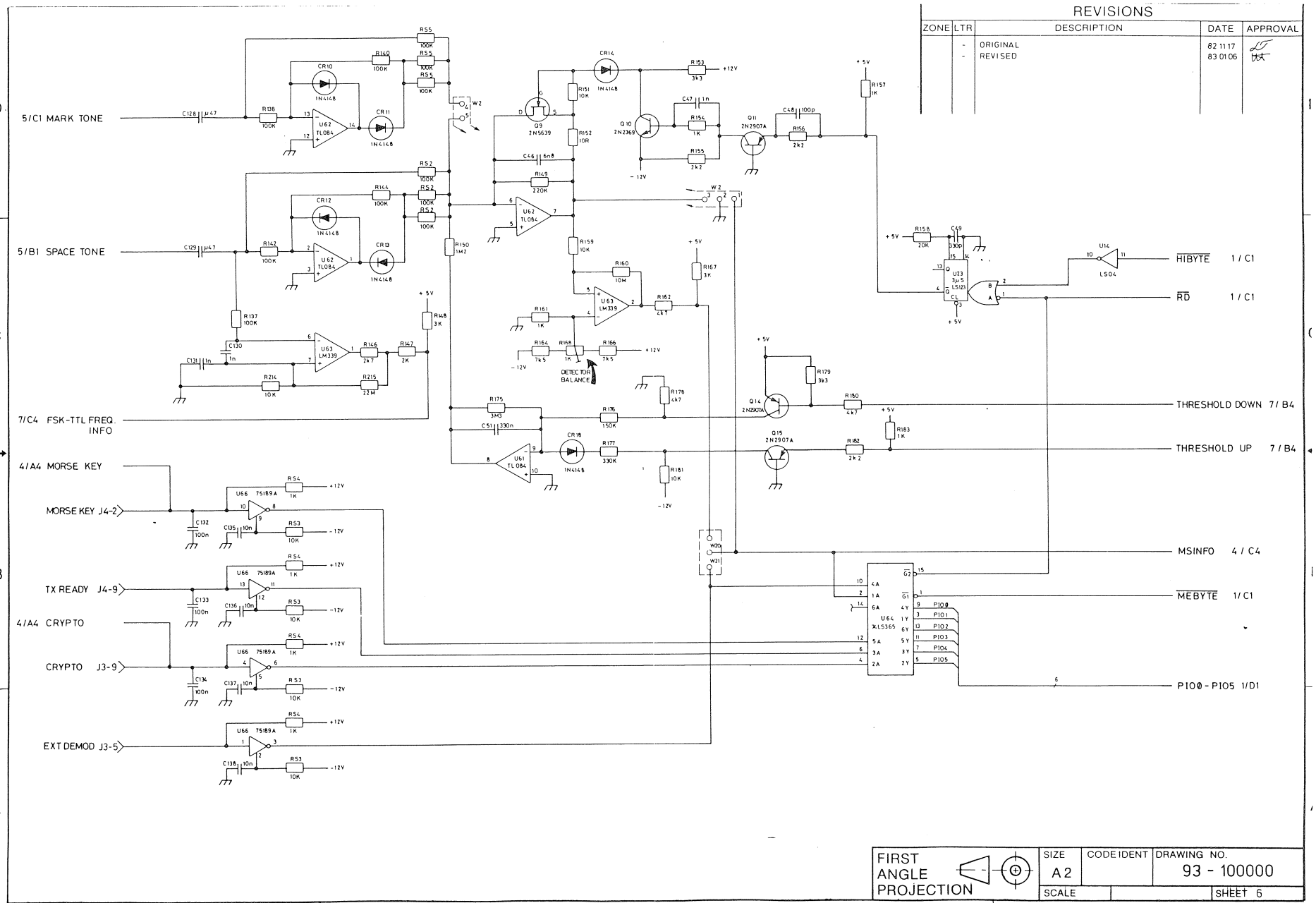
SHEET 5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4/A4 MORSE KEY
MORSE KEY J4-2
TX READY J4-9
4/A4 CRYPTO
CRYPTO J3-9
EXT DEMOD J3-5
HIBYTE 1/C1
RD 1/C1
THRESHOLD DOWN 7/B4
THRESHOLD UP 7/B4
MSINFO 4/C4
MEBYTE 1/C1
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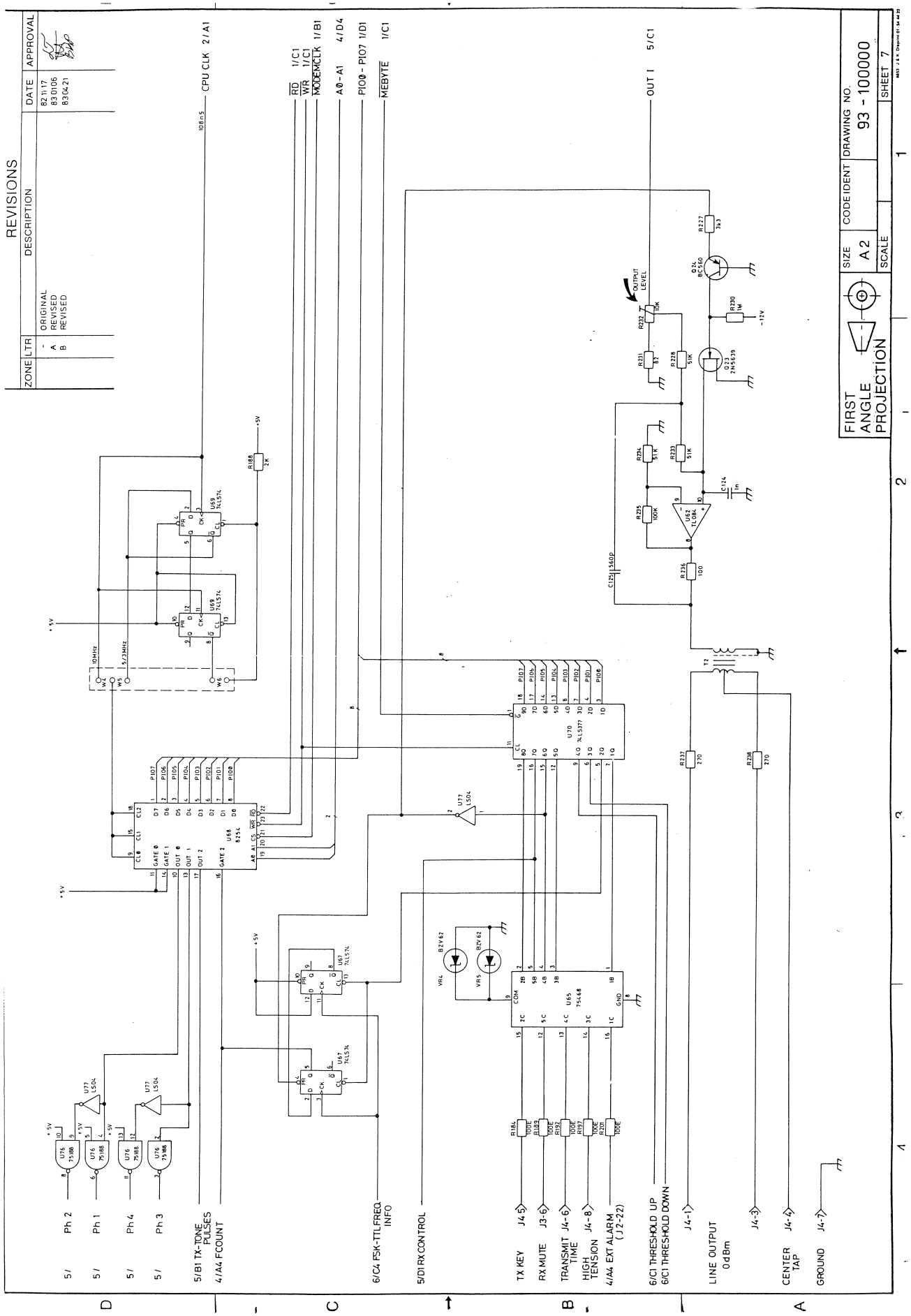
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SCALE
SHEET 7
CPU CLK 2/A1
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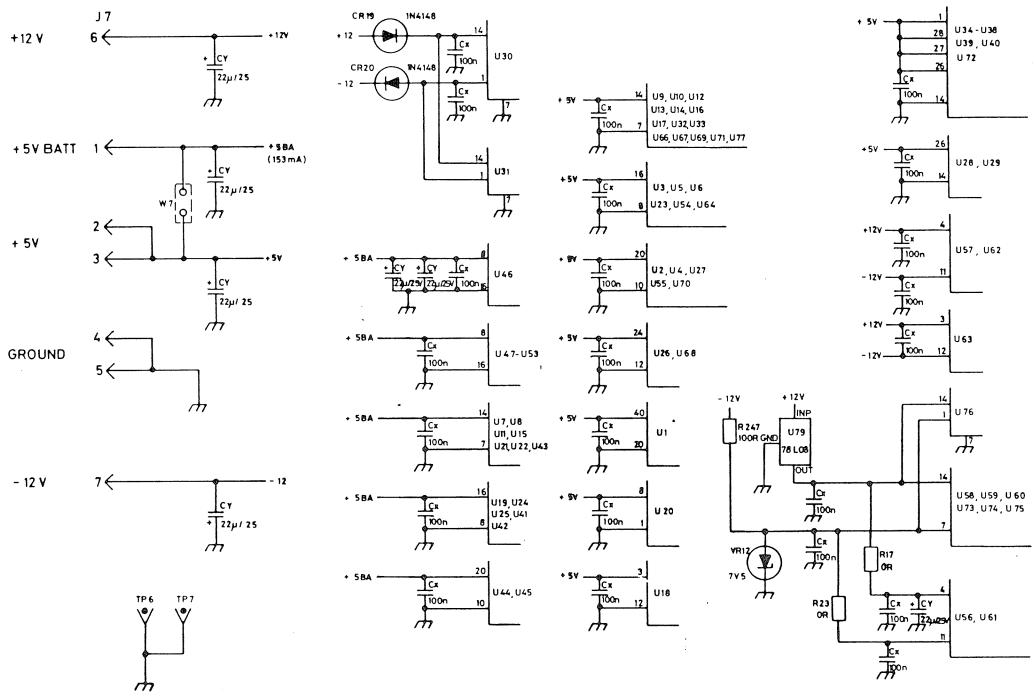
WR 1/C1
MODEMCLK 1/B1
A0-A1 4/D4
PIO0 - PIO7 1/D1
MEBYTE 1/C1
OUT I 5/C1
5/B1 TX-TONE PULSES
4/A4 FCOUNT
6/C4 FSK-TTL FREQ INFO
5/D1 RX CONTROL
TX KEY J4-5
RX MUTE J3-6
TRANSMIT TIME J4-6
HIGH TENSION J4-8
4/A4 EXT ALARM (J2-22)
6/C1 THRESHOLD UP
6/C1 THRESHOLD DOWN
LINE OUTPUT 0dBm J4-1
CENTER TAP J4-3
GROUND J4-4
J4-7
OUTPUT LEVEL
Ph 2
Ph 1
Ph 4
Ph 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	-	ORIGINAL	82 11 23	
	A	REVISED	83 01 12	
	B	REVISED	83 10 18	
	C	REVISED	84 03 21	
	D	REVISED	84 04 04	



FIRST ANGLE PROJECTION	SIZE	CODE IDENT	DRAWING NO.
	A2		93 - 100000
	SCALE		SHEET 8

6A10

POWER SUPPLY I (700)

POWER SUPPLY II (600)

MODE SWITCH UNIT (500)

INDICATOR UNIT (400)

MODEM (100-200)

MAIN SCHEMATIC DIAGRAM H1240

MAINS VOLTAGE	110 V AC	127 V AC	220 V AC	237 V AC
CONNECTIONS ON TR801	BLUE / BROWN	BLUE / BROWN	BLUE / BROWN	BLUE / BROWN
F 901	0.5A TIME-LAG		0.315A TIME-LAG	
RE 701	WSU/GD-6-C BV1062		WSU/GD-7-C	

POWER SUPPLY I (700)

POWER SUPPLY II (600)

MODE SWITCH UNIT (500)

ON/OFF DIMMER BELL BREAK OVER

INDICATOR UNIT (400)

MODEM (100-200)

MAIN SCHEMATIC DIAGRAM H1240

MAINS VOLTAGE	110 VAC	127 VAC	220 VAC	237 VAC
CONNECTIONS ON TR801	BLUE / BROWN	BLUE / BROWN	BLUE / BROWN	BLUE / BROWN
F 901	0.5A TIME-LAG		0.315A TIME-LAG	
RE 701	WSU/GD-6-C BV 1062		WSU/GD-7-C	

	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
1	TT37-100000	PRINTED WIRING BOARD	T&T	1
2	TT93-100000	ELECTRICAL SCHEMATIC DIAGRAM	T&T	R
3		COMPONENT LOCATION DRAWING	T&T	R
C1	2222 344 15334	CAPACITOR, PLST 330n/63V	PHI	2
C2	2222 809 05002	CAPACITOR, VAR 10p	PHI	1
C3	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	10
C4	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C5	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C6	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C7	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C8	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C9	MDØ15E104ZAA	CAPACITOR, CER 100n/50V	AVX	70
C10	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C11	2222 344 41473	CAPACITOR, PLST 47n/250V	PHI	2
C12	C-400-3n3	CAPACITOR, CER 3n3/63V	PHI	1
C13	C-400-330p	CAPACITOR, CER 330p/63V	FER	2
C14	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C15	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C16	C-400-1n	CAPACITOR, CER 1n/63V	FER	4
C17	2222 4244 3302	CAPACITOR, PLST 3n3/160V	PHI	1
C18	2222 344 25104	CAPACITOR, PLST 100n/100V	PHI	1
C19	2222 344 55 103	CAPACITOR, PLST 10n/400V	PHI	3
C20	6u8/35-150D	CAPACITOR, ELCT 6u8/35V	SEMI	1
C21	2222 344 41473	CAPACITOR, PLST 47n/250V	PHI	
C22	TW-L 0,33uF	CAPACITOR, ELCT u33/50V	RUB	1
C23	2222 344 15474	CAPACITOR, PLST 470n/63V	PHI	3
C24	2222 630 03472	CAPACITOR, CER 4n7/63V	PHI	2
C25		Not used		
C26		Not used		
C27	2222 630 03472	CAPACITOR, CER 4n7/63V	PHI	
C28	2222 4244 2702	CAPACITOR, PLST 2n7/160V	PHI	7
C29	2222 4274 2201	CAPACITOR, PLST 220p/160V	PHI	1
C30	2222 4244 2702	CAPACITOR, PLST 2n7/160V	PHI	
C31	2222 4264 1002	CAPACITOR, PLST 1n/160V	PHI	7
C32	2222 4244 2202	CAPACITOR, PLST 2n2/160V	PHI	6
C33	2222 4244 2702	CAPACITOR, PLST 2n7/160V	PHI	
C34	2222 4244 2702	CAPACITOR, PLST 2n7/160V	PHI	
C35	2222 4264 1002	CAPACITOR, PLST 1n/160V	PHI	

REV STATUS	LTR A	NEXT ASSY			
OF SHEETS		USED ON	H1240.		

APPROVAL	DATE	REV. APPROVAL AND DATE	CODE IDENT	PL 91-100000
PT	831016		REV A	SHEET 1 of 14

INSTALLATION & SERVICE MANUAL
H 1240

6A13

	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
C36	2222 4244 2202	CAPACITOR, PLST 2n2/160V	PHI	
C37	2222 4244 2202	CAPACITOR, PLST 2n2/160V	PHI	
C38	2222 4264 5601	CAPACITOR, PLST 560p/160V	PHI	5
C39		TBD , CER	FER	
C40	2222 4264 5601	CAPACITOR, PLST 560p/160V	PHI	
C41	2222 4264 1002	CAPACITOR, PLST 1n/160V	PHI	
C42	2222 344 55103	CAPACITOR, PLST 10n/400V	PHI	
C43	2222 4244 2702	CAPACITOR, PLST 2n7/160V	PHI	
C44	2222 4264 1002	CAPACITOR, PLST 1n/160V	PHI	
C45	2222 4244 2202	CAPACITOR, PLST 2n2/160V	PHI	
C46	2222 4244 6802	CAPACITOR, PLST 6n8/160V	PHI	1
C47	C-400-1n	CAPACITOR, CER 1n/63V	FER	
C48	C-400-100p	CAPACITOR, CER 100p/63V	FER	7
C49	C-400-330p	CAPACITOR, CER 330p/63V	FER	
C50	TW-L 1uF	CAPACITOR, ELCT 1u/50V	RUB	1
C51	2222 344 15334	CAPACITOR, PLST 330n/63V	PHI	
C52		TBD , CER	FER	
C53		TBD , CER	FER	
C54		TBD , CER	FER	
C55		TBD , CER	FER	
C56		TBD , CER	FER	
C57		TBD , CER	FER	
C112	C-400-10p	CAPACITOR, CER 10p/63V	FER	1
C113	2222 4244 2702	CAPACITOR, PLST 2n7/160V	PHI	
C114	2222 4244 2702	CAPACITOR, PLST 2n7/160V	PHI	
C115	2222 4264 1002	CAPACITOR, PLST 1n/160V	PHI	
C116	2222 4244 2202	CAPACITOR, PLST 2n2/160V	PHI	
C117	2222 4244 2202	CAPACITOR, PLST 2n2/160V	PHI	
C118	2222 4264 5601	CAPACITOR, PLST 560p/160V	PHI	
C119		TBD , CER	FER	
C120	2222 4264 5601	CAPACITOR, PLST 560p/160V	PHI	
C121	2222 4264 1002	CAPACITOR, PLST 1n/160V	PHI	
C122	2222 344 55103	CAPACITOR, PLST 10n/400V	PHI	
C123		Not used		
C124	2222 4264 1002	CAPACITOR, PLST 1n/160V	PHI	
C125	2222 4264 5601	CAPACITOR, PLST 560p/160V	PHI	
C126		Not used		
C127		Not used		

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON	H1240.		

APPROVAL	DATE	REV. APPROVAL AND DATE	CODE IDENT	PL 91-100000
PT	831016		REV A	SHEET 2 of 14

	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
C128	2222 344 15474	CAPACITOR, PLST 470n/63V	PHI	
C129	2222 344 15474	CAPACITOR, PLST 470n/63V	PHI	
C130	C-400-1n	CAPACITOR, CER 1n/63V	FER	
C131	C-400-1n	CAPACITOR, CER 1n/63V	FER	
C132	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C133	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C134	MD015E104ZAA	CAPACITOR, CER 100n/50V	AVX	
C135	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C136	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C137	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
C138	SR215E103KAA	CAPACITOR, CER 10n/63V	AVX	
CX	MD015E104ZAA	CAPACITOR, CER 100n/50V (63 pcs)	AVX	
CY	25 TW 22 MS	CAPACITOR, ELCT 22u/25V	RUB	7
H	9102 3x10 PHMX	SCREW, M3x10	HFC	8
H	1813 M3-A2	SQUARE NUT, M3	HFC	8
H	303004	INSULATING WASHER	RAD	8
CR1	1N4935	DIODE, SI 1N4935	MOT	1
CR2		Not used		
CR3		Not used		
CR4	1N4148	DIODE, SI 1N4148	PHI	13
CR5	1N4148	DIODE, SI 1N4148	PHI	
CR6	BZV46C1V5	DIODE, SI BZV46-C1V5	PHI	2
CR7	BZV46C1V5	DIODE, SI BZV46-C1V5	PHI	
CR8		Not used		
CR9		Not used		
CR10	1N4148	DIODE, SI 1N4148	PHI	
CR11	1N4148	DIODE, SI 1N4148	PHI	
CR12	1N4148	DIODE, SI 1N4148	PHI	
CR13	1N4148	DIODE, SI 1N4148	PHI	
CR14	1N4148	DIODE, SI 1N4148	PHI	
CR15		Not used		
CR16		Not used		
CR17		Not used		
CR18	1N4148	DIODE, SI 1N4148	PHI	
CR19	1N4148	DIODE, SI 1N4148	PHI	
CR20	1N4148	DIODE, SI 1N4148	PHI	
CR21	1N4148	DIODE, SI 1N4148	PHI	
CR22	1N4148	DIODE, SI 1N4148	PHI	

REV STATUS	LTR A		NEXT ASSY		
OF SHEETS			USED ON	H1240.	

APPROVAL	DATE	REV. APPROVAL AND DATE	CODE IDENT	PL 91-100000
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	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
CR23	1N4148	DIODE, SI 1N4148	PHI	
F1	480518	FUSE, 1A mT	RAD	1
H1	75160-102-36	WRAP POST	BERG	67/36
H2	1358	TEST POINTS	PHI	7
H3	5965	FUSE SOCKET	PHI	2
H4	ICK 24B	IC-HEAT SINK	FISC	2
H5	304742	TERMINAL-GND	RAD	1
J1	164802-1	CONNECTOR, 25-POLE FEMALE	AMP	2
J2	164802-1	CONNECTOR, 25-POLE FEMALE	AMP	
J3	164800-1	CONNECTOR, 9-POLE FEMALE	AMP	1
J4	164492-1	CONNECTOR, 9-POLE MALE	AMP	1
J5	10-56-3261	CONNECTOR, 26-POLE MALE	MLX	1
J6	10-56-3161	CONNECTOR, 16-POLE MALE	MLX	1
J7	09-75-1071	CONNECTOR, 7-POLE MALE	MLX	1
L1	B65806-A1006-D1	COIL, 180u 30 vindinger	SIE	1
L1	B65805-N160-A48	CORE, FERRIT	SIE	1
L1	B65806-B2001	CORE CLAMPS	SIE	2
L2	IM6, 470u	COIL, 470u IM6	DALE	1
Q1	2N2222A	TRANSISTOR, NPN 2N2222A	PHI	3
Q2	2N2222A	TRANSISTOR, NPN 2N2222A	PHI	3
Q3	2N2222A	TRANSISTOR, NPN 2N2222A	PHI	
Q4	2N2907A	TRANSISTOR, PNP 2N2907A	PHI	4
Q5	BC560	TRANSISTOR, PNP BC560	PHI	3
Q6	BC547	TRANSISTOR, NPN BC547	PHI	3
Q7	BC547	TRANSISTOR, NPN BC547	PHI	
Q8	BC547	TRANSISTOR, NPN BC547	PHI	
Q9	2N5639	TRANSISTOR, FET 2N5639	MOT	1
Q10	2N2369A	TRANSISTOR, NPN 2N2369A	PHI	1
Q11	2N2907A	TRANSISTOR, PNP 2N2907A	PHI	
Q12		Not used		
Q13		Not used		
Q14	2N2907A	TRANSISTOR, PNP 2N2907A	PHI	
Q15	2N2907A	TRANSISTOR, PNP 2N2907A	PHI	
Q16		Not used		
Q17		Not used		
Q18		Not used		
Q19		Not used		

REV STATUS	LTR	A											NEXT ASSY			
OF SHEETS													USED ON	H1240.		

APPROVAL	DATE	REV APPROVAL AND DATE	CODE IDENT	PL 91-100000
PT	831016		REV A	SHEET 4 of 14

	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
Q20		Not used		
Q21	2N5639	TRANSISTOR, FET 2N5639	MOT	
Q22	BC560	TRANSISTOR, PNP BC560	PHI	
Q23	2N5639	TRANSISTOR, FET 2N5639	MOT	
Q24	BC560	TRANSISTOR, PNP BC560	PHI	
Q25	2N5639	TRANSISTOR, FET 2N5639	MOT	
Q26	2N5639	TRANSISTOR, FET 2N5639	MOT	
R1	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	11
R2	SFR 25	RESISTOR, FILM 470R/0.25 J	PHI	7
R3	SFR 25	RESISTOR, FILM 470R/0.25 J	PHI	
R4	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	21
R5	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R6	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R7	SFR 25	RESISTOR, FILM 27K/0.25 J	PHI	2
R8	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R9	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	9
R10	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R11	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R12	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	
R13	SFR 25	RESISTOR, FILM 220R/0.25 J	PHI	8
R14	SFR 25	RESISTOR, FILM 220R/0.25 J	PHI	
R15	SFR 25	RESISTOR, FILM 11K/0.25 J	PHI	4
R16	SFR 25	RESISTOR, FILM 11K/0.25 J	PHI	
R17		Not used		
R18	SFR 25	RESISTOR, FILM 200R/0.25 J	PHI	5
R19	SFR 25	RESISTOR, FILM 200R/0.25 J	PHI	
R20	SFR 25	RESISTOR, FILM 200R/0.25 J	PHI	
R21	SFR 25	RESISTOR, FILM 200R/0.25 J	PHI	
R22	SFR 25	RESISTOR, FILM 200R/0.25 J	PHI	
R23		Not used		
R24	SFR 25	RESISTOR, FILM 470R/0.25 J	PHI	
R25	SFR 25	RESISTOR, FILM 470R/0.25 J	PHI	
R26	SFR 25	RESISTOR, FILM 470R/0.25 J	PHI	
R27	SFR 25	RESISTOR, FILM 470R/0.25 J	PHI	
R28	SFR 25	RESISTOR, FILM 11K/0.25 J	PHI	
R29	SFR 25	RESISTOR, FILM 11K/0.25 J	PHI	
R30	SFR 25	RESISTOR, FILM 470R/0.25 J	PHI	

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON	H1240.		

APPROVAL	DATE	REV APPROVAL AND DATE	CODE IDENT	PL 91-100000
PT	831016		REV A	SHEET 5 of 14

	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
R31	SFR 25	RESISTOR, FILM 270R/0.25 J	PHI	6
R32	SFR 25	RESISTOR, FILM 270R/0.25 J	PHI	
R39	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R40	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R41	SFR 25	RESISTOR, FILM 510R/0.25 J	PHI	4
R42	SFR 25	RESISTOR, FILM 3K6/0.25 J	PHI	1
R43	SFR 25	RESISTOR, FILM 47R/0.25 J	PHI	1
R44	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	
R45	SFR 25	RESISTOR, FILM 82R/0.25 J	PHI	2
R46	SFR 25	RESISTOR, FILM 2R2/0.25 J	PHI	1
R47	SFR 25	RESISTOR, FILM 510R/0.25 J	PHI	
R48	SFR 25	RESISTOR, FILM 510R/0.25 J	PHI	
R49	PR 37	RESISTOR, CARB 33R/1.0 J	PHI	1
R50	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R51	SFR 25	RESISTOR, FILM 22K/0.25 J	PHI	2
R52	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R53	SFR 25	RESISTOR, FILM 2K2/0.25 J	PHI	5
R54	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R55	SFR 25	RESISTOR, FILM 5K1/0.25 J	PHI	1
R56	258038EKP102E1	RESISTOR, VAR 1K/0.5 K	PHI	2
R57	SFR 25	RESISTOR, FILM 91R/0.25 J	PHI	1
R58	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R59	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R60	SFR 25	RESISTOR, FILM 560R/0.25 J	PHI	1
R61	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R62	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	15
R63	SFR 25	RESISTOR, FILM 3K9/0.25 J	PHI	5
R64	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R65	SFR 25	RESISTOR, FILM 5K6/0.25 J	PHI	1
R66	SFR 25	RESISTOR, FILM 300K/0.25 J	PHI	1
R67	SFR 25	RESISTOR, FILM 56K/0.25 J	PHI	3
R68	SFR 25	RESISTOR, FILM 27K/0.25 J	PHI	
R69	SFR 25	RESISTOR, FILM 1K8/0.25 J	PHI	1
R70	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R71	SFR 25	RESISTOR, FILM 47K/0.25 J	PHI	5
R72	SFR 25	RESISTOR, FILM 47K/0.25 J	PHI	
R73	SFR 25	RESISTOR, FILM 47K/0.25 J	PHI	
R74	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	

REV STATUS	LTR A	NEXT ASSY		
OF SHEETS		USED ON	H1240.	

APPROVAL PT	DATE 831016	REV APPROVAL AND DATE	CODE IDENT	PL 91-100000
			REV A	SHEET 6 of 14

	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
R75	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	
R76	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R77	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R78	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R79	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R80	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R81	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R82	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R83	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R84	SFR 25	RESISTOR, FILM 220R/0.25 J	PHI	
R85	SFR 25	RESISTOR, FILM 220R/0.25 J	PHI	
R86	SFR 25	RESISTOR, FILM 910R/0.25 J	PHI	2
R87	SFR 25	RESISTOR, FILM 220R/0.25 J	PHI	
R88	SFR 25	RESISTOR, FILM 220R/0.25 J	PHI	
R89	SFR 25	RESISTOR, FILM 910R/0.25 J	PHI	
R90	SFR 25	RESISTOR, FILM 820R/0.25 J	PHI	1
R91	SFR 25	RESISTOR, FILM 220R/0.25 J	PHI	
R92	SFR 25	RESISTOR, FILM 270R/0.25 J	PHI	
R93	SFR 25	RESISTOR, FILM 2K2/0.25 J	PHI	
R94	SFR 25	RESISTOR, FILM 270R/0.25 J	PHI	
R95	SFR 25	RESISTOR, FILM 1K6/0.25 J	PHI	1
R96	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	
R97	SFR 25	RESISTOR, FILM 510/0.25 J	PHI	
R98	SFR 25	RESISTOR, FILM 20K/0.25 J	PHI	2
R99	SFR 25	RESISTOR, FILM 30K/0.25 J	PHI	1
R100	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R101	SFR 25	RESISTOR, FILM 3K9/0.25 J	PHI	
R102	SFR 25	RESISTOR, FILM 56K/0.25 J	PHI	
R103	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	9
R104	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R105	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	11
R106	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R107	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
R108	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	
R109	SFR 25	RESISTOR, FILM 3K9/0.25 J	PHI	
R110	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	
R111	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
R112	SFR 25	RESISTOR, FILM 47K/0.25 J	PHI	
R113	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON	H1240.		

APPROVAL	DATE	REV APPROVAL AND DATE	CODE IDENT	PL 91-100000
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	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
R114	SFR 25	RESISTOR, FILM 470K/0.25 J	PHI	2
R115	SFR 25	RESISTOR, FILM 1K2/0.25 J	PHI	2
R116	SFR 25	RESISTOR, FILM 82K/0.25 J	PHI	4
R117	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	
R118	SFR 25	RESISTOR, FILM 82K/0.25 J	PHI	7
R119	SFR 25	RESISTOR, FILM 51K/0.25 J	PHI	
R120	SFR 25	RESISTOR, FILM 51K/0.25 J	PHI	
R121	SFR 25	RESISTOR, FILM 56K/0.25 J	PHI	
R122	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	
R123	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R124	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
R125	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R126	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
R127	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	
R128	SFR 25	RESISTOR, FILM 3K9/0.25 J	PHI	
R129	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	
R130	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
R131	SFR 25	RESISTOR, FILM 47K/0.25 J	PHI	
R132	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
R133	SFR 25	RESISTOR, FILM 470K/0.25 J	PHI	
R134	SFR 25	RESISTOR, FILM 1K2/0.25 J	PHI	
R135	SFR 25	RESISTOR, FILM 51K/0.25 J	PHI	
R136	SFR 25	Not used		
R137	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R138	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R139		Not used		
R140	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R141		Not used		
R142	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R143		Not used		
R144	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R145		Not used		
R146	SFR 25	RESISTOR, FILM 2K7/0.25 J	PHI	1
R147	SFR 25	RESISTOR, FILM 2K/0.25 J	PHI	2
R148	SFR 25	RESISTOR, FILM 3K/0.25 J	PHI	2
R149	SFR 25	RESISTOR, FILM 220K/0.25 J	PHI	1
R150	VR 25	RESISTOR, CARB 1M2/0.25 J	PHI	1
R151	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R152	SFR 25	RESISTOR, FILM 10R/0.25 J	PHI	1

REV STATUS	LTR A		NEXT ASSY		
OF SHEETS			USED ON	H1240.	
APPROVAL PT	DATE 831016	REV APPROVAL AND DATE	CODE IDENT	PL 91-100000	
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	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
R153	SFR 25	RESISTOR, FILM 3K3/0.25 J	PHI	4
R154	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R155	SFR 25	RESISTOR, FILM 2K2/0.25 J	PHI	
R156	SFR 25	RESISTOR, FILM 2K2/0.25 J	PHI	
R157	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R158	SFR 25	RESISTOR, FILM 20K/0.25 J	PHI	
R159	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R160	VR 25	RESISTOR, CARB 10M/0.25 J	PHI	1
R161	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R162	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	
R163	SFR 25	RESISTOR, FILM 120K/0.25 J	PHI	1
R164	SFR 25	RESISTOR, FILM 7K5/0.25 J	PHI	2
R165	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R166	SFR 25	RESISTOR, FILM 7K5/0.25 J	PHI	
R167	SFR 25	RESISTOR, FILM 3K1/0.25 J	PHI	
R168	8038EKP102E1	RESISTOR, VAR. 1K/0.5K	PHI	
R169		Not used		
R170		Not used		
R171		Not used		
R172	SFR 25	RESISTOR, FILM 1M/0.25 J	PHI	4
R173		Not used		
R174		Not used		
R175	VR 25	RESISTOR, CARB 3M3/0.25 J	PHI	1
R176	SFR 25	RESISTOR, FILM 150K/0.25 J	PHI	1
R177	SFR 25	RESISTOR, FILM 330K/0.25 J	PHI	1
R178	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	
R179	SFR 25	RESISTOR, FILM 3K3/0.25 J	PHI	
R180	SFR 25	RESISTOR, FILM 4K7/0.25 J	PHI	
R181	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R182	SFR 25	RESISTOR, FILM 2K2/0.25 J	PHI	
R183	SFR 25	RESISTOR, FILM 1K/0.25 J	PHI	
R184	PR 37	RESISTOR, CARB 100R/1.0 J	PHI	5
R185		Not used		
R186		Not used		
R187		Not used		
R188	SFR 25	RESISTOR, FILM 2K/0.25 J	PHI	
R189	PR 37	RESISTOR, CARB 100R/1.0 J	PHI	
R190		Not used		

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON	H1240.		

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	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
R191	SFR 25	RESISTOR, FILM 1M/0.25 J	PHI	
R192	PR 37	RESISTOR, CARB 100R/1.0 J	PHI	
R193		Not used		
R194		Not used		
R195		Not used		
R196		Not used		
R197	PR 37	RESISTOR, CARB 100R/1.0 J	PHI	
R198		Not used		
R199		Not used		
R200		Not used		
R201	PR 37	RESISTOR. CARB 100R/1.0 J	PHI	
R202		Not used		
R203		Not used		
R204		Not used		
R205	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R206	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R207	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R208	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R209	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R210	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R211	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R212	SFR 25	RESISTOR, FILM 33R/0.25 J	PHI	
R213	SFR 25	RESISTOR, FILM 220R/0.25 J	PHI	
R214	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R215	VR 25	RESISTOR, CARB 22M/0.25J	PHI	1
R216		Not used		
R217		Not used		
R218		Not used		
R219		Not used		
R220	SFR 25	RESISTOR, FILM 51K/0.25 J	PHI	
R221	SFR 25	RESISTOR, FILM 39K/0.25 J	PHI	
R222	SFR 25	RESISTOR, FILM 82K/0.25 J	PHI	
R223	SFR 25	RESISTOR, FILM 68K/0.25 J	PHI	1
R224	SFR 25	RESISTOR, FILM 3K3/0.25 J	PHI	
R225	SFR 25	RESISTOR, FILM 22K/0.25 J	PHI	
R226	SFR 25	RESISTOR, FILM 390K/0.25 J	PHI	
R227	SFR 25	RESISTOR, FILM 3K3/0.25 J	PHI	
R228	SFR 25	RESISTOR, FILM 51K/0.25 J	PHI	

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON	H1240.		

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	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
R229	SFR 25	RESISTOR, FILM 1M/0.25 J	PHI	
R230	SFR 25	RESISTOR, FILM 1M/0.25 J	PHI	
R231	SFR 25	RESISTOR, FILM 82R/0.25 J	PHI	
R232	8038EKP103E1	RESISTOR, VAR. 10K/0.5 K	PHI	1
R233	SFR 25	RESISTOR. FILM 51K/0.25 J	PHI	
R234	SFR 25	RESISTOR, FILM 51K/0.25 J	PHI	
R235	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R236	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
R237	SFR 25	RESISTOR, FILM 270R/0.25 J	PHI	
R238	SFR 25	RESISTOR, FILM 270R/0.25 J	PHI	
R239		Not used		
R240		Not used		
R241	SFR 25	RESISTOR, FILM 10K/0.25 J	PHI	
R242	SFR 25	RESISTOR, FILM 3K9/0.25 J	PHI	
R243	SFR 25	RESISTOR, FILM 82K/0.25 J	PHI	
R244	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R245	SFR 25	RESISTOR, FILM 100K/0.25 J	PHI	
R246	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
R247	SFR 25	RESISTOR, FILM 100R/0.25 J	PHI	
RS1	MSP10A01-103G	RESISTOR, SIL 9 x 10K	Dale	1
RS2	C04-1-104 J	RESISTOR, SIL 3 x 100K	TRW	2
RS3	MSP08A01-103G	RESISTOR, SIL 7 x 10K	DALE	1
RS4	MSP08A01-102G	RESISTOR, SIL 7 x 1K	DALE	1
RS5	C04-1-104 J	RESISTOR, SIL 3 x 100K	TRW	
T1	TD 2418	TRAFO, 600 OHM LINE	TRA	2
T2	TD 2418	TRAFO, 600 OHM LINE	TRA	
U1	8085 AH-2	INTEGRATED CKT, 8085AH-2	SIE	1
U2	74LS373	INTEGRATED CKT, 74LS373	TI	3
U3	74LS365	INTEGRATED CKT, 74LS365	TI	3
U4	74LS245	INTEGRATED CKT, 74LS245	TI	1
U5	74LS138	INTEGRATED CKT, 74LS138	TI	2
U6	74LS138	INTEGRATED CKT, 74LS138	TI	
U7	74LS74	INTEGRATED CKT, 74LS74	TI	5
U8	74LS74	INTEGRATED CKT, 74LS74	TI	
U9	74LS74	INTEGRATED CKT, 74LS74	TI	
U10	74LS27	INTEGRATED CKT, 74LS27	TI	1
U11	74LS32	INTEGRATED CKT, 74LS32	TI	2
U12	74LS00	INTEGRATED CKT, 74LS00	TI	3

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON	H1240.		

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	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
U13	74LS04	INTEGRATED CKT, 74LS04	TI	4
U14	74LS04	INTEGRATED CKT, 74LS04	TI	
U15	74LS04	INTEGRATED CKT, 74LS04	TI	
U16	74LS32	INTEGRATED CKT, 74LS32	TI	
U17	7406	INTEGRATED CKT, 7406	TI	1
U18	LM339	INTEGRATED CKT, LM339	TI	2
U19	74LS279	INTEGRATED CKT, 74LS279	TI	1
U20	NE555	INTEGRATED CKT, NE555	TI	
U21	74LS00	INTEGRATED CKT, 74LS00	TI	
U22	74LS00	INTEGRATED CKT, 74LS00	TI	
U23	74LS123	INTEGRATED CKT, 74LS123	TI	1
U24	74LS195A	INTEGRATED CKT, 74LS195A	TI	1
U25	74LS390	INTEGRATED CKT, 74LS390	TI	1
U26	8253-5	INTEGRATED CKT, 8253-5	SIE	1
U27	74LS373	INTEGRATED CKT, 74LS373		
U28	8251A	INTEGRATED CKT, 8251A	SIE	2
U29	8251A	INTEGRATED CKT, 8351A	TI	
U30	75188	INTEGRATED CKT, 75188	TI	3
U31	75188	INTEGRATED CKT, 75188	TI	
U32	75189A	INTEGRATED CKT, 75189A	TI	3
U33	75189A	INTEGRATED CKT, 75189A	TI	
U34	MBM2764-30Z	INTEGRATED CKT, 2764	FUJ	6
U35	MBM2764-30Z	INTEGRATED CKT, 2764	FUJ	
U36	MBM2764-30Z	INTEGRATED CKT, 2764	FUJ	
U37	MBM2764-30Z	INTEGRATED CKT, 2764	FUJ	
U38	MBM2764-30Z	INTEGRATED CKT, 2764	FUJ	
U39	2816	INTEGRATED CKT, 2816	SIE	1
U40	MK4802P(J)	INTEGRATED CKT, MK4802P(J)	MOST	1
U41	74LS257A	INTEGRATED CKT, 74LS257A	TI	2
U42	74LS257A	INTEGRATED CKT, 74LS257A	TI	
U43	74LS393	INTEGRATED CKT, 74LS393	TI	1
U44	74LS244	INTEGRATED CKT, 74LS244	TI	1
U45	74LS373	INTEGRATED CKT, 74LS373	TI	
U46	MB8264-20	INTEGRATED CKT, 8264-20	FUJ	8
U47	MB8264-20	INTEGRATED CKT, 8264-20	FUJ	
U48	MB8264-20	INTEGRATED CKT, 8264-20	FUJ	
U49	MB8264-20	INTEGRATED CKT, 8264-20	FUJ	
U50	MB8264-20	INTEGRATED CKT, 8264-20	FUJ	

REV STATUS	LTR	A											NEXT ASSY			
OF SHEETS													USED ON	H1240.		

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	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
U51	MB8264-20	INTEGRATED CKT, 8264-20	FUJ	
U52	MB8264-20	INTEGRATED CKT, 8264-20	FUJ	
U53	MB8264-20	INTEGRATED CKT, 8264-20	FUJ	
U54	74LS365	INTEGRATED CKT, 74LS365	TI	
U55	74LS377	INTEGRATED CKT, 74LS377	TI	2
U56	TL084	INTEGRATED CKT, TL084	TI	4
U57	TL084	INTEGRATED CKT, TL084	TI	
U58	HEF4066	INTEGRATED CKT, HEF4066	PHI	6
U59	HEF4066	INTEGRATED CKT, HEF4066	PHI	
U60	HEF4066	INTEGRATED CKT, HEF4066	PHI	
U61	TL084	INTEGRATED CKT, TL084	TI	
U62	TL084	INTEGRATED CKT, TL084	TI	
U63	LM339	INTEGRATED CKT, LM339	TI	
U64	74LS365	INTEGRATED CKT, 74LS365	TI	
U65	75468	INTEGRATED CKT, 75468	TI	1
U66	75189A	INTEGRATED CKT, 75189A	TI	
U67	74LS74	INTEGRATED CKT, 74LS74	TI	
U68	8254	INTEGRATED CKT, 8254	SIE	1
U69	74LS74	INTEGRATED CKT, 74LS74	TI	
U70	74LS377	INTEGRATED CKT, 74LS377	TI	
U71	74LS37	INTEGRATED CKT, 74LS37	TI	1
U72	MBM2764-30Z	INTEGRATED CKT, 2764	FUJ	
U73	HEF4066	INTEGRATED CKT, HEF4066	PHI	
U74	HEF4066	INTEGRATED CKT, HEF4066	PHI	
U75	HEF4066	INTEGRATED CKT, HEF4066	PHI	
U76	75188	INTEGRATED CKT, 75188	TI	
U77	74LS04	INTEGRATED CKT, 74LS04	TI	
VR1	BZX79C12	DIODE,SD,ZENER, 12V	PHI	1
VR2	BZX79C6V2	DIODE,SD,ZENER, 6,2V	PHI	1
VR3	BZX79C3V9	DIODE,SD,ZENER, 3,9V	PHI	1
VR4	BZV85C62	DIODE,SD,ZENER, 62V	PHI	2
VR5	BZV85C62	DIODE,SD,ZENER, 62V	PHI	
VR6	BZX79C6V8	DIODE,SD,ZENER, 6,8V	PHI	2
VR7	BZX79C6V8	DIODE,SD,ZENER, 6,8V	PHI	
VR8		Not used		
VR9	BZX79C7V5	DIODE,SD,ZENER, 7,5V	PHI	2
VR10	BZX79C2V4	DIODE,SD,ZENER, 2,4V	PHI	2
VR11	BZX79C2V4	DIODE,SD,ZENER, 2,4V	PHI	

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON	H1240.		

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	TITEL	STYKLISTE
	H1240 Main Modem Board.	PARTS LIST

REF DES / FIND NO	PART NO	NOMENCLATURE OR DESCRIPTION	MFR CODE	QTY
VR12	BZX79C7V5	DIODE,SD,ZENER, 7,5V	PHI	
W1/23	76264-101	MINI-MATE-2600 0,1"	BERG	14
Y1	9.216 MHz	CRYSTAL UNIT,QUARTZ 9.216MHz	PIE	1
XU	DIL B40P108	SOCKET, 40 PIN	BURN	1
XU	DIL B28P108	SOCKET, 28 PIN	BURN	10
XU	DIL B24P108	SOCKET, 24 PIN	BURN	2
XU	DIL B20P108	SOCKET, 20 PIN	BURN	7
XU	DIL B16P108	SOCKET, 16 PIN	BURN	20
XU	DIL B14P108	SOCKET, 14 PIN	BURN	37
XU	DIL B8P108	SOCKET, 8 PIN	BURN	1

REV STATUS	LTR	A										NEXT ASSY			
OF SHEETS												USED ON	H1240.		

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13. PART LISTS

INDICATOR UNIT H1240 Modul 400

Symbol	Description	Manufact.	
R401	Resistor 100Kohm±5% 0,33W	Philips	2322 211 13104
R402	Resistor 22Kohm±5% 0,33W	Philips	2322 211 13223
R403	Resistor 220Kohm±5% 0,33W	Philips	2322 211 33224
R404	Resistor 10Kohm±5% 0,33W	Philips	2322 211 13103
R405	Resistor 10Kohm±5% 0,33W	Philips	2322 211 13103
R406	Resistor 22Kohm±5% 0,33W	Philips	2322 211 13223
R407	Resistor 22Kohm±5% 0,33W	Philips	2322 211 13223
R408	Resistor 15Kohm±5% 0,33W	Philips	2322 211 33153
R409	Resistor 39Kohm±5% 0,33W	Philips	2322 211 33393
R410	Resistor 15Kohm±5% 0,33W	Philips	2322 211 33153
R411	Resistor 100Kohm±5% 0,33W	Philips	2322 211 13104
R412	Resistor 68Kohm±5% 0,33W	Philips	2322 211 13683
R413	Resistor 150Kohm±5% 0,33W	Philips	2322 211 33154
R414	Resistor 10Kohm±5% 0,33W	Philips	2322 211 13103
R415	Resistor 10Kohm±5% 0,33W	Philips	2322 211 13103
R416	Resistor 680 Ohm±5% 0,33W	Philips	2322 211 13681
R417	Resistor 1Kohm±5% 0,33W	Philips	2322 211 13102
C401	Capacitor, polyetylent. 220nF±20% 100V	Siemens	32560-D1224-K
C402	Capacitor, polyetylent. 220nF±20% 100V	Siemens	32560-D1224-K
C403	Capacitor, polyetylent. 100nF±20% 100V	Siemens	32510-D1104-K
T401	Transistor	Motorola	BC328-25
T402	Transistor	Motorola	BC558
D401	Diode, silicon	Motorola	1N4448
D402	Diode, silicon	Motorola	1N4448
D403	Diode, silicon	Motorola	1N4448
D404	Diode, silicon	Motorola	1N4448
D405	Diode, light emitting	Nord Elektron	MV5753
D406	Diode, light emitting	Nord Elektron	MV5753
D407	Diode, light emitting	Nord Elektron	MV5253
D408	Diode, light emitting	Nord Elektron	MV5253
D409	Diode, light emitting	Nord Elektron	MV5253
D410	Diode, light emitting	Nord Elektron	MV5253
D411	Diode, light emitting	Nord Elektron	MV5753
D412	Diode, light emitting	Nord Elektron	MV5753
D413	Diode, light emitting	Nord Elektron	MV5253
D414	Diode, light emitting	Nord Elektron	MV5253

Symbol	*Description*	*Manufact.*	
IC401	Integrated circuit	Motorola	MC14017B
IC402	Integrated circuit	Motorola	LM393
J401	IC-soket	AMP	640-358-3
P401	AMP connector	AMP	164713-7

Symbol	*Description*	*Manufact.*	
S501	Switch 5xF20,2u 0.0.+F2u ee NE15 to S505.	Shadow	
S506	Miniswitch, unimec, momentery 15.500	MEC	MK II

ARQ H1240

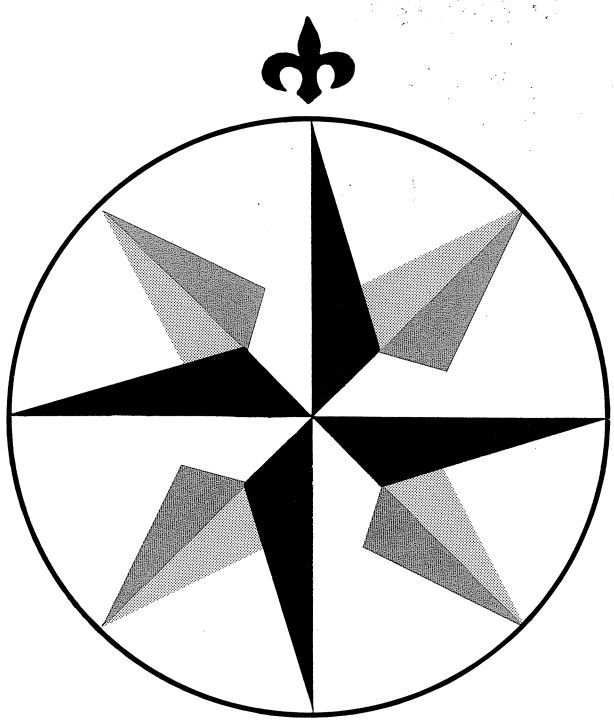
Symbol	Description			Manufact.	
R601	Resistor	220 Ohm ± 5%	4W	Philips	2322 330 22221
R602	Resistor	1Kohm ± 5%	0,33W	Philips	2322 106 33102
R603	Resistor	150Kohm ± 5%	0,33W	Philips	2322 106 33154
R604	Resistor	560 Ohm ± 5%	½W	Philips	2322 212 13561
R605	Resistor	3,9Kohm ± 5%	0,33W	Philips	2322 211 13392
R606	Resistor	2,7Kohm ± 5%	1,6W	Philips	2322 191 52702
C601	Capacitor, polyester	1uF	100V	PH	2222 344 25105
C602	Capacitor, polyester	1uF	100V	PH	2222 344 25105
C603	Capacitor, polyester	1uF	100V	PH	2222 344 25105
C604	Capacitor, elektrolytic	100uF	40V	ROE	EKM 00 DD 310G
C605	Capacitor, elektrolytic	100uF	16V	ROE	EKM 00 CC 310D
C606	Capacitor, polyetylent.	10nF	400V	Siemens	B32510-D6103-K
C607	Capacitor, polyetylent.	10nF	400V	Siemens	B32510-D6103-K
C608	Capacitor, polyester	0,22uF	100V	PH	2222 344 25224
C609	Capacitor, polyester	0,22uF	100V	PH	2222 344 25224
C610	Capacitor, polyester	0,22uF	100V	PH	2222 344 25224
C611	Capacitor, elektrolytic	2200uF	16V	ROE	EG 03 KE 422D
C612	Capacitor, elektrolytic	1000uF	25V	ROE	EKM 00JG 410E
C613	Capacitor, elektrolytic	1000uF	25V	ROE	EKM 00JG 410E
C614	Capacitor, elektrolytic	2200uF	16V	ROE	EG 03 KE 422D
C615	Capacitor, elektrolytic	2200uF	16V	ROE	EG 03 KE 422D
C616	Capacitor, elektrolytic	2200uF	16V	ROE	EG 03 KE 422D
C617	Capacitor, polyester	0,22uF	100V	PH	2222 344 25224
C618	Capacitor, polyester	0,22uF	100V	PH	2222 344 25224
C619	Capacitor, polyester	0,22uF	100V	PH	2222 344 25224
C620	Capacitor, elektrolytic	2200uF	16V	ROE	EG 03 KE 422D
C621	Capacitor, elektrolytic	100uF	16V	ROE	EKM 00 CC 310D
C622	Capacitor, polyester	0,22uF	100V	PH	2222 344 25224
C623	Capacitor, polyester	0,22uF	100V	PH	2222 344 25224
C624	Capacitor, polyester	1uF	100V	PH	2222 344 25105

Symbol	*Description*	*Manufact.*	
T6o1	Transistor	Philips	BC 547A
T6o2	Transistor	Philips	BC 639
T6o3	Transistor	Philips	BC 639
D6o1	Diode, silicon	Motorola	MR 75o
D6o2	Diode, zener	Motorola	MPZ 4742A
D6o3	Diode, bridge	Motorola	2KBP oo5
D6o4	Diode, bridge	Motorola	2KBP oo5
D6o5	Diode, silicon	Motorola	IN 4oo2
TR6o1	Transformer	Tradania	TD 4469

Symbol	Description		Manufact.	
R701	Resistor 100 Ohm±5%	0,33W	Philips	2322 211 13101
R702	Resistor 100 Ohm±5%	0,33W	Philips	2322 211 13101
R703	Resistor 10Kohm±5%	0,5 W	Philips	2322 212 13103
R704	Resistor 10Kohm±5%	0,5 W	Philips	2322 212 13103
R705	Resistor 2,2Kohm±5%	0,33W	Philips	2322 211 13222
R706	Resistor 2,2Kohm±5%	0,33W	Philips	2322 211 13222
R707	Resistor 10 Ohm±5%	0,5 W	Philips	2322 329 05109
C701	Capacitor, ceramic 4,7nF	5KV	Ferroperm	9/0138,9
C702	Capacitor, ceramic 4,7nF	5KV	Ferroperm	9/0138,9
C703	Capacitor, ceramic 4,7nF	5KV	Ferroperm	9/0138,9
C704	Capacitor, elektrolytic 10uF	40V	ROE	EB 00CA210G
C705	Capacitor, ceramic 4,7nF	5KV	Ferroperm	9/0138,9
C706	Capacitor, ceramic 4,7nF	5KV	Ferroperm	9/0138,9
D701	Diode, silicon		Motorola	1N4002
D702	Diode, silicon		Motorola	1N4002
D703	Diode, silicon		Motorola	MR 751
D704	Diode, silicon		Motorola	MR 751
RE701	Relay, 220V version		PASI	WSU/GD-7-C
RE701	Relay, 110V version		PASI	WSU/GD-6-C
RE702	Relay		PASI	KH/R-3-C
RE703	Relay		PASI	BV 998
L701	Filtershoke		ERO	F1753-270-124

Symbol	*Description*	*Manufact.*	
IC8o1	Voltage regulator	Motorola	MC78Mo5CT
IC8o2	Voltage regulator	Motorola	MC78o5CT
IC8o3	Voltage regulator	Motorola	MC78M12CT
IC8o4	Voltage regulator	Motorola	MC7912CT
T8o1	Transistor	Motorola	BD8o1
T8o2	Transistor	Motorola	BD8o1
T8o3	Transistor	Motorola	BD8o8
TR8o1	Transformer	Tradania	TD36o
D8o1	Diode, bridge	Nord elek.	KBPC6Too5

Symbol	Description	Manufact.	
F901	Fuse 220V ø5x20mm 315mA T	Radio Part	480511
	Fuse 110V ø5x20mm 500mA T	Radio Part	480514
F902	Fuse 24 V ø5x20mm 2,5 A T	Radio Part	480423
P901	Plug	Radio Part	383010
J901	Jack	Hischmann	Mesei 60 F



Sailor

Sailor

INTEGRATED RADIOTELEX SYSTEM
INTERFACE EXAMPLEX FOR
H1240 RADIOTELEX MODEM

A/S S. P. RADIO · AALBORG · DENMARK

SAILOR INTEGRATED RADIOTELEX SYSTEM CONSISTS OF FOLLOWING UNITS:

RADIOTELEX MODEM ARQ H1240

KEYBOARD PROCESSOR H1249

CHARACTER DISPLAY H1253

MOUNTING KIT FOR DO = H1251

HARD COPY PRINTER H1252

MOUNTING KIT FOR DO = H1250

TELEX ALARM H1231

SCANNING RECEIVER R1121

POWER SUPPLY FOR DO = N1405

CONNECTION BOX H1247

CONTENTS

3.7.

3.8.

3.9.

3.10. - 3.12. PRINCIPLE DESCRIPTION FOR TELEX MODE PROGRAMME 1000/B

3.10. UNATTENDED TELEX MODE ON ONE FREQUENCY WITH AUTOMATIC POWER-UP OF TRANSMITTER

3.11. UNATTENDED TELEX MODE ON ??FREQUENCIES WITH AUTOMATIC POWER-UP OF TRANSMITTER

3.12.

3.13. ACCESSORY FUNCTIONS (MORSE KEY, EXT. ALARM) FOR H1240

3.14. INTERFACE SIGNAL WAVEFORMS H1240

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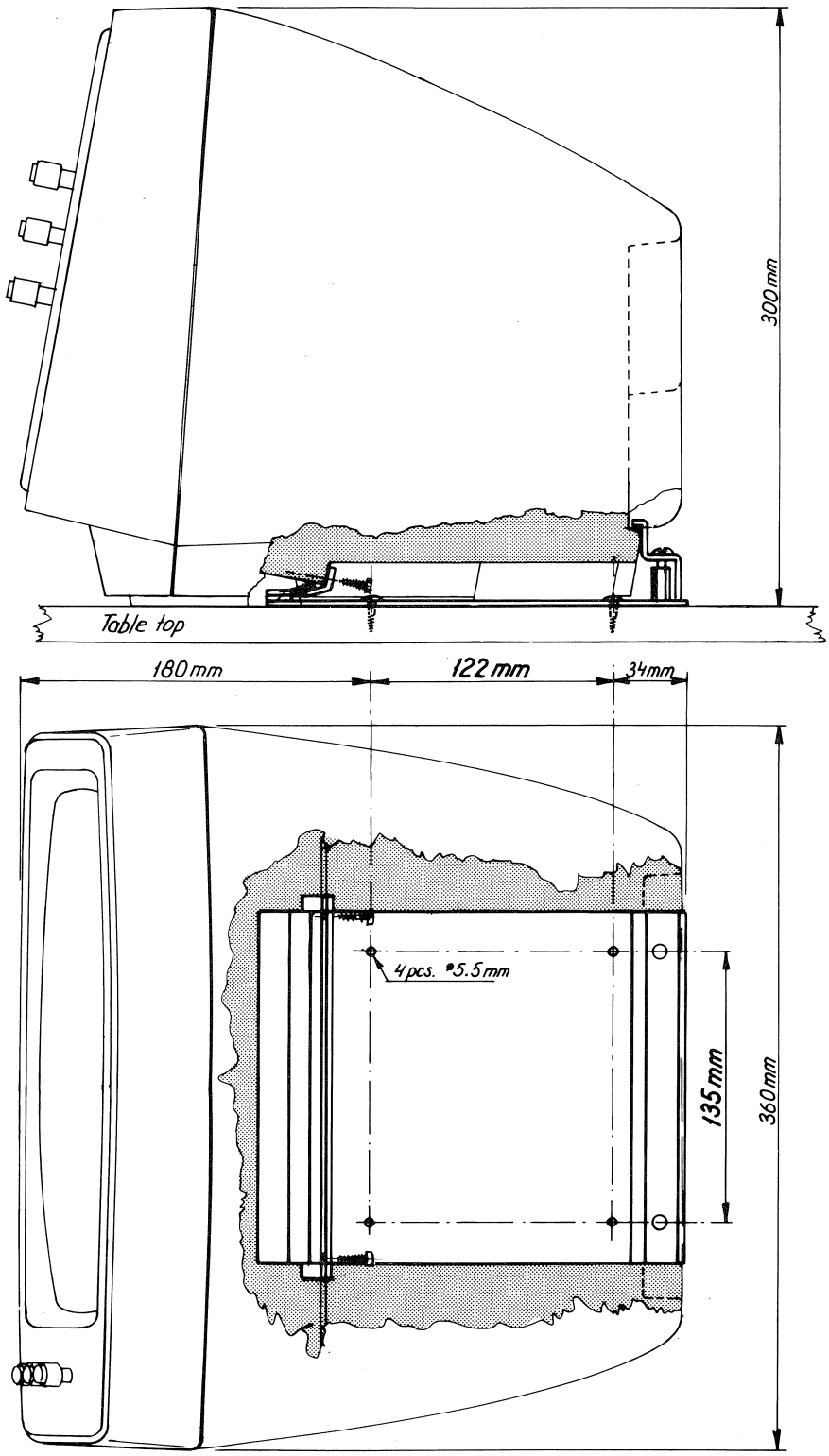
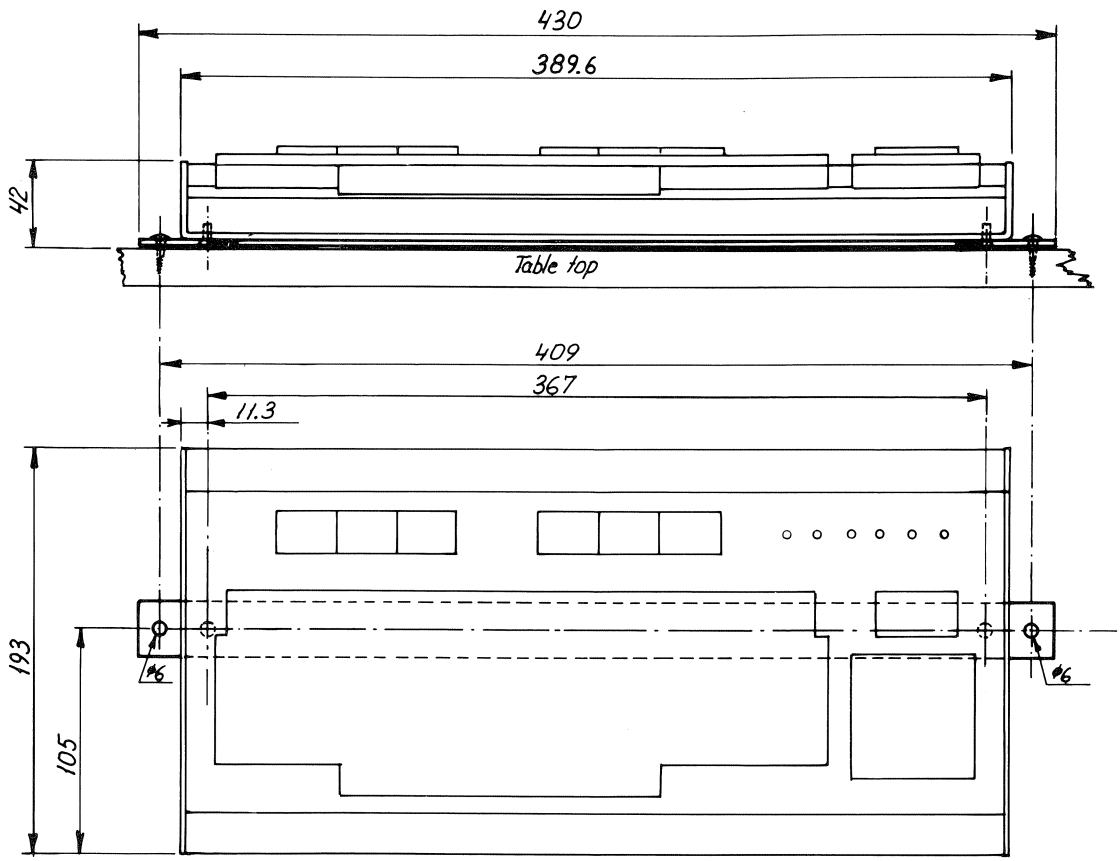


Dimensional drawing for NEC Character display JB - 1201 M. H1253 with S.P. Radio mounting kit H 1251.

All dimensions in mm.



Dimensional drawing for Keyboard Processor H1249

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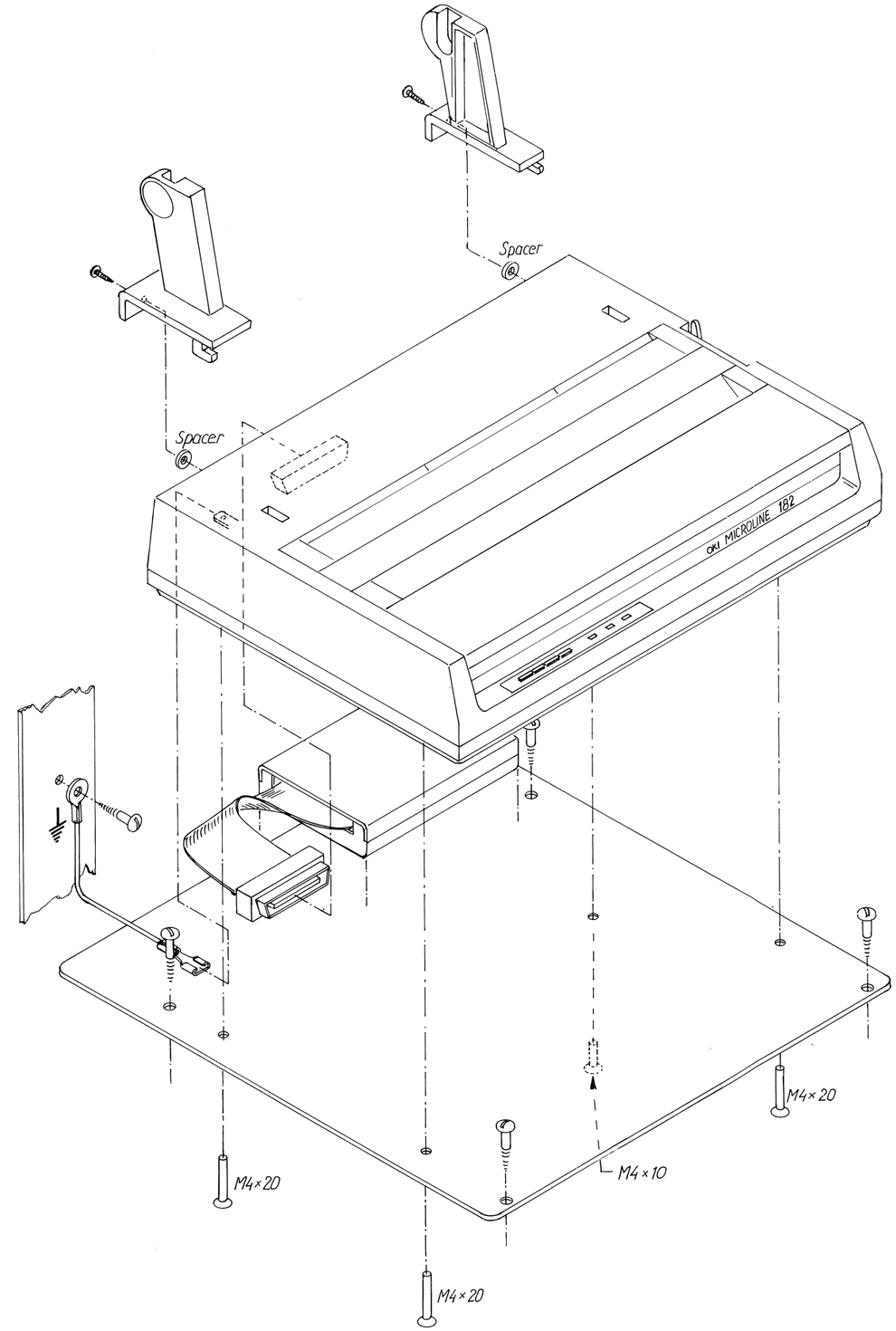
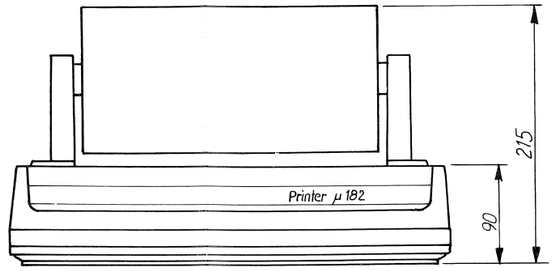
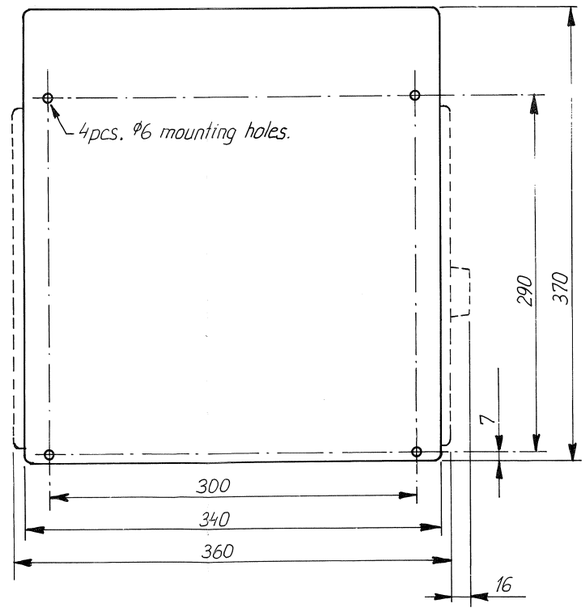


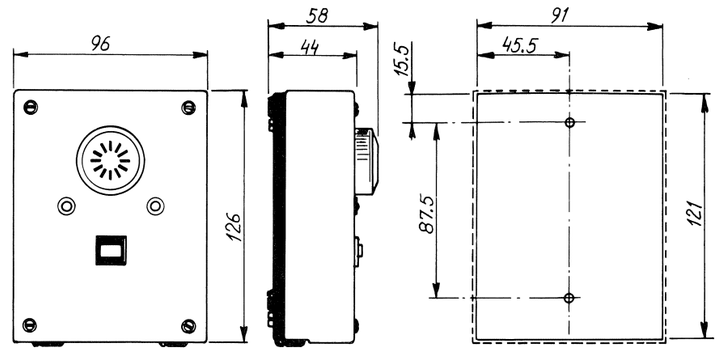


Drillingplan for OKI printer Microline 182, SAILOR H1252, with SAILOR mounting kit H1250

Dimensions in mm.



DIMENSIONS H1231

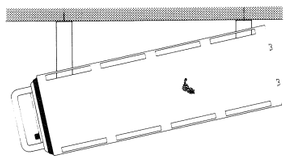


Dimensions in mm.

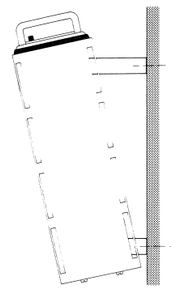
DIMENSIONS H1240

Installation possibilities for SAILOR Radio Telex Modem ARQ H1240 in cabinet H1225.
The cabinet H1225 can be tilted-up in 5 steps.

20 mm clearance around the cabinet.
75 mm clearance at rear side of cabinet.

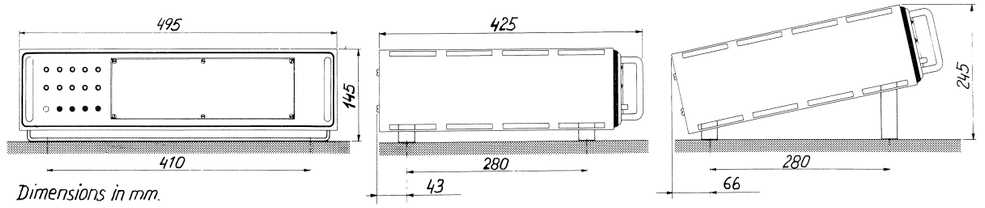


Deck head installation.



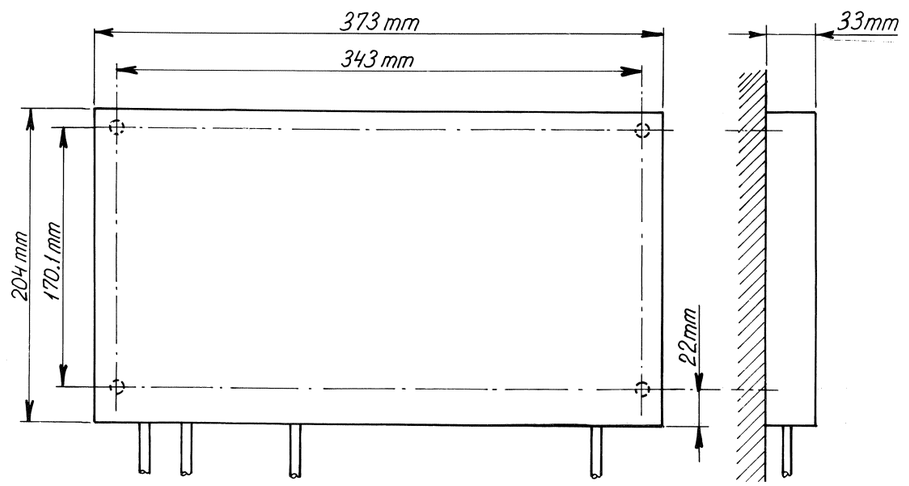
Bulkhead installation.

Desk top installation.



Dimensions in mm.

DIMENSIONS H1247



INTERFACE

SAILOR ARQ H1240 and SAILOR KEYBOARD PROCESSOR H1249

Following jumper setting on ARQ H1240:

W19 - 0, IN	W19 - 1, OUT
W19 - 4, IN	W19 - 2, OUT
W17 - IN	W19 - 3, OUT
	W19 - 5, OUT
	W19 - 6, OUT

SYSTEM GENERATION FOR ARQ H1240 (see also section 8 in System Operation Reference Manual).

```
System generation "Write out";
TT1585 Vers 2.1.

Software configuration(s)

   50 Baud operation

Select an option:

(1) MODEM control
(2) RX/TX interfaces
(3) SELCALL and WRU codes
(4) EQUIPMENT interfaces
(5) MEMORY formats
(6) TESTING system performance
(7) PRINTER logging

Enter action desired?
```

(1) MODEM control

```
FEC and CW transmit allowed = ON
FEC diversity = 2 periods
Max. FEC error rate (Ø/Ø) = 3Ø
Max. errors in ARQ-block (Ø,1,2) = Ø
Max. Autotelex call series = 3
Restart = ON
Finite start/restart = ON
Standby on single Alpha-block = ON
```

(2) RX/TX interfaces

```
RX1-mark  = 1615 Hz
RX1-space = 1785 Hz
TX1-mark  = 1615 Hz
TX1-space = 1785 Hz
Receiver Post-Mute    = 3 x 1.25ms
Transmitter Pre-Key   = Ø x 1.25ms
Transmitter Post-Key  = Ø x 1.25ms
Slave delay           = 3 x 1.25ms
```

(3) SELCALL and WRU codes

```
ARQ/FEC selcall number    = ØØØØØ+
GroupFEC selcall number   = 11111+
Internal Answerback = ON
Answerback =
12345 abcdefg x
7E-ØD-ØA-31-32-33-34-35-7F-2Ø-61-62-63-64-65-66-67-2Ø-78-7F
```

(4) EQUIPMENT interfaces

```
Echo = ON
Auto-linefeed = ON
Operator interface
  Console =  T+T:
  Printer =  LPT:
  Reader  =  TTY:
  Puncher =  MEM:
Remote control = OFF
Remote/printer port mode = 24ØØ,N,8,1
Buffered printing = ON
```

(5) MEMORY formats

```
   64 Kbytes total memory

Enter size of transmit buffer char's): 8Ø

   867 lines in text memory
   8Ø  char's in transmit buffer

Secret messages? (Y/N) Y
Enter password: secret
```

(6) TESTING system performance

```
----------------------Performance verification----------------------
              S: Start      C: Cycle      E: End
                                    no. tests  no. fail

ROM checksum test:

Type S

ROM No. 1 checksum:           AD46        Ø1         ØØ
ROM no. 2 checksum:           64EA        Ø1         ØØ
ROM no. 3 checksum:           19Ø2        Ø1         ØØ
ROM no. 4 checksum:           53FB        Ø1         ØØ
ROM no. 5 checksum:           96E2        Ø1         ØØ
ROM no. 6 checksum:           61D3        Ø1         ØØ
CPU selftest:

Dynamic RAM test:

Static RAM test:

EEPROM test:

Modem test:

Serial I/O test:

Parallel I/O test:

--------------------Performance verification--------------------
              S: Start      C: Cycle      E: End
                                    no. tests  no. fail

ROM checksum test:

TYPE E
```

(7) PRINTER logging

```
Hard-copy? (Y/N)
```

INTERFACE

SAILOR ARQ H1240 and

Video Display Unit: Hazeltine, type ESPRIT I (T.M.)

Interconnection cable (screened).

ARQ H1240 X3	ESPRIT I EIA/C.L.	Note
1	1	Protective ground
2	2	Transmitted data
3	3	Received data
7	7	Signal ground
20	20	Data Terminal ready

Note: The screen on the cable has to be open at the VDU side.
There are ferrit-beads on each wire.

FUNCTION SELECTION

Following switch setting on Video Display Unit:

To the left:

SW1 - ON
SW2 - OFF
SW3 - OFF
SW4 - OFF
SW5 - OFF
SW6 - ON
SW7 - OFF
SW8 - ON
SW9 - OFF
SW10- OFF

To the right:

SW1 - ON
SW2 -ON
SW3 - ON
SW4 - OFF
SW5 - OFF
SW6 - OFF
SW7 - OFF
SW8 - OFF

Following jumper setting on ARQ H1240:

W19 - 0, IN
W19 - 4, IN

W19 - 1, OUT
W19 - 2, OUT
W19 - 3, OUT
W19 - 5, OUT
W19 - 6, OUT

INTERFACE

SAILOR ARQ H1240 and

Video Display Unit: Hazeltine, type ESPRIT II

Interconnection cable (screened).

ARQ H1240 X3	ESPRIT I EIA/C.L.	Note
1	1	Protective ground
2	2	Transmitted data
3	3	Received data
7	7	Signal ground
20	20	Data Terminal ready

Note: The screen on the cable has to be open at the VDU side.
There are ferrit-beads on each wire.

FUNCTION SELECTION

Following switch setting on Video Display Unit:

To the left:

SW1 - OFF
SW2 - OFF
SW3 - ON
SW4 - ON
SW5 - ON
SW6 - ON
SW7 - ON
SW8 - OFF
SW9 - ON
SW10- OFF

To the right:

SW1 - OFF
SW2 - ON
SW3 - OFF
SW4 - OFF
SW5 - OFF
SW6 - OFF
SW7 - OFF
SW8 - OFF
SW9 - ON
SW10- OFF

Following jumper setting on ARQ H1240:

W19 - 0, IN
W19 - 4, IN

W19 - 1, OUT
W19 - 2, OUT
W19 - 3, OUT
W19 - 5, OUT
W19 - 6, OUT

INTERFACE

SAILOR ARQ H1240 and

Printer: OKI Electric, type Microline 80 with
Serial Interphase (RS - 232C)

If H1285 T-BUS/Centronics interface is used, please see H1285 Instruction Book

Interconnection cable (screened)

ARQ H1240 X4	u80 RS-232C	Note
1	1	Protective ground
3	3	Received data
7	7	Ground
20	11	Printer ready
	6 - 20	Jumper

Note: The screen on the cable has to be open at the printer side.
Screws on Microline 80 connector are non-standard 2.5mm Metric.
There are ferrit-beads on each wire.

FUNCTION SELECTION

Following switch setting on printer for 300 Baud operation (with EPROMs SP1-SP5)

To the left:	To the right:	
SW1 - OFF	SW7 - OFF	SW12 - ON
SW2 - ON	SW8 - ON	SW13 - OFF
SW3 - OFF	SW9 - ON	SW14 - OFF
	SW10- ON	
SW4 - OFF	SW11- ON	
SW5 - ON		
SW6 - OFF		

On main printer board S4 - A.

No setting on Radiotelex Modem ARQ H1240.

FUNCTION SELECTION

Folloving switch setting on printer for 2400 Baud operation (with EPROMs from SP6 and up)

To the left:	To the right:	
SW1 - OFF	SW7 - OFF	SW12 - ON
SW2 - ON	SW8 - ON	SW13 - OFF
SW3 - OFF	SW9 - ON	SW14 - OFF
	SW10- ON	
SW4 - ON	SW11- ON	
SW5 - OFF		
SW6 - ON		

On main printer board S4 - A.

Check the setting on Radiotelex Modem ARQ H1240 remote/printer port mode = 24ØØ,N,8,1

INTERFACE

SAILOR ARQ H1240 with Universal teleprinter interface TT1580A and

Teleprinter: Philips PACT 200 with line unit 570 12300/3531 590 10700 (double current).

Interconnection cable (screened)

TT1580A X10	PACT 200 P ✳	Note
3	6	
5	3	RX-data
6	4	RX-data return
7	2	TX-data return
8	1	TX-data
2	5	

Note! The screen on the cable has to be open at the teleprinter side. There are ferrit-beads on each wire.

✳ Telegraph plug on line cable.

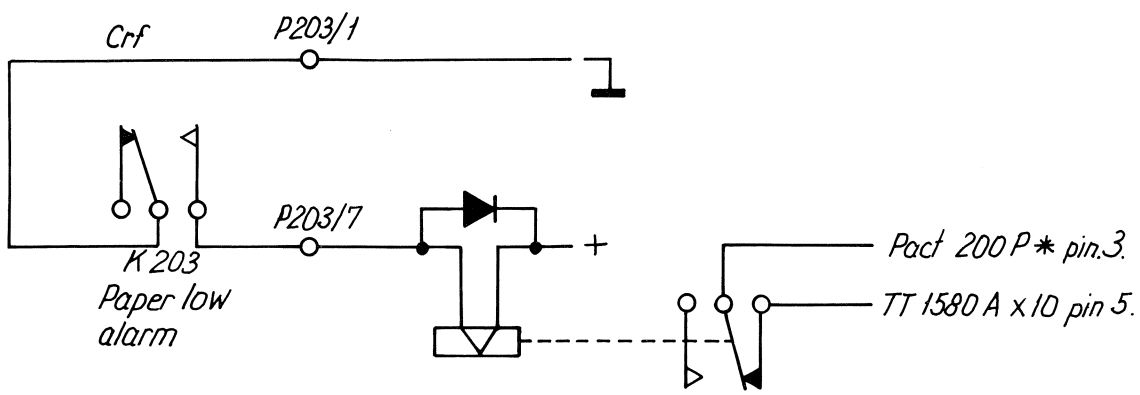
Plug pin	Lead	Plinth screw in PACT 200	Description
1	A (white)	P203/22	TX-line +
2	B (brown)	P203/23	TX-line -
3	C (yellow)	P203/18	RX-line +
4	D (green)	P203/16	RX-line -
7	G (blue)	P203/1	CRF relays, common
8	H (red)	P203/7	Paper/tape low alarm

FUNCTION SELECTION

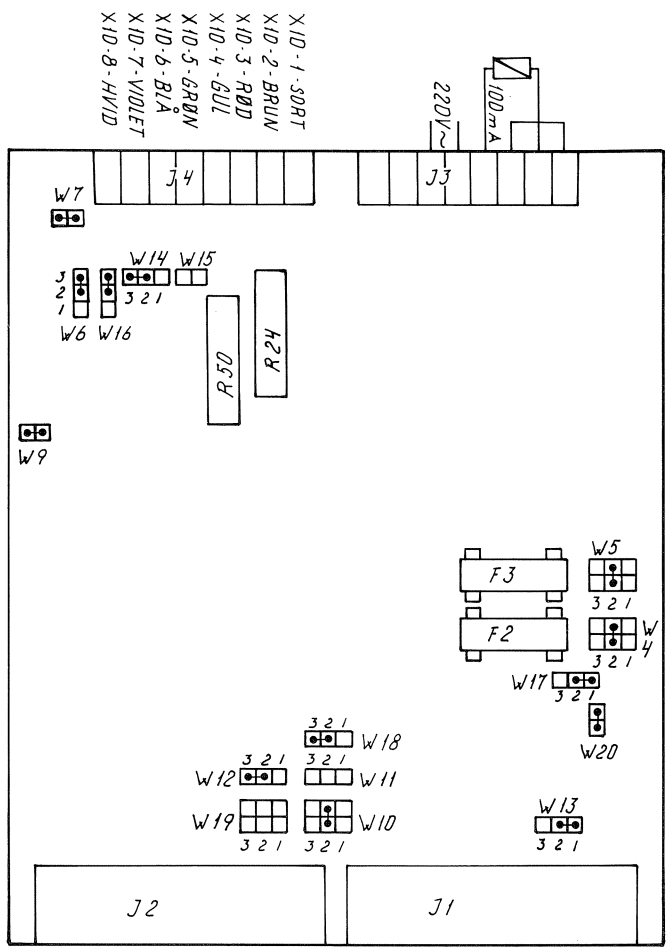
System set-up for PACT 200: Refer to installation manual for PACT 200.

Set Baud rate to 100 for PACT 200.

OBS! Paper/tape low alarm not in use. PACT 200 has to be modified with an external relay to enable paper/tape low alarm, see diagram below:



Following jumper setting in Universal Teleprinter Interface TT1580A.



Following jumper setting for ARQ H1240.

W1 - IN	W16 - IN	W19-5, IN	W6 , OUT	W19-1, OUT
W5 - IN	W17 - IN	W19-6, IN	W13 , OUT	W19-4, OUT
W8 - IN	W18 - IN	W20 , IN	W14 , OUT	W19-7, OUT
W10 - IN	W19-2, IN	W23 , IN	W15 , OUT	
W11 - IN	W19-3, IN	W4 , OUT	W19-0, OUT	

Cable between X3 and X8.

X3 - 3	Grøn	X8 - 3
X3 - 7	Gul	X8 - 7
X3 - 9	Orange	X8 - 9
X3 - 11	Rød	X8 - 11
X3 - 12	Brun	X8 - 12
X3 - 13	Sort	X8 - 13
X3 - 14	Hvid	X8 - 14
X3 - 17	Grå	X8 - 17
X3 - 21	Violet	X8 - 21
X3 - 25	Blå	X8 - 25

ARQ H1240/4-6-24287 A

SYSTEM GENERATION FOR ARQ H1240 (see also section 8 in System Operation Reference Manual).

System generation "Write out";
TT1585 Vers 2.1.

Software configuration(s)

50 Baud operation

Select an option:

(1) MODEM control
(2) RX/TX interfaces
(3) SELCALL and WRU codes
(4) EQUIPMENT interfaces
(5) MEMORY formats
(6) TESTING system performance
(7) PRINTER logging

Enter action desired?

(1) MODEM control

FEC and CW transmit allowed = ON
FEC diversity = 2 periods
Max. FEC error rate (Ø/Ø) = 3Ø
Max. errors in ARQ-block (Ø,1,2) = Ø
Max. Autotelex call series = 3
Restart = ON
Finite start/restart = ON
Standby on single Alpha-block = ON

(2) RX/TX interfaces

RX1-mark = 1615 Hz
RX1-space = 1785 Hz
TX1-mark = 1615 Hz
TX1-space = 1785 Hz
Receiver Post-Mute = 3 x 1.25ms
Transmitter Pre-Key = Ø x 1.25ms
Transmitter Post-Key = Ø x 1.25ms
Slave delay = 3 x 1.25ms

(3) SELCALL and WRU codes

ARQ/FEC selcall number = ØØØØØ+
GroupFEC selcall number = 11111+
Internal Answerback = ON
Answerback =
12345 abcdefg x
7E-ØD-ØA-31-32-33-34-35-7F-2Ø-61-62-63-64-65-66-67-2Ø-78-7F

(4) EQUIPMENT interfaces

Echo = OFF
Auto-linefeed = OFF
Operator interface
Console = TTY
Printer = TTY
Reader = TTY
Puncher = TTY
Remote control = OFF
Remote/printer port mode = 24ØØ,N,8,1
Buffered printing = ON

(5) MEMORY formats

64 Kbytes total memory

Enter size of transmit buffer char's): 8ØØØ

867 lines in text memory
8ØØØ char's in transmit buffer

Secret messages? (Y/N) Y
Enter password: secret

(6) TESTING system performance

----------Performance verification----------

	S: Start	C: Cycle no. tests	E: End no. fail
ROM checksum test:			
Type S			
ROM No. 1 checksum:	AD46	Ø1	ØØ
ROM no. 2 checksum:	64EA	Ø1	ØØ
ROM no. 3 checksum:	19Ø2	Ø1	ØØ
ROM no. 4 checksum:	53FB	Ø1	ØØ
ROM no. 5 checksum:	96E2	Ø1	ØØ
ROM no. 6 checksum:	61D3	Ø1	ØØ
CPU selftest:			
Dynamic RAM test:			
Static RAM test:			
EEPROM test:			
Modem test:			
Serial I/O test:			
Parallel I/O test:			

----------Performance verification----------

	S: Start	C: Cycle no. tests	E: End no. fail
ROM checksum test:			
TYPE E			

(7) PRINTER logging

Hard-copy? (Y/N)

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INTERFACE

SAILOR ARQ H1240 and

Teleprinter: Philips PACT 220 with V28 Line Unit 570 12400/3531590 10600

Interconnection cable (screened)

ARQ H1240 X3	PACT 220 P203	Note
2	21	Transmitted data
3	15	Received data
7	16,22,23	Signal ground

Note: The screen on the cable has to be open at the teleprinter side.
There are ferrite beads on each wire.

FUNCTION SELECTION

System set-up for PACT 220

PACT 220 Adr.	0	1	2	3	4	5	6
00	1	1	1	1	0	1	1
9	1	1	1	1	1	1	0
15	0	0	0	0	0	0	0
21	1	1	0	0	1	1	0
24	0	1	1	1	1	0	1
25	1	1	1	1	0	0	1
10 to 94	1	1	1	1	1	1	1
*Note							

* Note: All other codes from 10 to 94 than these mentioned in the table is set to 1 1 1 1 1 1 1 1.
On the V28 line unit the IC5C has to be removed.
The answer-back has to be programmed to on in the ARQ H1240.
The answer-back has to be programmed in the PACT 220 and in the H1240.

Following jumper setting on ARQ H1240

W1,	IN	W4,	OUT	W19-0,	OUT
W5,	IN	W6,	OUT	W19-1,	OUT
W8,	IN	W7,	OUT	W19-4,	OUT
W10,	IN	W13,	OUT	W19-5,	OUT
W11,	IN	W14,	OUT		
W19-2,	IN	W15,	OUT		
W19-3,	IN	W16,	OUT		
W19-6,	IN	W17,	OUT		
W20,	IN	W18,	OUT		
W23,	IN				

SYSTEM GENERATION FOR ARQ H1240 (see also section 8 in System Operation Reference Manual).

```
System generation "Write out";
TT1585 Vers 2.1.

Software configuration(s)

   50 Baud operation

Select an option:

(1) MODEM control
(2) RX/TX interfaces
(3) SELCALL and WRU codes
(4) EQUIPMENT interfaces
(5) MEMORY formats
(6) TESTING system performance
(7) PRINTER logging

Enter action desired?
```

(1) MODEM control

```
FEC and CW transmit allowed = ON
FEC diversity = 2 periods
Max. FEC error rate (Ø/Ø) = 3Ø
Max. errors in ARQ-block (Ø,1,2) = Ø
Max. Autotelex call series = 3
Restart = ON
Finite start/restart = ON
Standby on single Alpha-block = ON
```

(2) RX/TX interfaces

```
RX1-mark  = 1615 Hz
RX1-space = 1785 Hz
TX1-mark  = 1615 Hz
TX1-space = 1785 Hz
Receiver Post-Mute   = 3 x 1.25ms
Transmitter Pre-Key  = Ø x 1.25ms
Transmitter Post-Key = Ø x 1.25ms
Slave delay          = 3 x 1.25ms
```

(3) SELCALL and WRU codes

```
ARQ/FEC selcall number   = ØØØØØ+
GroupFEC selcall number  = 11111+
Internal Answerback = ON
Answerback =
12345 abcdefg x
7E-ØD-ØA-31-32-33-34-35-7F-2Ø-61-62-63-64-65-66-67-2Ø-78-7F
```

(4) EQUIPMENT interfaces

```
Echo = OFF
Auto-linefeed = OFF
Operator interface
  Console = TTY
  Printer = TTY
  Reader  = TTY
  Puncher = TTY
Remote control = OFF
Remote/printer port mode = 24ØØ,N,8,1
Buffered printing = ON
```

(5) MEMORY formats

```
  64 Kbytes total memory

Enter size of transmit buffer char's): 8ØØØ

  867 lines in text memory
  8ØØØ char's in transmit buffer

Secret messages? (Y/N) Y
Enter password: secret
```

(6) TESTING system performance

```
--------------------Performance verification--------------------
               S: Start      C: Cycle      E: End
                                 no. tests  no. fail

ROM checksum test:

Type S

ROM No. 1 checksum:          AD46       Ø1        ØØ
ROM no. 2 checksum:          64EA       Ø1        ØØ
ROM no. 3 checksum:          19Ø2       Ø1        ØØ
ROM no. 4 checksum:          53FB       Ø1        ØØ
ROM no. 5 checksum:          96E2       Ø1        ØØ
ROM no. 6 checksum:          61D3       Ø1        ØØ
CPU selftest:

Dynamic RAM test:

Static RAM test:

EEPROM test:

Modem test:

Serial I/O test:

Parallel I/O test:

--------------------Performance verification--------------------
               S: Start      C: Cycle      E: End
                                 no. tests  no. fail

ROM checksum test:

TYPE E
```

(7) PRINTER logging

```
Hard-copy? (Y/N)
```

INTERFACE

SAILOR ARQ H1240 with Universal teleprinter interface TT1580A and

Teleprinter: Siemens T1000

Interconnection cable (screened)

TT1580A X10	T1000 P✱	Note
5	4	RX-data
6	8	RX-data return
7	2	TX-data
8	1	TX-data return
	3 to 7	Jumper

Note! The screen on the cable has to be open at the teleprinter side. There are ferrit-beads on each wire.

✱ Telegraph plug on line cable.

FUNCTION SELECTION

System set-up for T1000.

Special function connector VS1

Insert jumper VS1.1 (pin 1 to 14)
VS1.5 (pin 5 to 10)

Special function connector VS2

Insert jumper VS2.4 (pin 4 to 11)

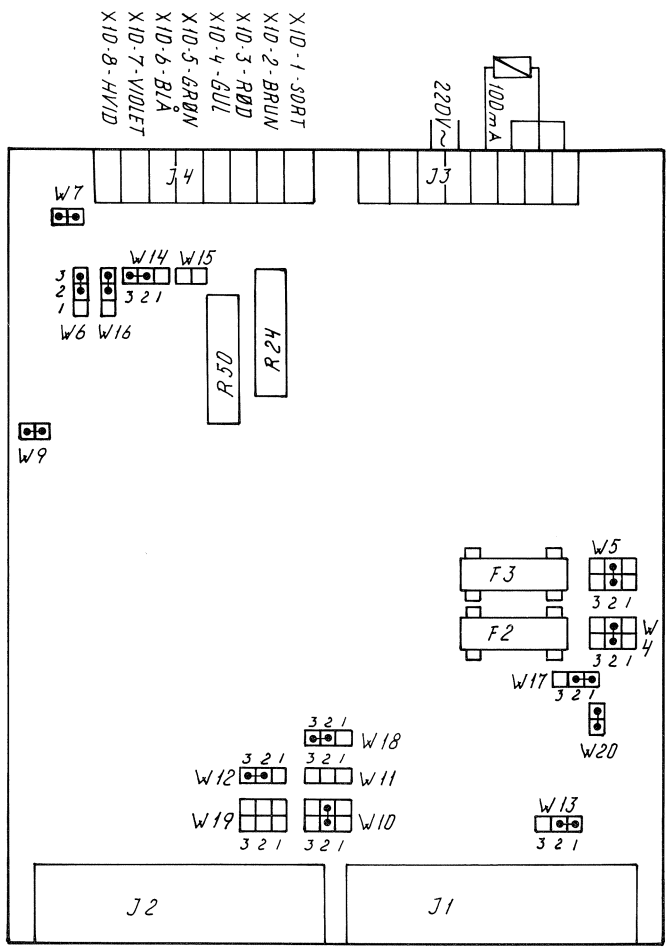
Special function module VA

Insert diode 2,5,7,11,35,48
Insert jumper 55,57,62

Remove answer-back module KG

Set Baud rate to 100 for T1000

Following jumper setting in Universal Teleprinter Interface TT1580A.



Following jumper setting for ARQ H1240.

W1 - IN	W16 - IN	W19-5, IN	W6 , OUT	W19-1, OUT
W5 - IN	W17 - IN	W19-6, IN	W13 , OUT	W19-4, OUT
W8 - IN	W18 - IN	W20 , IN	W14 , OUT	W19-7, OUT
W10 - IN	W19-2, IN	W23 , IN	W15 , OUT	
W11 - IN	W19-3, IN	W4 , OUT	W19-0, OUT	

Cable between X3 and X8.

X3 - 3	Grøn	X8 - 3
X3 - 7	Gul	X8 - 7
X3 - 9	Orange	X8 - 9
X3 - 11	Rød	X8 - 11
X3 - 12	Brun	X8 - 12
X3 - 13	Sort	X8 - 13
X3 - 14	Hvid	X8 - 14
X3 - 17	Grå	X8 - 17
X3 - 21	Violet	X8 - 21
X3 - 25	Blå	X8 - 25

ARQ H1240/4-6-24287 A

SYSTEM GENERATION FOR ARQ H1240 (see also section 8 in System Operation Reference Manual).

```
System generation "Write out";
TT1585 Vers 2.1.

Software configuration(s)

   50 Baud operation

Select an option:

(1) MODEM control
(2) RX/TX interfaces
(3) SELCALL and WRU codes
(4) EQUIPMENT interfaces
(5) MEMORY formats
(6) TESTING system performance
(7) PRINTER logging

Enter action desired?
```

(1) MODEM control

```
FEC and CW transmit allowed = ON
FEC diversity = 2 periods
Max. FEC error rate (Ø/Ø) = 3Ø
Max. errors in ARQ-block (Ø,1,2) = Ø
Max. Autotelex call series = 3
Restart = ON
Finite start/restart = ON
Standby on single Alpha-block = ON
```

(2) RX/TX interfaces

```
RX1-mark  = 1615 Hz
RX1-space = 1785 Hz
TX1-mark  = 1615 Hz
TX1-space = 1785 Hz
Receiver Post-Mute   = 3 x 1.25ms
Transmitter Pre-Key  = Ø x 1.25ms
Transmitter Post-Key = Ø x 1.25ms
Slave delay          = 3 x 1.25ms
```

(3) SELCALL and WRU codes

```
ARQ/FEC selcall number   = ØØØØØ+
GroupFEC selcall number  = 11111+
Internal Answerback = ON
Answerback =
12345 abcdefg x
7E-ØD-ØA-31-32-33-34-35-7F-2Ø-61-62-63-64-65-66-67-2Ø-78-7F
```

(4) EQUIPMENT interfaces

```
Echo = OFF
Auto-linefeed = OFF
Operator interface
  Console = TTY
  Printer = TTY
  Reader  = TTY
  Puncher = TTY
Remote control = OFF
Remote/printer port mode = 24ØØ,N,8,1
Buffered printing = ON
```

(5) MEMORY formats

```
  64 Kbytes total memory

Enter size of transmit buffer char's): 8ØØØ

  867 lines in text memory
  8ØØØ char's in transmit buffer

Secret messages? (Y/N) Y
Enter password: secret
```

(6) TESTING system performance

```
--------------------Performance verification--------------------
               S: Start      C: Cycle      E: End
                                 no. tests  no. fail

ROM checksum test:

Type S

ROM No. 1 checksum:          AD46       Ø1        ØØ
ROM no. 2 checksum:          64EA       Ø1        ØØ
ROM no. 3 checksum:          19Ø2       Ø1        ØØ
ROM no. 4 checksum:          53FB       Ø1        ØØ
ROM no. 5 checksum:          96E2       Ø1        ØØ
ROM no. 6 checksum:          61D3       Ø1        ØØ
CPU selftest:

Dynamic RAM test:

Static RAM test:

EEPROM test:

Modem test:

Serial I/O test:

Parallel I/O test:

--------------------Performance verification--------------------
               S: Start      C: Cycle      E: End
                                 no. tests  no. fail

ROM checksum test:

TYPE E
```

(7) PRINTER logging

```
Hard-copy? (Y/N)
```

INTERFACE

SAILOR ARQ H1240 and

Teletypewriter CAE Victor KSR 743

Interconnection cable (screened).

ARQ H1240 X3	KSR 743	Note
1	1	Protective ground
2	2	Transmitted data
3	3	Received data
7	7	Signal ground
20	20	Data terminal ready

Note: The screen on the cable has to be open at the TTY side.
There are ferrit-beads on each wire.

FUNCTION SELECTION

System set-up for KSR 743.

STATUS PM DSR 0 CTS 0 RLSD 0 RD 1 SI

Typing Options
Print intensity = 8.
LCV time = 10 deciseconds.
Characters/inch = 11.
Left margin = 0 characters.
Line length = 69 characters.
Lines/inch = 6.
Half lines/LF = 2.

Printer Options
On receipt of CR the printer will CR.
On receipt of LF the printer will CR LF.
On receipt of VT the printer will SLEW 1".
On receipt of FF the printer will SLEW 2".

Keyboard Options
New line key = CR LF.

Communications Options
Baud rate = 300.
Transmit parity is MARKING.
Terminal connects DIRECT.
Terminal = FULL duplex.
Terminal = RD/TD ONLY.
Data IS NOT paced with DC3/DC1.
Data IS NOT paced with BREAK.
Printer IS NOT controlled by DC2/DC4.

Answerback Options
Answerback IS NOT present.

Following jumper setting for ARQ H1240:

W1 , IN	W4 , OUT
W5 , IN	W6 , OUT
W8 , IN	W13 , OUT
W10 , IN	W14 , OUT
W11 , IN	W15 , OUT
W19-1, IN	W16 , OUT
W19-3, IN	W17 , OUT
W19-4, IN	W18 , OUT
W20 , IN	W19-0 , OUT
W23 , IN	W19-2 , OUT
	W19-5 , OUT
	W19-6 , OUT
	W19-7 , OUT

SYSTEM GENERATION FOR ARQ H1240 (see also section 8 in System Operation Reference Manual).

System generation "Write out";
TT1585 Vers 2.1.

Software configuration(s)

50 Baud operation

Select an option:

(1) MODEM control
(2) RX/TX interfaces
(3) SELCALL and WRU codes
(4) EQUIPMENT interfaces
(5) MEMORY formats
(6) TESTING system performance
(7) PRINTER logging

Enter action desired?

(1) MODEM control

FEC and CW transmit allowed = ON
FEC diversity = 2 periods
Max. FEC error rate (Ø/Ø) = 3Ø
Max. errors in ARQ-block (Ø,1,2) = Ø
Max. Autotelex call series = 3
Restart = ON
Finite start/restart = ON
Standby on single Alpha-block = ON

(2) RX/TX interfaces

RX1-mark = 1615 Hz
RX1-space = 1785 Hz
TX1-mark = 1615 Hz
TX1-space = 1785 Hz
Receiver Post-Mute = 3 x 1.25ms
Transmitter Pre-Key = Ø x 1.25ms
Transmitter Post-Key = Ø x 1.25ms
Slave delay = 3 x 1.25ms

(3) SELCALL and WRU codes

ARQ/FEC selcall number = ØØØØØ+
GroupFEC selcall number = 11111+
Internal Answerback = ON
Answerback =
12345 abcdefg x
7E-ØD-ØA-31-32-33-34-35-7F-2Ø-61-62-63-64-65-66-67-2Ø-78-7F

(4) EQUIPMENT interfaces

Echo = ON
Auto-linefeed = OFF
Operator interface
Console = CRT:
Printer = LPT:
Reader = TTY:
Puncher = MEM:
Remote control = OFF
Remote/printer port mode = 24ØØ,N,8,1
Buffered printing = ON

(5) MEMORY formats

64 Kbytes total memory

Enter size of transmit buffer char's): 8Ø

867 lines in text memory
8Ø char's in transmit buffer

Secret messages? (Y/N) Y
Enter password: secret

(6) TESTING system performance

----------Performance verification----------

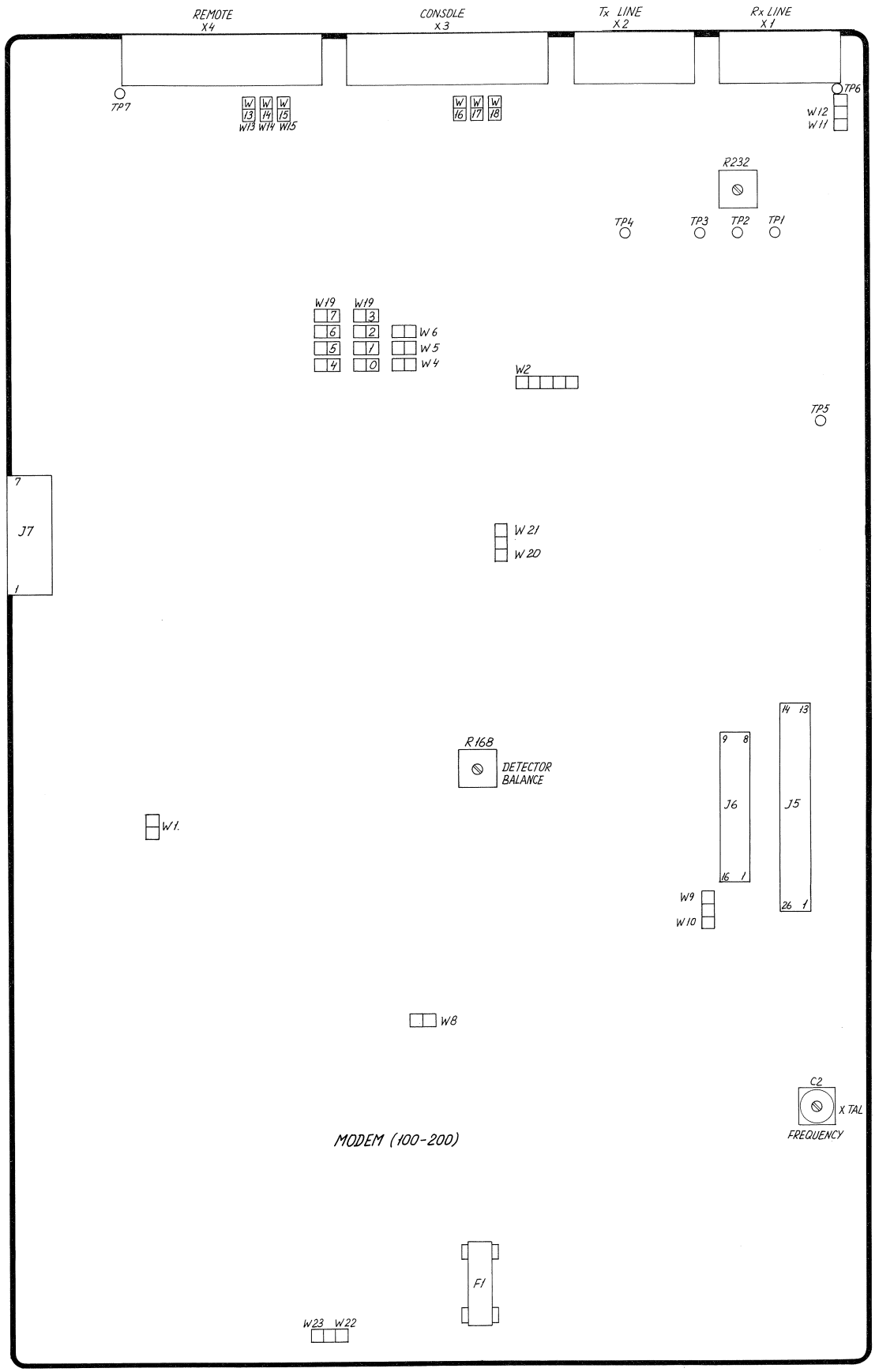
	S: Start	C: Cycle no. tests	E: End no. fail
ROM checksum test:			
Type S			
ROM No. 1 checksum:	AD46	Ø1	ØØ
ROM no. 2 checksum:	64EA	Ø1	ØØ
ROM no. 3 checksum:	19Ø2	Ø1	ØØ
ROM no. 4 checksum:	53FB	Ø1	ØØ
ROM no. 5 checksum:	96E2	Ø1	ØØ
ROM no. 6 checksum:	61D3	Ø1	ØØ
CPU selftest:			
Dynamic RAM test:			
Static RAM test:			
EEPROM test:			
Modem test:			
Serial I/O test:			
Parallel I/O test:			

----------Performance verification----------

	S: Start	C: Cycle no. tests	E: End no. fail
ROM checksum test:			
TYPE E			

(7) PRINTER logging

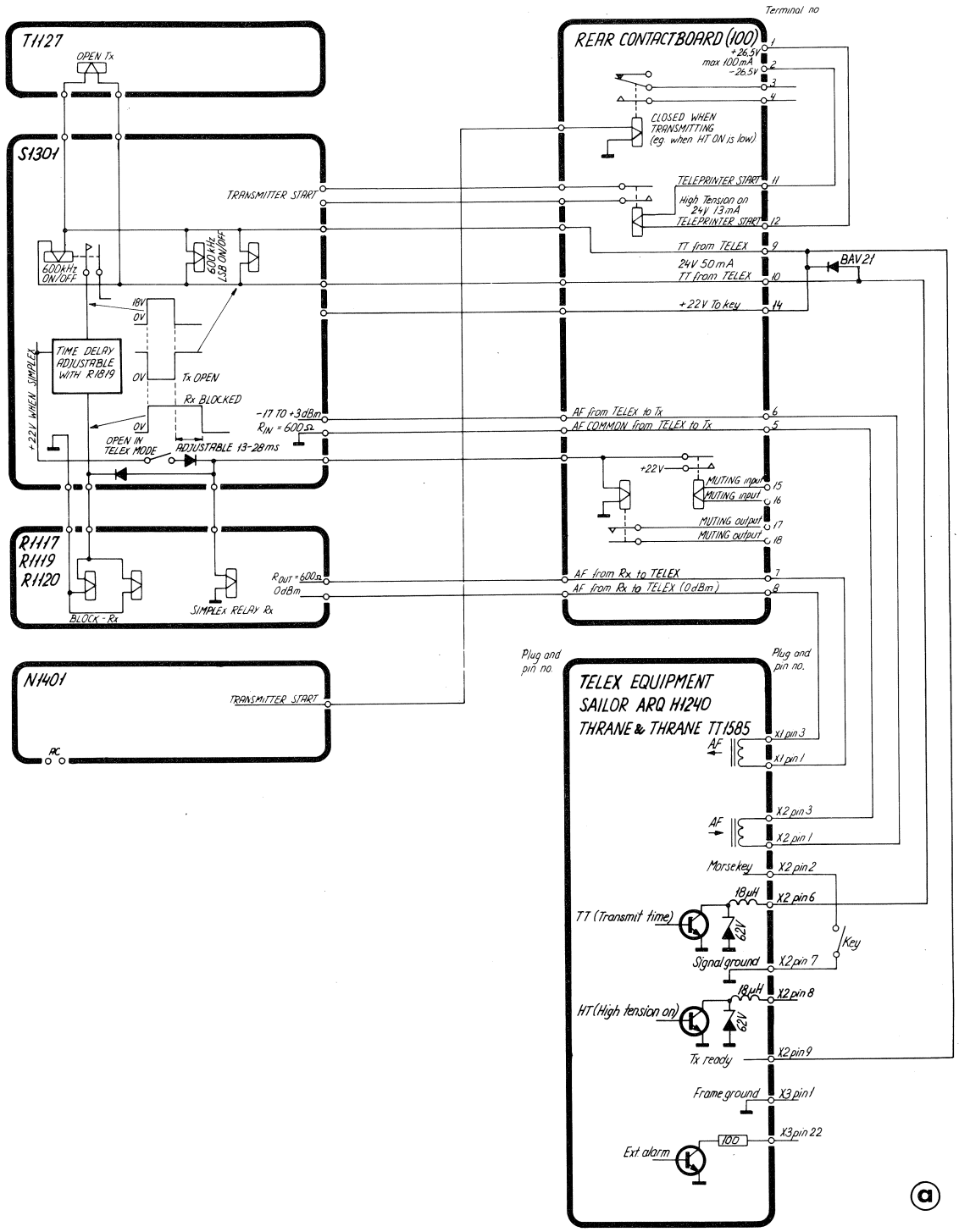
Hard-copy? (Y/N)



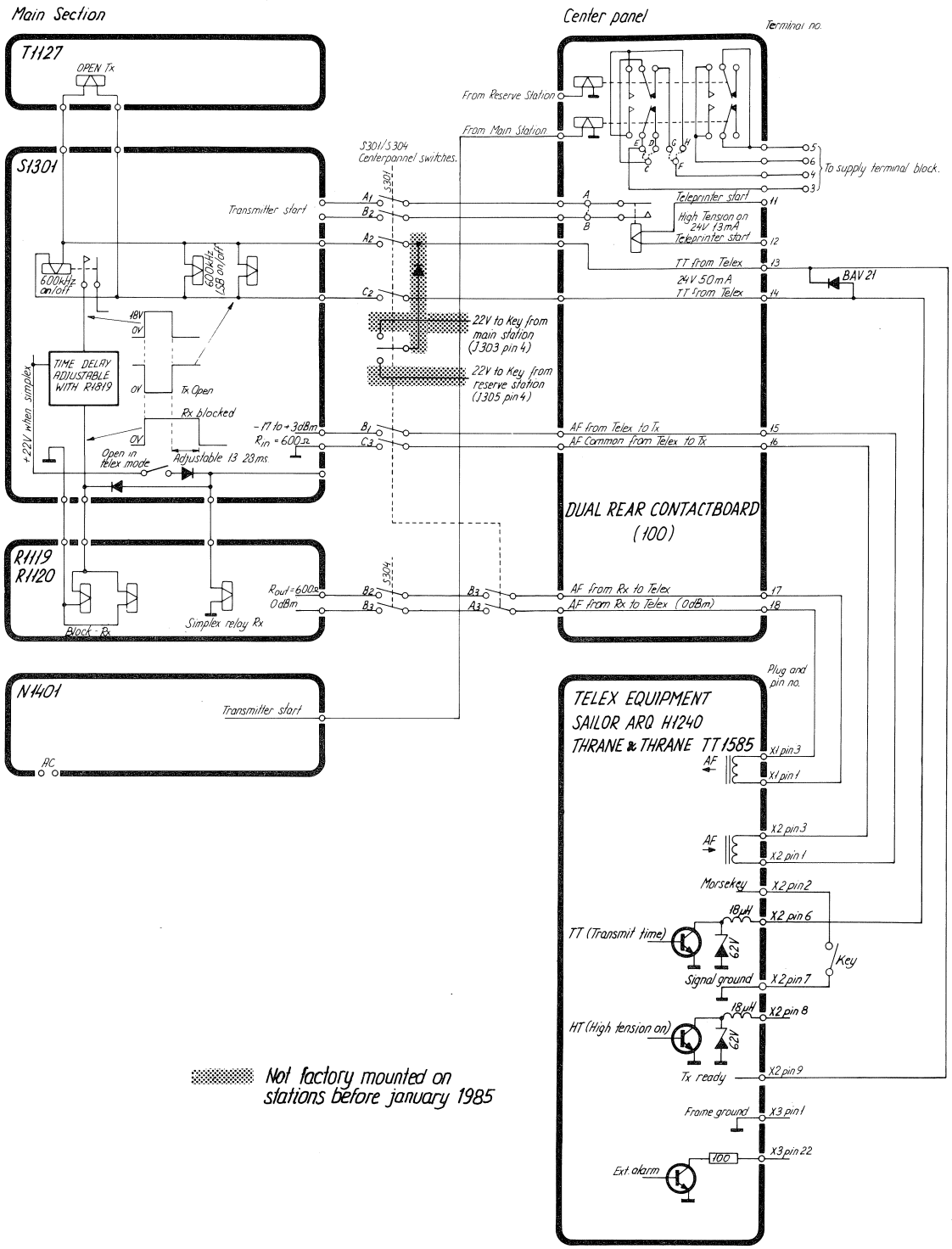
MAIN SCHEMATIC DIAGRAM H1240 ⓐ

2.15 JUMPER LOCATION ON MODEM BOARD H1240

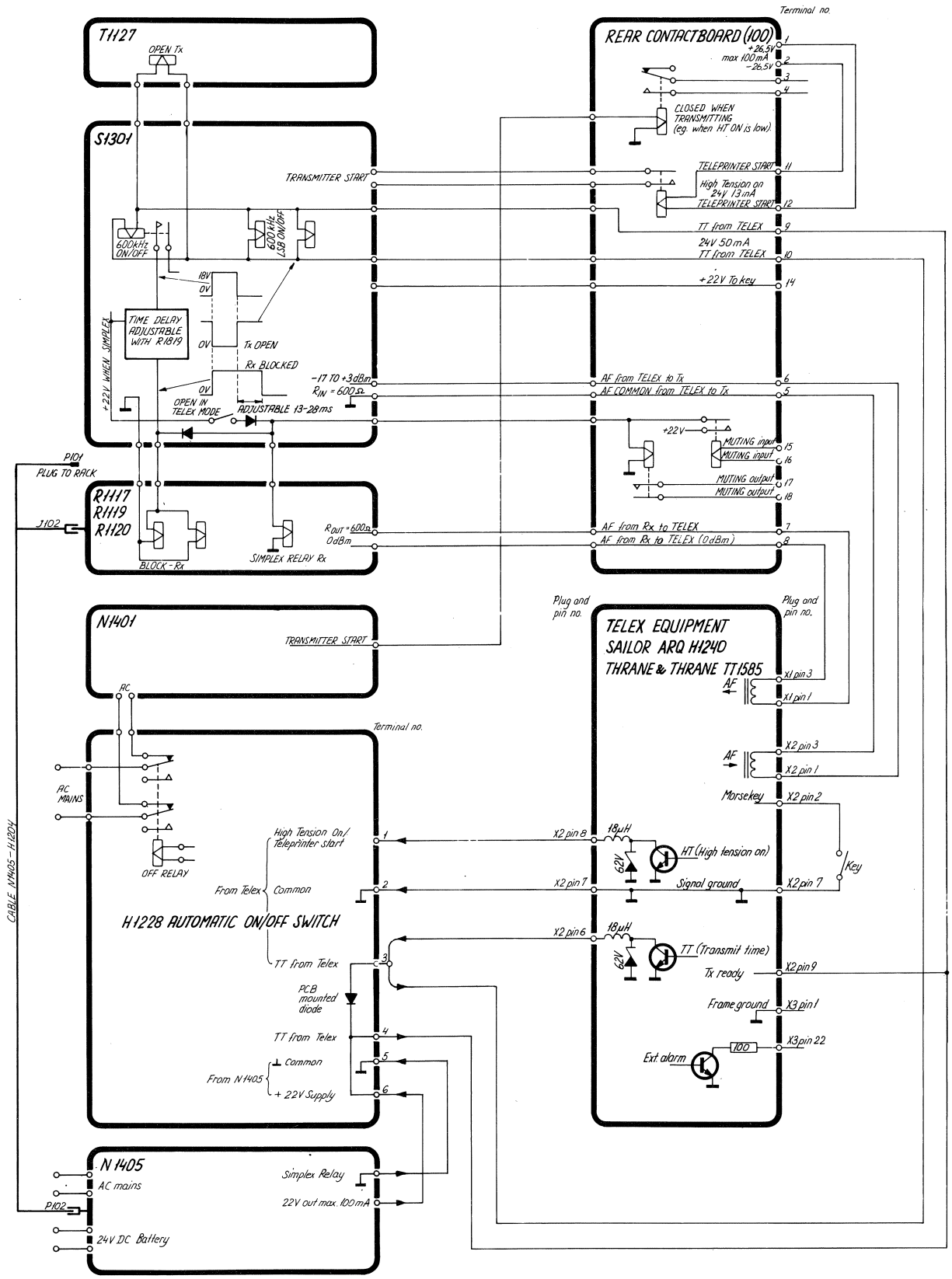
3.1. SHORT WAVE PROGRAMME 1000 TELEX MODE SINGLE STATION



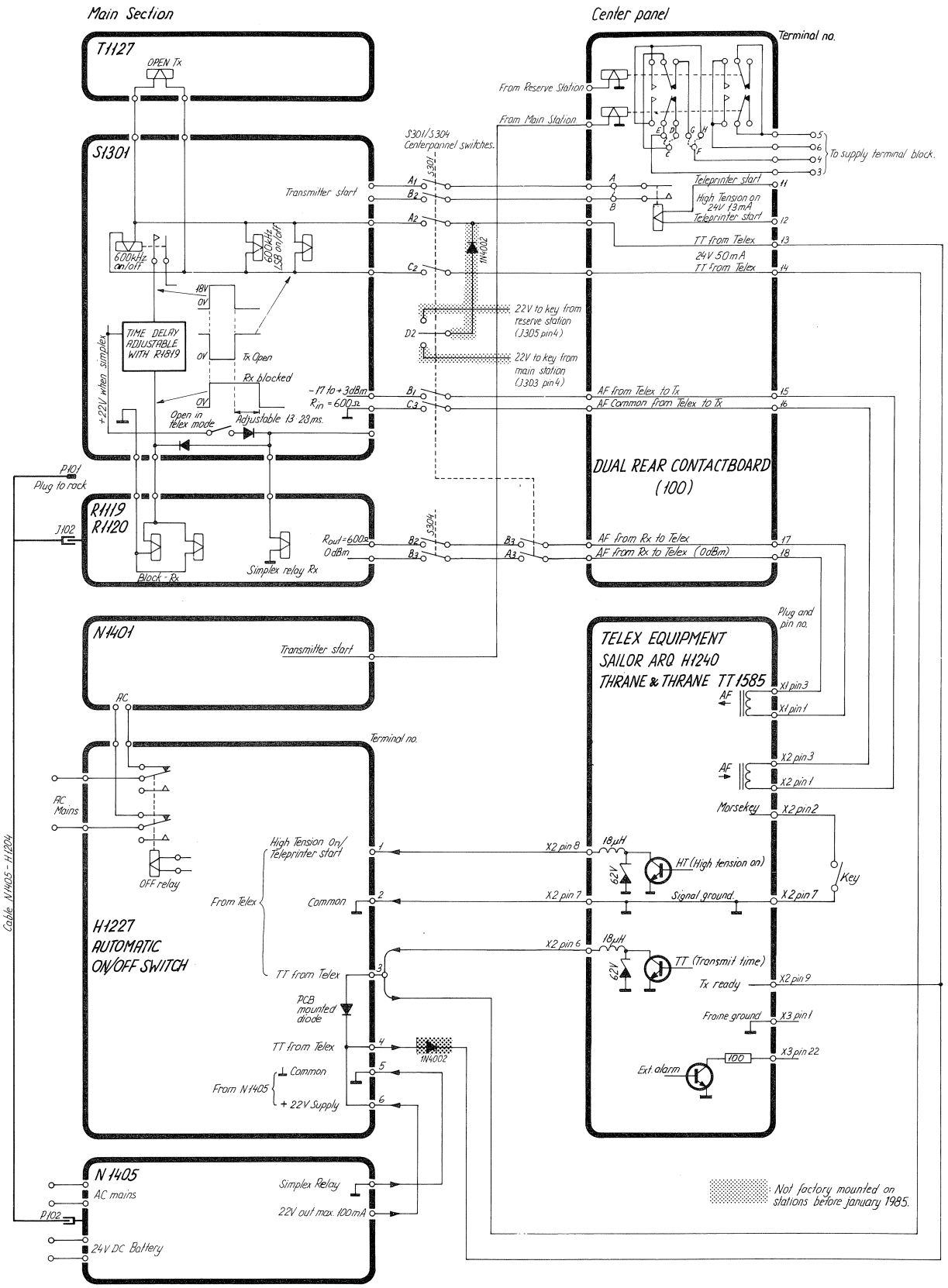
3.2. SHORT WAVE PROGRAMME 1000 TELEX MODE TANDEM STATION



3.3 SHORT WAVE PROGRAMME 1000 UNATTENDED TELEX MODE SINGLE STATION WITH AUTOMATIC ON/OFF SWITCH H1228

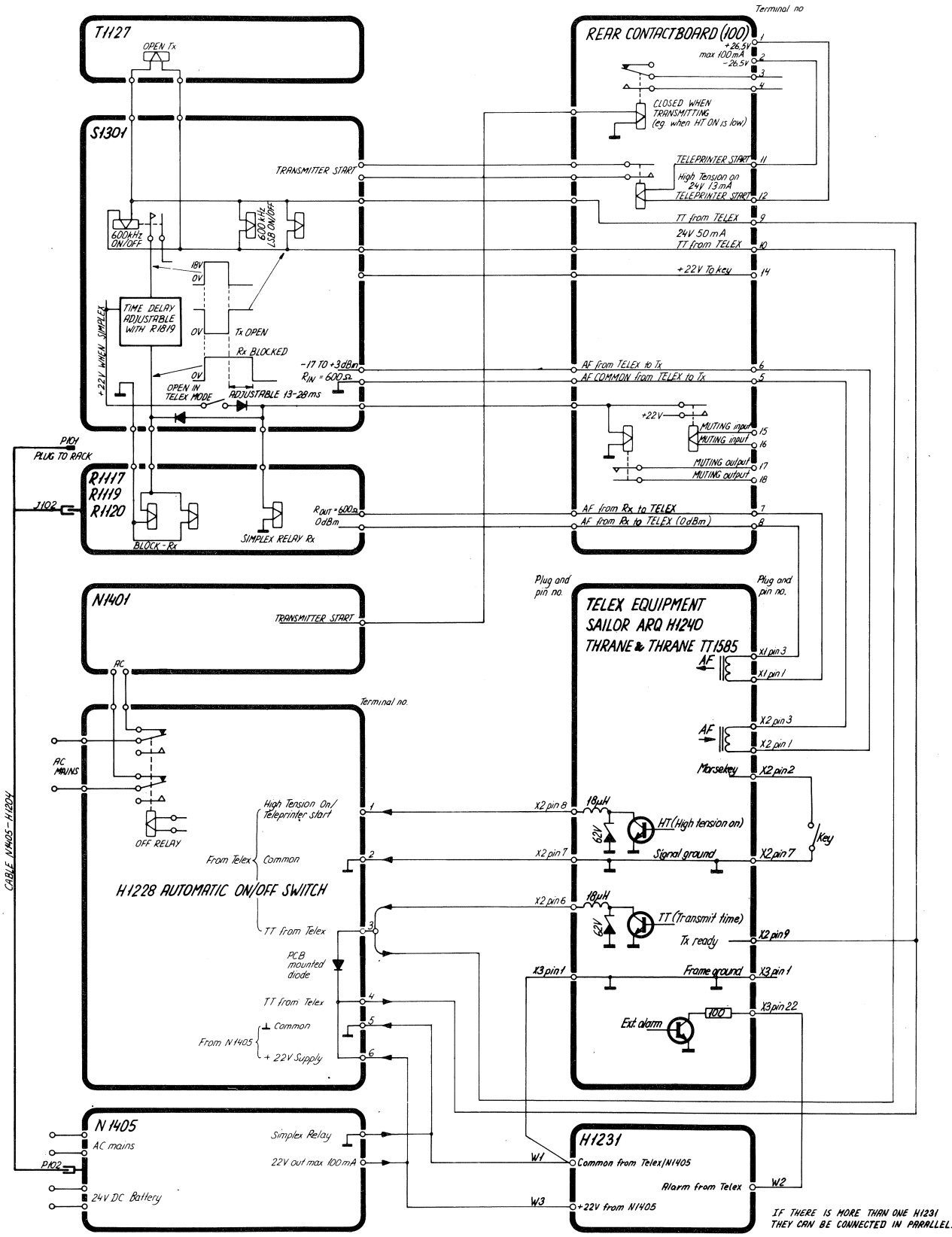


3.4 SHORT WAVE PROGRAMME 1000 UNATTENDED TELEX MODE TANDEM STATION WITH AUTOMATIC ON/OFF SWITCH H1227

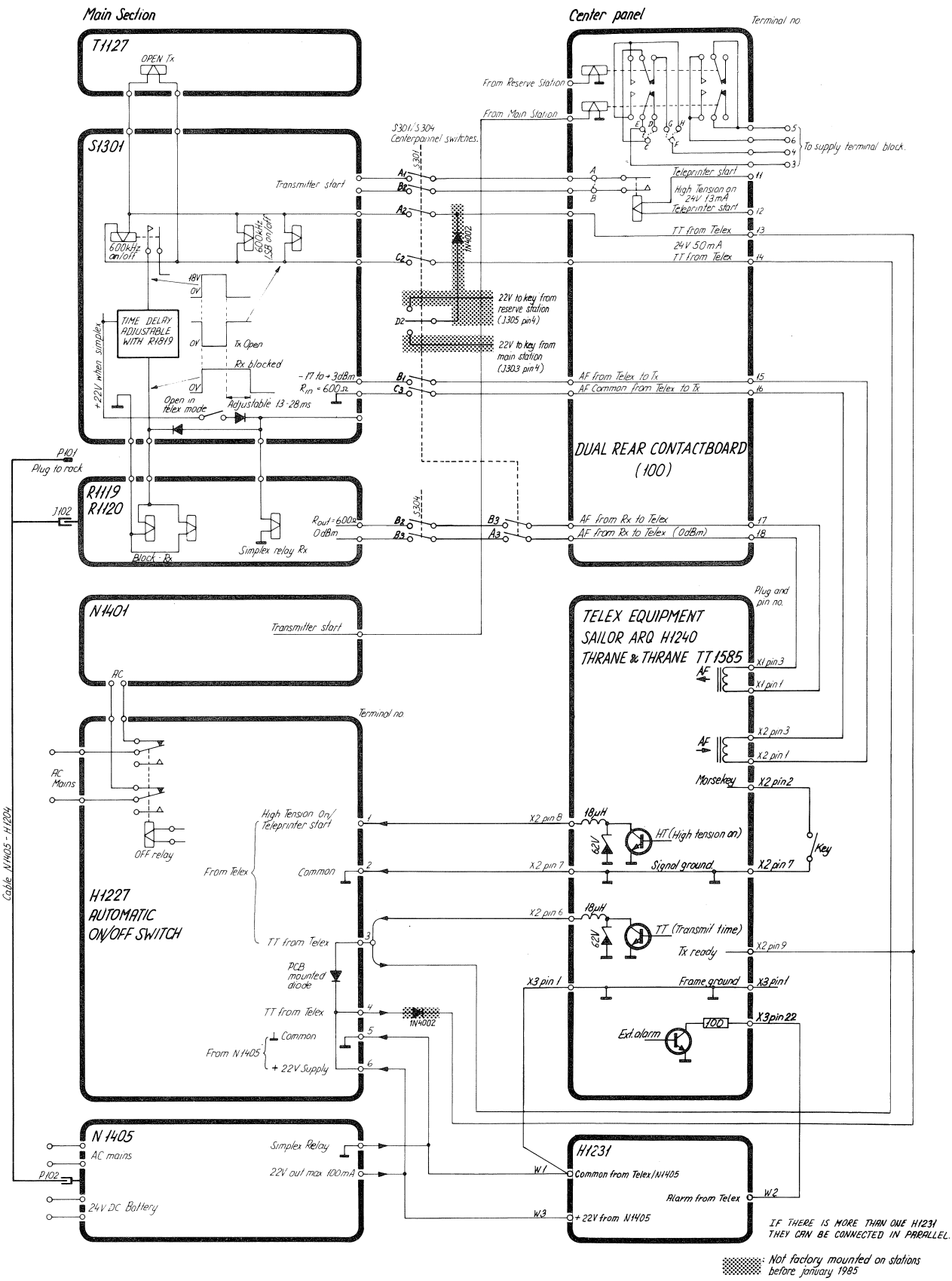


ARQ H1240 Interface A
4-0-23390 C

3.5 SHORT WAVE PROGRAMME 1000 UNATTENDED TELEX MODE SINGLE STATION WITH AUTOMATIC ON/OFF SWITCH H1228 AND TELEX ALARM H1231



3.6 SHORT WAVE PROGRAMME 1000 UNATTENDED TELEX MODE TANDEM STATION WITH AUTOMATIC ON/OFF SWITCH H1227 AND TELEX ALARM H1231

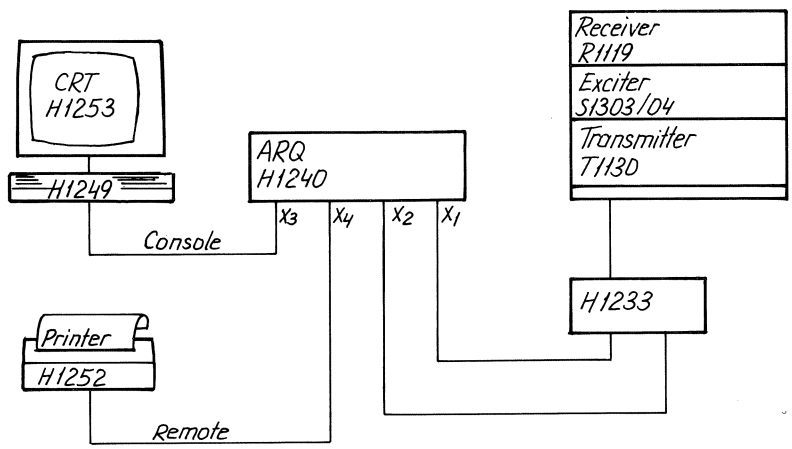


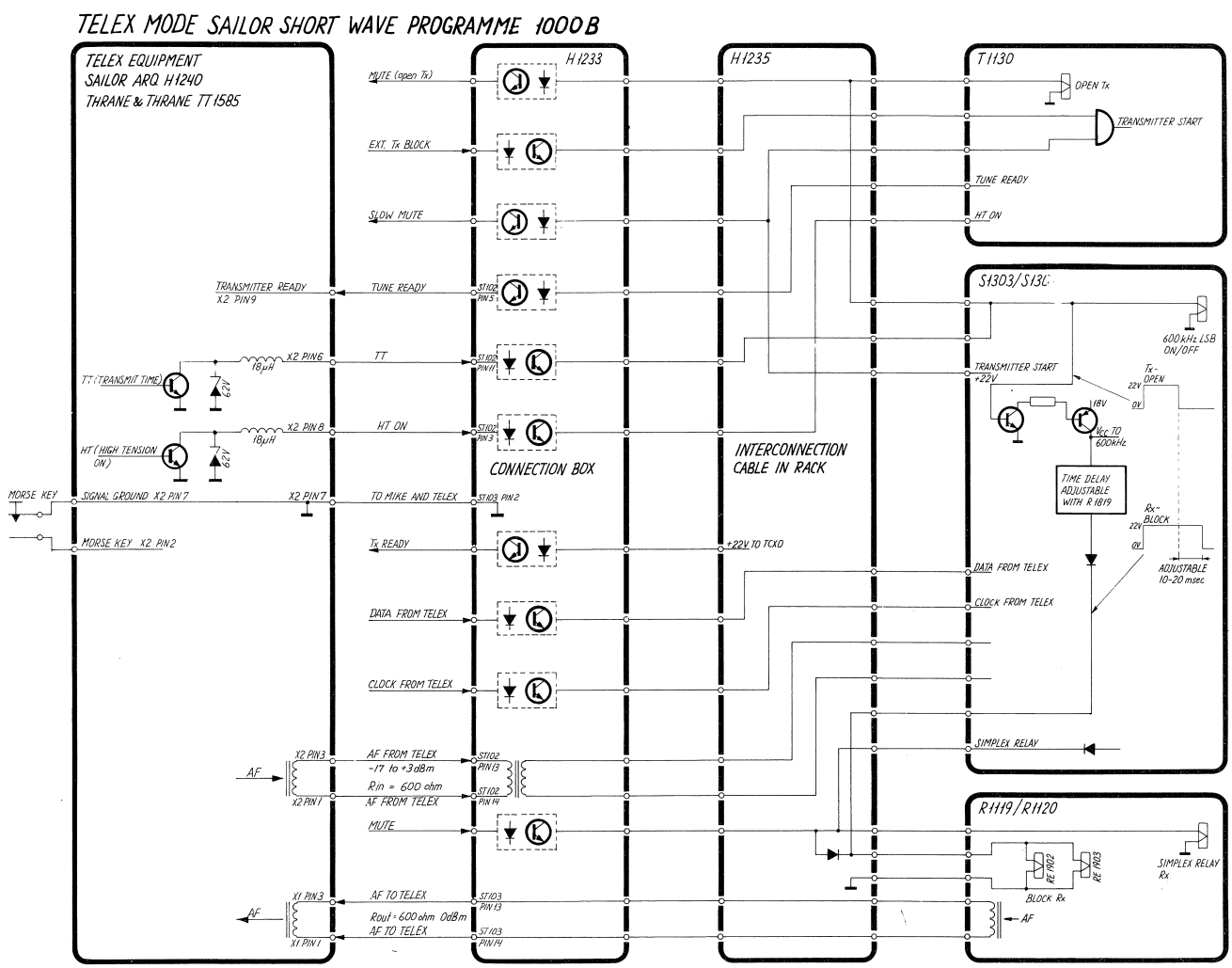
ARQ H1240 Interface A
4-0-23700 C

3.10. UNATTENDED TELEX MODE ON ONE FREQUENCY WITH AUTOMATIC POWER-UP OF TRANSMITTER

Functional Block diagram

Telex/communication Station

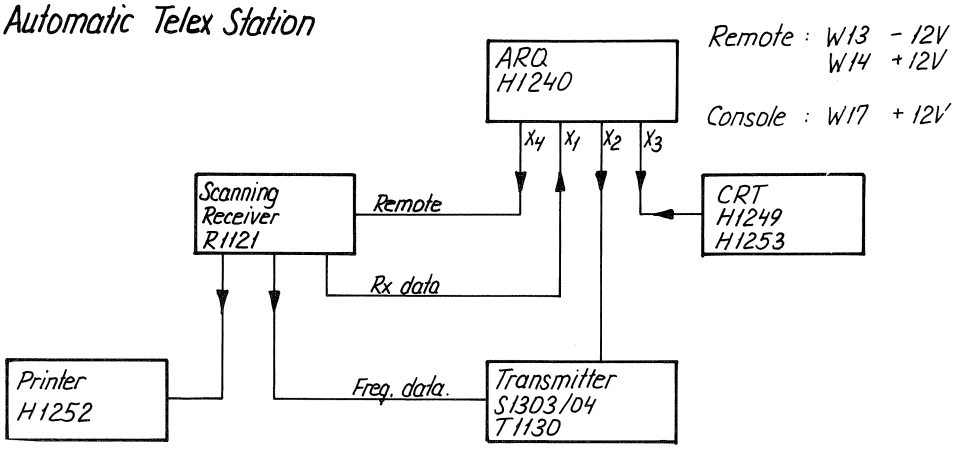




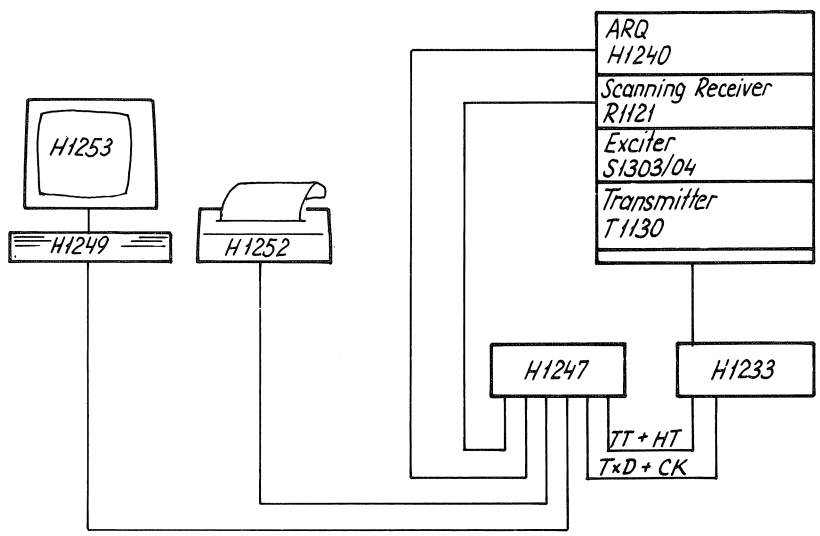
3.11. UNATTENDED TELEX MODE ON ??FREQUENCIES WITH AUTOMATIC POWER-UP OF TRANSMITTER

Functional Block diagram

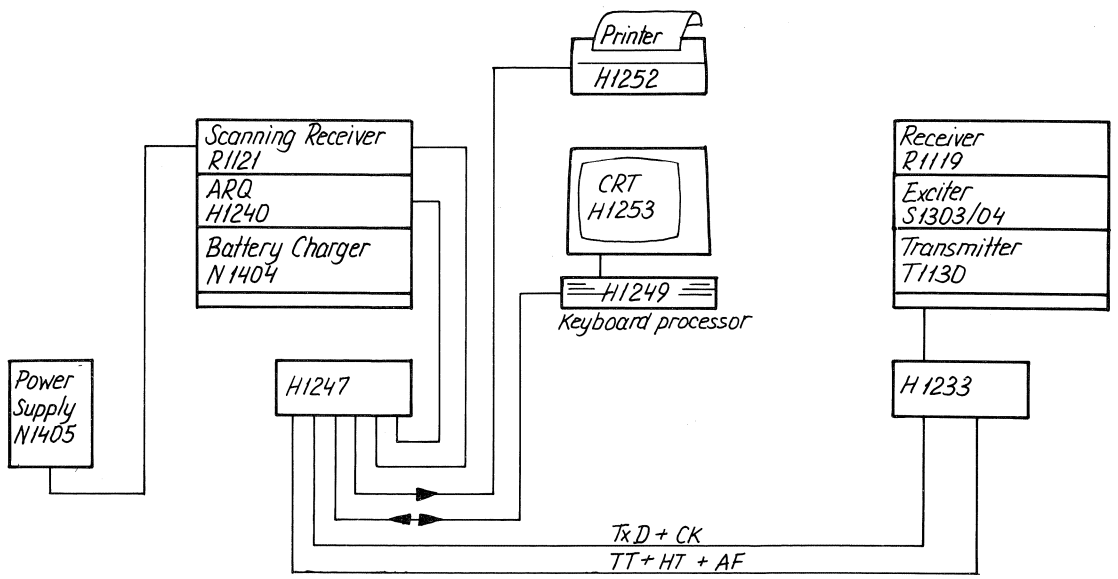
Automatic Telex Station

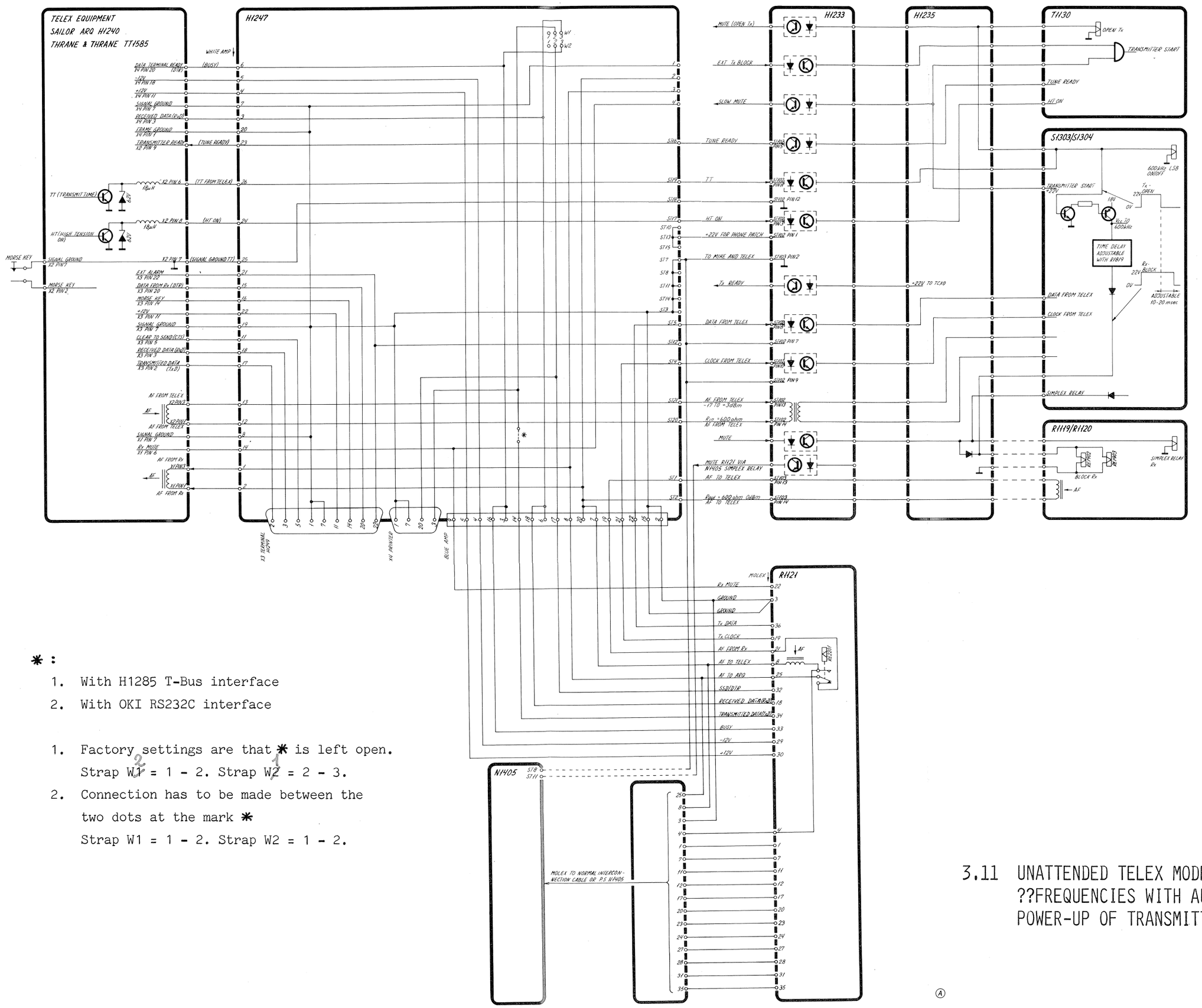


MARITEX or Automatic Radiotelex Station



Automatic Radiotelex Station





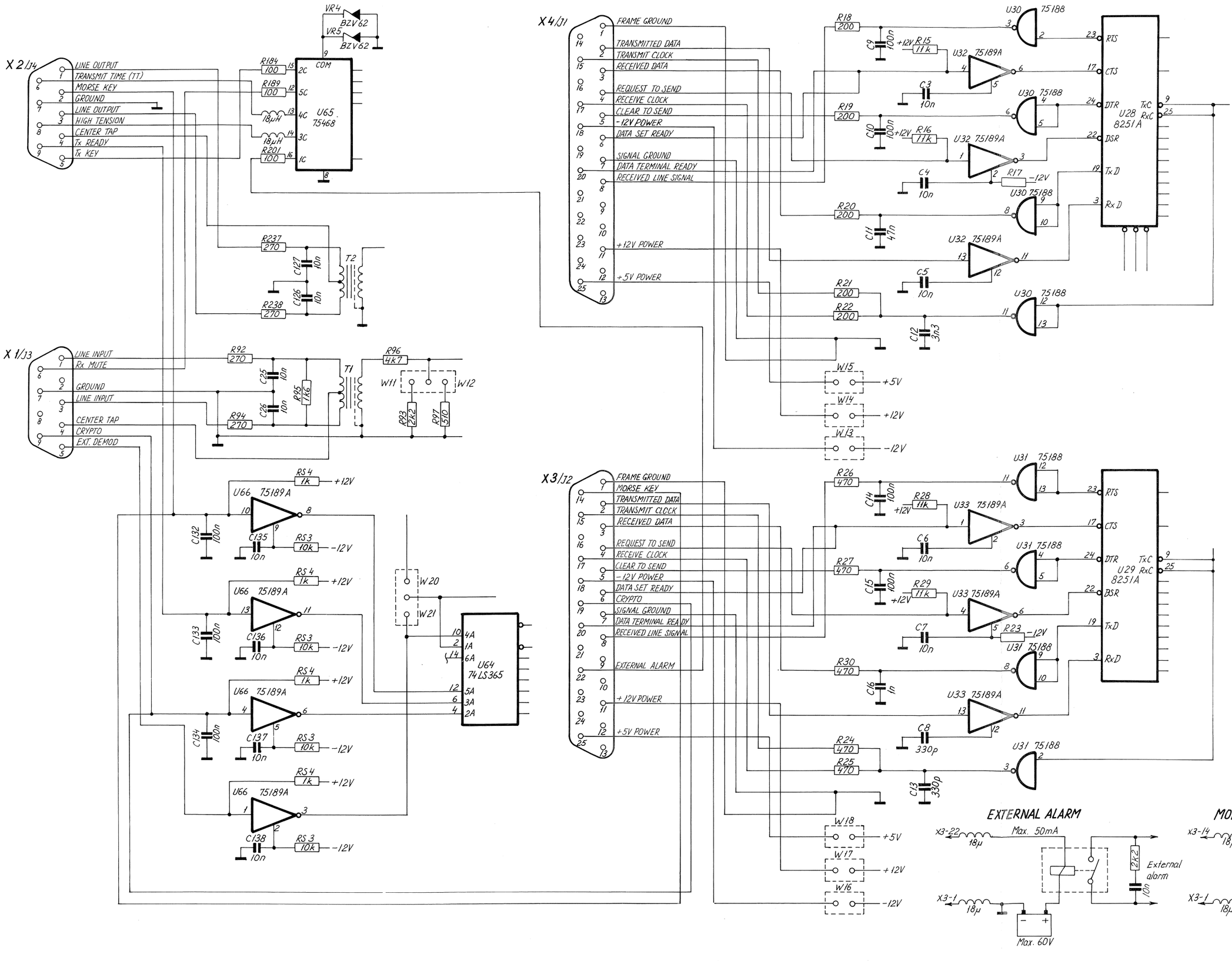
*:

1. With H1285 T-Bus interface
2. With OKI RS232C interface

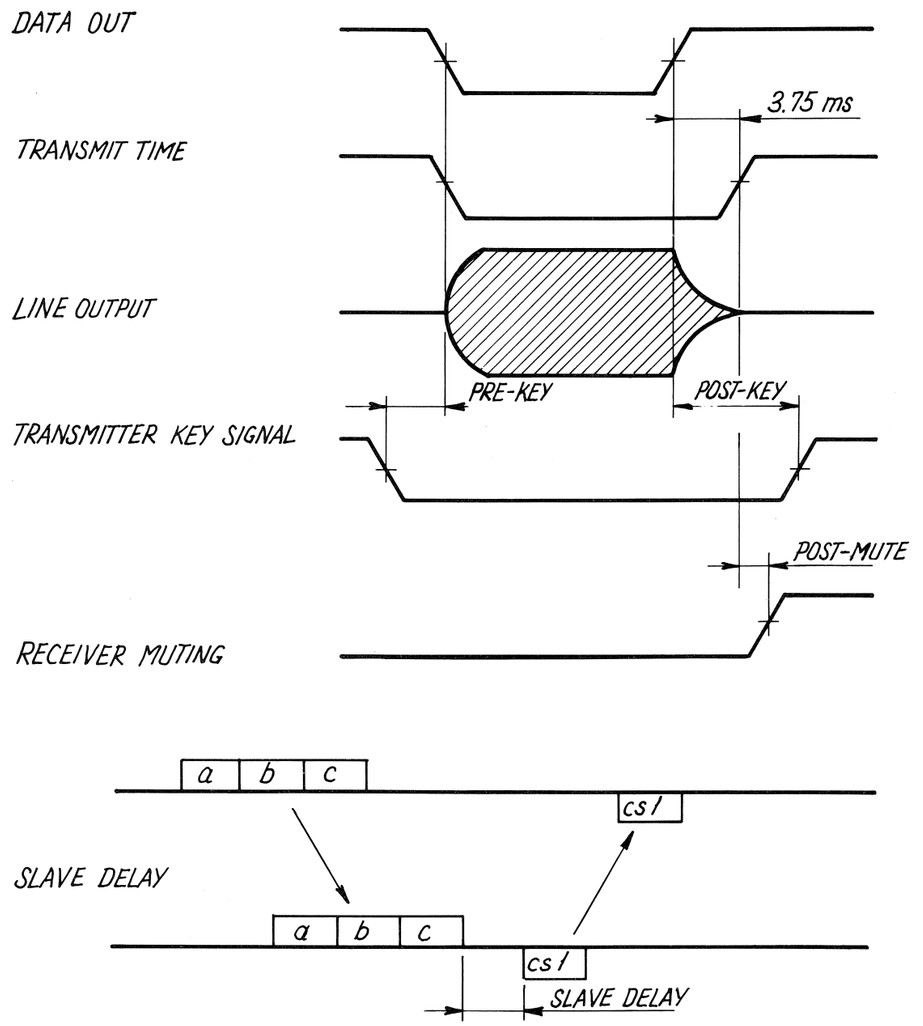
1. Factory settings are that * is left open.
   Strap W1 = 1 - 2. Strap W2 = 2 - 3.
2. Connection has to be made between the
   two dots at the mark *
   Strap W1 = 1 - 2. Strap W2 = 1 - 2.

3.11 UNATTENDED TELEX MODE ON ??FREQUENCIES WITH AUTOMATIC POWER-UP OF TRANSMITTER.

Ⓐ


X2/J4
LINE OUTPUT
TRANSMIT TIME (TT)
MORSE KEY
GROUND
LINE OUTPUT
HIGH TENSION
CENTER TAP
Tx READY
Tx KEY
VR4 BZV62
VR5 BZV62
R184 100
R189 100
R201 100
18µH
18µH
U65 75468
COM
R237 270
R238 270
C127 10n
C126 10n
T2
X1/J3
LINE INPUT
Rx MUTE
GROUND
LINE INPUT
CENTER TAP
CRYPTO
EXT. DEMOD
R92 270
R94 270
C25 10n
C26 10n
R95 1k6
T1
R96 4k7
W11
W12
R93 2k2
R97 510
RS4 1k
RS3 10k
+12V
-12V
U66 75189A
C132 100n
C135 10n
C133 100n
C136 10n
C134 100n
C137 10n
C138 10n
W20
W21
U64 74LS365
X4/J1
FRAME GROUND
TRANSMITTED DATA
TRANSMIT CLOCK
RECEIVED DATA
REQUEST TO SEND
RECEIVE CLOCK
CLEAR TO SEND
-12V POWER
DATA SET READY
SIGNAL GROUND
DATA TERMINAL READY
RECEIVED LINE SIGNAL
+12V POWER
+5V POWER
R18 200
R19 200
R20 200
R21 200
R22 200
C9 100n
C10 100n
C11 47n
C12 3n3
R15 11k
R16 11k
R17 -12V
C3 10n
C4 10n
C5 10n
U30 75188
U32 75189A
U28 8251A
RTS
CTS
DTR
DSR
Tx D
Rx D
TxC
RxC
W15 +5V
W14 +12V
W13 -12V
X3/J2
FRAME GROUND
MORSE KEY
TRANSMITTED DATA
TRANSMIT CLOCK
RECEIVED DATA
REQUEST TO SEND
RECEIVE CLOCK
CLEAR TO SEND
-12V POWER
DATA SET READY
CRYPTO
SIGNAL GROUND
DATA TERMINAL READY
RECEIVED LINE SIGNAL
EXTERNAL ALARM
+12V POWER
+5V POWER
R26 470
R27 470
R30 470
R24 470
R25 470
C14 100n
C15 100n
C16 1n
C8 330p
C13 330p
R28 11k
R29 11k
R23 -12V
C6 10n
C7 10n
U31 75188
U33 75189A
U29 8251A
W18 +5V
W17 +12V
W16 -12V
EXTERNAL ALARM
Max. 50mA
18µ
2k2
10n
External alarm
Max. 60V
MORSE KEY
Morse Key.

3.14. INTERFACE SIGNAL WAVEFORMS H1240



S.P. Radio A/S · Aalborg · Denmark

S.P. RADIO A/S - PORSVEJ 2 - 9200 AALBORG SV. - DENMARK - PHONE (08) 18 09 99 - INT. +45 8 18 09 99 - TELEGRAMS: ESPERA - TELEX 69 789

August, 1985

Cipher operation is a new facility which is implemented in the H1240 radio-telex modem from serial No. 296939 (Eprom version SP12 aug. 1985).

Note:

One of the six EPROM's (No. 4) has been changed from 2764 to 27128. Therefore you cannot interchange Eprom programmes from SP12 and upwards with SP1-11 without hardware modifications.
Please contact us if this is necessary.

H1240
CIPER OPERATION

CIPHER OPERATION

1.1. INTRODUCTION

The following chapter tells you how to operate the H1240 Radiotelex modem in on-line and off-line cipher mode.

1.2. CIPHERING PRINCIPLE

The H1240 Radiotelex modem incorporates a software-based non-linear ciphering generator. For highest security, a triple key principle is used:

- 40 BIT ELEMENTARY KEY
- 80 BIT COMBINER KEY
- 40 BIT AUXILIARY KEY

The enciphered text results from combining the output from the ciphering generator with the telex message. The same ciphering generator is also used for deciphering.

The secret Elementary Key affects the initialisation of the ciphering generator (seed).

You can enter or erase up to 25 Elementary Keys from the terminal keyboard. These keys are stored in non-volatile EEPROM, protected against power failure.

The Secret Combiner Key affects the ciphering algorithm and is stored in the same EEPROM as the Elementary Keys. The Combiner Key is programmed during system generation.

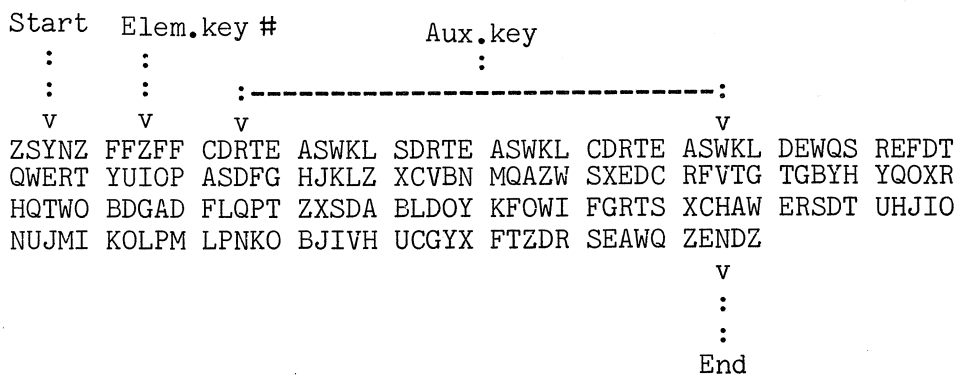
The Auxiliary Key is generated by a random generator at the beginning of every enciphered message and is automatically transmitted. The Auxiliary Key ensures that every message will be enciphered with another ciphering programme.

For user identification a password is used. You must enter the password from the keyboard before any message can be enciphered or deciphered. The password is permanently stored in the same EEPROM as the Combiner Key and the Elementary Keys.

1.3. CIPHER OPERATION

GENERAL OPERATION PRINCIPLES

The cryptogram has the following form:



The length of the cryptogramme is approximately 35 percent larger than the plain text message.

Off-line cryptogramme will have the start-group replaced by the sequence ZOFFZ.

ENABLING CIPHER OPERATION

To enable operation in cipher mode, you must set the CIPHER switch. Use the command:

CIPHER

the modem will respond:

Enter password:

If you now enter the correct password, ciphering will be enabled. If you enter an invalid password the modem will respond:

Bad password

If you just press Carriage return, cipher mode will be disabled.

If you forget to set the CIPHER switch, you will be promted for it the first time you use a CRYPT command.

SETTING THE KEY CODES

You can enter or erase up to 25 Elementary Keys from your keyboard.

To set a key, e.g. key number 4, enter:

KEY 4

The modem responds:

Enter key:

Enter a keyword of up to 8 alphanumeric characters (valid filename characters). The response will be:

Stored (x)

where (x) is a checksum for the keys entered.

If you want to erase a key, e.g. key number 4, enter:

KEYCLR 4

If you, for security reasons, want to erase all the Elementary Keys, you can use the single command:

KEYCLR A

The modem will respond:

All keys (Y/N)?

Press Y to erase all the Elementary Keys.

To get a general status of the programmed keys, use the command:

KEY

without parameters. The display may look like this:

Selected: 12
Stored : 1 2 3 9 13 17 21

IMPORTANT: Keys No. 1...5 can be altered by you at any time, while keys 6...25 are protected against accidental erasure. If you want to programme any of the keys 6...25, you must first enable programming. Use the following procedure:

H1240: Remove jumper W8.

When you have finished programming you should restore the original position of jumpers and switches.

If you try to programme any of the keys 6...25 while they are protected, you will get the following response:

Cannot programme EEPROM

1.4. OFF-LINE OPERATION

The CRYPT command can be used to encipher/decipher messages in the text memory.

To encipher a message, use the command:

CRYPT infile (outfile (keyno))

The message in infile is enciphered and placed in outfile. If you do not supply any outfile, the modem will place the enciphered message in a file named infile.cry. The key number keyno is also optional. If you do not include it in the command, the modem will respond:

Key no. 6?

where key number 6 is the default number used after power-up. If you want to change the key number, enter the new number, else just press Carriage return. The new number will now become the default number.

To decipher a message, use the following command:

DECRYPT infile (outfile)

The message in infile is deciphered and placed in outfile. If you do not supply any outfile, the output will appear on your terminal.

1.5. ON-LINE OPERATION

In this mode, you establish radio connection, on either ARQ, FEC or SELFEC.

You may exchange Answerbacks and transmit plain text.

To enter cipher mode, use the command:

CRYPT (keyno)

The key number keyno is optional. If you do not include it in the command, the modem will respond:

Key no. 6? _

where key number 6 is the default number used after power-up. If you want to change the key number, enter the new number, else just press Carriage return. The new number will now become the default number.

The modem will now respond:

Start crypt xx

and when phasing has been completed:

Crypt ready

xx is the elementary key number you have selected.

You can now send text. Provided the other station has also entered crypto mode, you can even change direction and exchange Answerbacks. The printout at your own terminal and at the terminal in the other end will be in plain text.

To leave cipher mode during conversation, use the command:

DECRYPT

The modem will respond:

End crypt

At the receiving station, automatic deciphering will take place when the ZSYNZ string is received. This means, that all standard enciphered messages will be automatically deciphered when received. When ZENDZ is received, the cipher mode is terminated. The printout will be like this:

(Start crypt) 6

message ...

(End crypt)

IMPORTANT: You should never force an Over in the middle of a text transmission. This will always result in the loss of code synchronisation. As a sending station, use either Poll, +?, or wait until all text has been transmitted before using Over. As a receiving station, be sure that all text has been received before you use Over to change the direction of traffic.

1.6. CONFIGURING THE CIPHER FUNCTIONS

Configuring the functions of cipher operation is done during System Generation, described in Chapter 8 in the H1240 Operation Reference Manual. The cipher functions are found in Section 8.6. MEMORY formats.

When the cipher options is installed, you always have to insert a password. This is the password you have to use whenever you want to enable cipher operation.

5-LETTER GROUPS

The modem now displays:

5-Letter groups? (Y/N) _

When 5-Letter groups are selected, the modem formats the cipher text in well structured blocks. If 5-Letter groups are disabled, the cipher text is transmitted as one continuous stream of characters. In this mode the transmission time at full speed is reduced approximately 20 percent as compared with cipher text in 5-Letter groups.

Two modems communicating with each other in cipher mode need not have the same setting of the 5-Letter group switch. The cipher unit is transparent to the use of character blocks.

COMBINER KEY

The modem will display the message:

Enter combiner key: _

All modems that communicate with each other in cipher mode must use the same Combiner key.

20 characters must be entered as Combiner key. Each of these characters must be either a digit 0..9 or one of the letters a, b, c, d, e, or f (hexadecimal characters).

Your entry is not echoed to the display. Remember to press the Carriage return key.

The modem will respond by displaying a checksum for the stored Combiner key.

If you do not want to enter any key, just press Carriage return. The modem will then use any previously entered Combiner Key.

1.7. MESSAGES

INTRODUCTION

The following messages are either error messages indicating that you have entered invalid commands, or other messages displayed by the modem in response to cipher commands.

MESSAGES

All keys (Y/N)?

This message appears if you use the KEYCLR A command. If you do want to erase all Elementary keys, press Y, otherwise press any other key.

Bad password

The password you entered was not the correct one.

Cannot CRYPT -

Insufficient memory to create cipher file.

Cannot DECRYPT: AK-key error

There was an error in the received Auxiliary Key.

Cannot DECRYPT: EK-key error

There was an error in the received Elementary key number, or the Elementary key does not exist in your modem.

Crypt ready

Phasing has been accomplished and your modem is ready to transmit cipher text.

End crypt

You have terminated cipher mode.

(End crypt)

Cipher mode has been terminated by the other modem.

Enter password

You have to enter the secret password in response to this request. Your entry is not echoed to the display. Remember to press the Carriage return key.

Erased

The specified key(s) has been erased from the Elementary key storage.

Invalid key number

An invalid key number has been specified.

Key no. x ?

If you press Carriage return, key no. x will be used. Otherwise enter the desired key number. Key number 6 is automatically selected after power-up.

No Elementary key

The Elementary key you have specified does not exist.

Not implemented

Option 007/107, Cipher operation is not implemented.

Start crypt xx

You have entered cipher mode with key no. xx.

(Start crypt) xx

You have been brought into cipher mode with key no. xx.

Stored (yy)

The specified key has been stored. yy is the checksum.

S.P. Radio A/S · Aalborg · Denmark

S.P. RADIO A/S - PORSVEJ 2 - 9200 AALBORG SV. - DENMARK - PHONE (08) 18 09 99 - INT. +45 8 18 09 99 - TELEGRAMS: ESPERA - TELEX 69 789

August, 1985

IBM-PC/XT Communications Support Software

is a new facility which is implemented in the H1240 Radiotelex modem from serial No. 296939 (Eprom version SP12, Aug. 1985).

Note:

One of the six Eprom's (No. 4) has been changed from 2764 to 27128. Therefore you cannot interchange Eprom programmes from SP12 and upwards with SP1-11 without hardware modifications.
Please contact us if this is necessary.

IBM-PC/XT COMMUNICATIONS
SUPPORT SOFTWARE
FOR SAILOR H1240

OPERATOR's GUIDE

```
ca  (filename) ........ capture data to file
cd  (path) ............ change working directory
di  (filename)......... directory of disc files
dr  (drive) ........... select default disc drive
er  (filename) ........ erase disc file
he  ................... help instructions
pr  (off)(-)(on)(+) ... copy screen data to printer
rq  (filename) ........ request data file from modem text memory
se  (filename) ........ send file directly from disc
ty  (filename) ........ display disc file on screen
wc  (filename) ........ count file size and check for invalid char's
xd  ................... exit to DOS
xf  (filename) ........ transfer disc file to modem text memory
```

XCOM function keys:

```
Esc ........ enter disc command mode
F1  ........ enter modem Command mode
F2  ........ Over
F3  ........ send Bell signal
F4  ........ Poll
Alt F10 .... terminate radio connection
```

INTRODUCTION

The XCOM programme package allows you to communicate directly with a SAILOR H1240 Radiotelex Modem, using all facilities of this modern equipment.

To learn more about the details of installation, use the commands:

HELP install (small letters)

and

HELP start (small letters)

When you run XCOM for the first time, it will ask you for the set-up parameters of your serial interface board. The settings will be permanently stored, and automatically loaded whenever you start XCOM.

If you want to read the settings, start XCOM and immediately press the 'R' key.

If you want to modify the settings, start XCOM and immediately press the 'X' key.

XCOM makes full use of all the "handshaking" signals provided by your serial communications port. In order for the programme to operate properly, these signals must be properly connected.

You have to set the correct port address on your serial board.

The serial board must have an interrupt request signal assigned to the port. If you change the port address, remember also to reassign the interrupt address. Consult your board user's manual for details.

STARTING XCOM

Each time you start XCOM, you will first have to start up DOS, so in addition to the disk that come with the XCOM package, you need:

An IBM personal computer DOS (Disc operating system) disk.

Working with XCOM will be much easier if you modify your XCOM programme disk so that it has everything you need on it to start DOS, to formate blank disks, to edit files, and to communicate with the Radiotelex modem.

HOW TO MODIFY YOUR XCOM PROGRAMME DISK

You will need the XCOM disk and a DOS disk that has the programme files SYS.COM, FORMAT.COM and EDLIN.COM on it.

1. Start DOS.

- Insert your DOS disk in drive A and put your XCOM programme disk in drive B.
- If your computer is off, turn on your printer, your monitor, and then your computer. If your computer is already on but you do not see the A> promts, start DOS by holding down the Control and Alternate keys and pressing the Delete key.

- Type in the date and time when the computer asks you to.
  Remember to end each response by pressing the Carriage return key.
- You should now see the DOS prompt:

  A>

  It tells you that DOS has been started and that the computer is waiting for you to tell it what to do.

2. Add DOS to your XCOM programme disk.

- When you see the A> prompt, type:

  SYS B:

  and press Carriage return. Wait for the message:

  System transferred,

- When the A> prompt reappears, type:

  COPY A:COMMAND.COM B:

  and press Carriage return. Wait for the message:

  1 File(s) copied.

3. Add the FORMAT programme to your XCOM disk.

- When the A> prompt reappears, type:

  COPY A:FORMAT.COM B:

  and press Carriage return. Wait for the message:

  1 File(s) copied.

4. Add the EDLIN programme to your XCOM disk.

- When the A> prompt reappears, type:

  COPY A:EDLIN.COM B:

  and press Carriage return. Wait for the message:

  1 File(s) copied.

HOW TO START XCOM

1. Start DOS.

   - Insert your modified XCOM programme disc in drive A.

   - If your computer is off, turn on your printer, your monitor and then your computer. If your computer is already on but you do not see the A > prompt, hold down the Ctrl and Alt keys and then press the Del key.

   - Enter the date and time if DOS asks you to.

2. Start XCOM

   - When you see the A > prompt, type:

     XCOM

     and then press Carriage return.

A>

CAPTURE DATA TO DISK

The CA command captures directly to disk. Enter:

CA filename

If the file already exists, XCOM will append the new data to the end of the old file.

The command:

CA -

or

CA off

is used to end capture-to-disk, and closes the capture file.

A>help cd

SWITCH WORKING DIRECTORY

The CD command allows you to switch the working directory. To change directories, enter the command:

CD path

where "path" is the full path to the new working directory. To display the current working directory, use the CD command without parameter.

As an example, to switch to the working directory named "\users\guest" use the command:

```
CD \users\guest
```

The CD command will only work with DOS 2.00 and above.

DIRECTORY LIST

The DI command is used to view the disk directory, much like the DOS DIR command. You may provide an optional file name, and the programme will display only those files given in the file name.

You may use the wild card characters '*' and '?' in the directory search.

SELECTING DISK DRIVE

The DR command has two functions. Entering DR alone will show you the current default drive. Entering DR followed by a drive name, as:

```
DR A:
```

will change the default drive to the specified drive.

ERASE DISK FILES

The ER command is used to erase disk files. The command:

```
ER filename
```

will erase the file named "filename".

ECHO CHARACTERS TO PRINTER

The PR command tells XCOM to echo all data displayed on the terminal screen to the printer. Turning PR ON does not turn the terminal video display off. To switch the printer on, use the command:

```
PR
```

or

```
PR +
```

or

```
PR ON
```

To switch the printer off, use the command:

PR -

or

PR OFF

REQUEST A FILE FROM THE RADIOTELEX MODEM

To transfer a file from the Radiotelex modem to the disk, use the command:

RQ filename

where "filename" is the name of the file on both units.

If no characters are received within a time-out period, the programme will flag an error condition.

SEND A FILE DIRECTLY FROM DISK

To send a file directly from the disk when connected with another radio station, use the command:

SE filename

where "filename" is the name of the disk file that will be sent.

If you want to terminate a file transfer before it is actually ended, press the Esc key.

DISPLAY A DISK FILE

To display a disk file on the console, use the command:

TY filename

where "filename" is the name of the file to be displayed.

CHECK FILE

The WC command counts the number of characters, words and lines in a file. Moreover it calculates the time needed to transmit the file on an error-free 50 Baud Radiotelex connection.

The command also checks the file for valid Baudot characters. The first 10 errors are reported, the rest ignored.

The form of the command is:

WC filename

where "filename" is the name of the file to be checked.

The WC command can also be called directly from DOS.

EXIT TO DOS

The XD command tells XCOM to exit to DOS. You may then run other programmes and later return to XCOM.

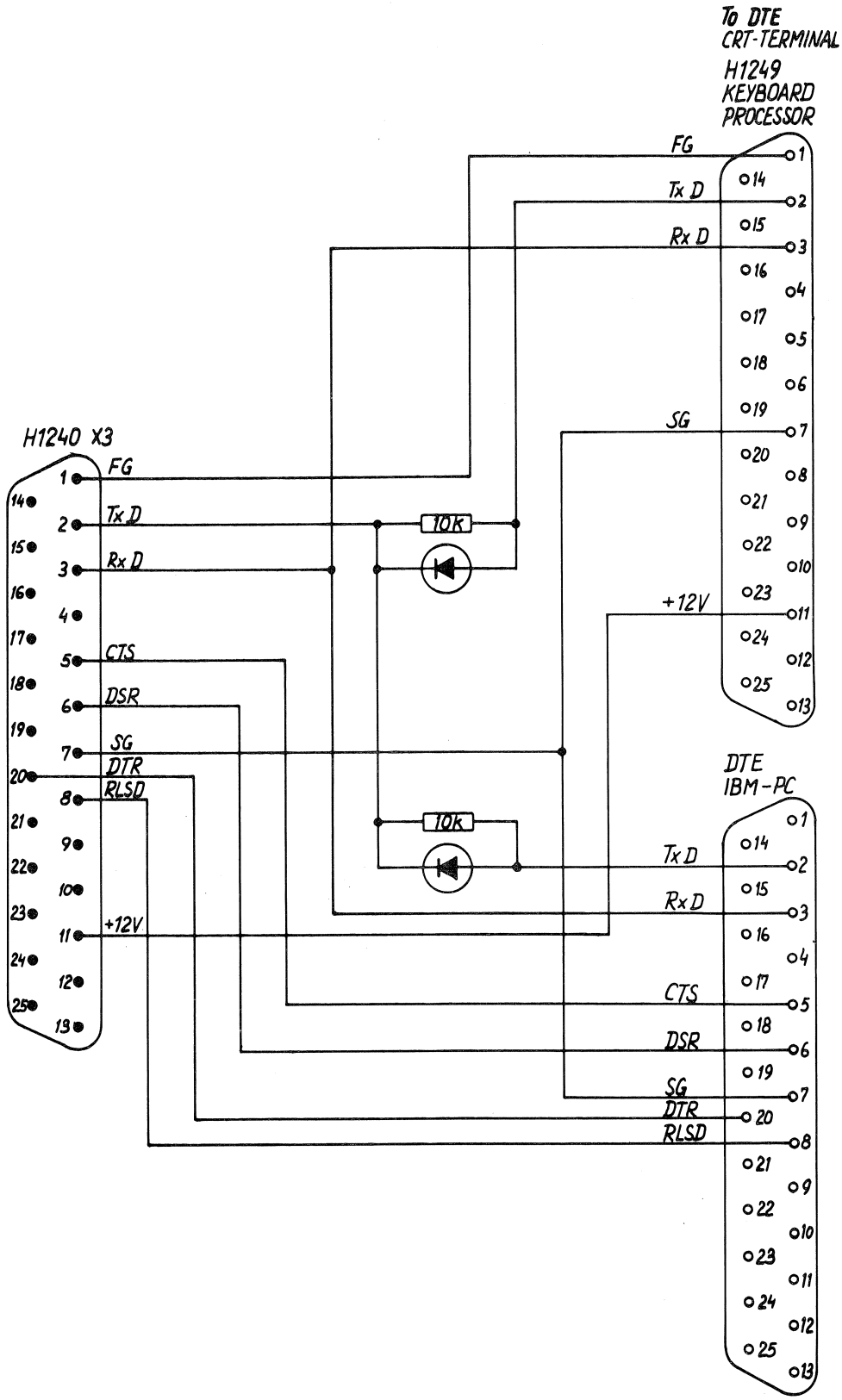
TRANSFER A FILE TO THE RADIOTELEX MODEM

To transfer a file from the disk to the Radiotelex modem, use the command:

XF filename

where "filename" is the name used for the file in both units.

If you want to terminate a file transfer before it is actually ended, press the Esc key.



H1240 IBM/PC-XT
COMMUNICATION INTERFACE CABLE.