ERICSSON

MRS3000

Field Service Manual
Remote Control System 210

EN/LZB 119 1661 R1

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Remote Control System 210
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Technical Data Control Unit CU210

Supply Voltage: Connector J1

Nom	12 Volt.
Max	16 Volt.
Min	10,6 Volt.

Current Consumption at 12 V

Max	200 mA. (Loudspeaker disabled)

Radio Control Line RX: Connector J3 pin. 3&4

Nom. Level	-13 dBm.
Max. Level	-4dbm all signals.
Input Impedance.	600Ω

Radio Control Line TX: Connector J3 pin. 5&6

Nom. Level	-13 dBm.
Max. Level	-4dbm all signals.
FSK Level	-13 dBm.
FSK Frequencies	1453 Hz / 2344 Hz
Input Impedance.	600Ω

NOTE: When used in 2-wire mode as a bi-directional line interface, see also specification for radio control line RX

Subscriber Line: Connector J5 pin. 4&5

Nom. Level	-13 dBm both directions
DTMF-tone Level, Low band	-11 dBm
DTMF-tone Level, High band	-9 dBm
Input / Output impedance	600Ω
Ring detect level	30 V AC

Tape output: Connector J4 pin. 2, 1 (GND)

Nom. Level	-10 dBm
Max. Level	-4 dBm

Optional AF-Output: Connector J6 pin. 6, 1 (GND)

Nom. Level	-13 dBm
Max. Level	-4 dBm

Loudspeaker Output: Connector J8 pin. 1, 2 (internal)

Nom. Level	50Ω load Vol. 7	2.6 V RMS ±2 dB

Handset Output: Connector J8 pin. 2, 3 (GND)

Nom. Level	200Ω load	Vol. 8	-2 dBμ
		Vol. 1	-32 dBμ

Relay Contact Outputs: Connector J4 pin. 3&4 and 5&6

Max. Voltage	30 V
Max. Current	100 mA

RS232 Interface: Connector J6 pin. 1 (GND), 2 (TXD), 3 (RXD)

Logic Levels	±5 V
Baud Rate	9600 baud, 8 bits, No parity

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
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Technical Data Line panel LP210

LP210 is a line panel that can be connected used with F800 base radio stations. LP210 consists of one eurocard CP6272. The LP210 line panel handles all tone encoding and decoding to/from mobile stations as well as line signalling to and from the control boxes CU200 and CU210. The line panel has an 8Kbyte EEPROM that contains all system personality parameters except the local shortnumbers. The EEPROM contains a set of default parameters but it can be coded directly from the control boxes keyboard/display or a PC connected to the RS232 port of the controlboxes.

The eurocard connector contains all controlsignals for F800 and 2 or 4 wire lines connections.
The eurocard connector also provides 2 external active low inputs and 2 external active low, max 50mA, outputs for alarms etc.

A special version of the LP210 provides an extra input for AF from a second receiver mainly used for special applications as BFS in Finland.

Supply Voltage		**Current Consumption**	
Nom	12 Volt.	Max	200 mA.
Max	16 Volt.		
Min	10,6 Volt.		

Line input Level

Nom	-13 dBm to -33 dBm.
Max	-4dbm all signals.
FSK- Tone carrier	2344Hz Nom -13dBm to -33 dBm.
FSK- Tone	1453Hz Nom -13dBm to -33 dBm.

Line equalizer max +9 dB at 3000 Hz in 3dB step.
Line gain max +20 dB in 1.25 dB step.

TX Output Level		**RX Input**	
To F800 Nom	-10 dBm.	From F800 Nom	-10 dBm.
Distortion	<0.5 %.		
Hum and Noise	<35 dB /Nom Lev.		

Line Output level

Nom	-13 dBm.

Flat Response 300 Hz – 3000 Hz -2 dB +1 dB

Distortion	<0.5 %.
Hum and Noise	<45 dB /Nom Lev.
FSK- Tone carrier	2344Hz Nom -13 dBm to -33 dBm.
FSK- Tone	1453Hz Nom -13 dBm to -33 dBm.

External alarm outputs
2 open collector outputs
Active level max 1 V
Max load 50 mA/30 V

External alarm inputs
2 buffer inputs with 10 kΩ pull-up to +5 V
Min input voltage 1 V
Type current 1 mA

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SYSTEM 3000 OVERVIEW

Valid from V3.3 of LP200/210 and CU200/210

Incoming calls

Incoming call to one CU

A beep sounds in the called CU's loudspeaker. The other CU's indicate LINE BUSY.
If 11-tone call, the mobile's id is shown in the display, but it is not automatically queued.
If not answered within 30 seconds, the call is cleared down and both radio and the line becomes free.
The mobile can clear down the call before it is answered by transmitting a DISCON call.
The mobile can transmit a WHC-call, which will cause the call to be cleared down, and the mobile's id is queued in the CU's call queue.
It is personality programmable if the mobile can clear down the call by transmitting a DISCON call, after the CU-operator has answered the call.
The CU can always clear down the call by pressing |-/-|, which will cause a DISCON telegram to be transmitted.

Incoming multiline call CUs

A beep sounds in the called CU's loudspeakers. The other CU's indicate LINE BUSY.
If 11-tone call, the mobiles id is shown in the display.
If not answered within 30 seconds, the call is cleared down and both radio and the line becomes free.
The mobile can clear down the call before it is answered by transmitting a DISCON call.
The mobile can transmit a WHC-call, which will cause the call to be cleared down, and the mobile id is queued in the CU's call queue.
When one of the called CU's has answered the call, by pressing |↗|, the other CU's indicate LINE BUSY.
The call is thereafter handled as an incoming call to one CU.

Incoming group call to CU's (and mobiles)

The called CU's indicate an incoming call but don't beep.
The other CU's indicate LINE BUSY. If repeater traffic is enabled on the channel and the call is destined also to mobiles, a tone-call is transmitted to the specified mobiles and the base is started in repeater mode.

If 11-tone call, the mobile's id is shown in the display.
If not answered within 30 seconds, the call is cleared down and the line becomes free.
The calling mobile can transmit a WHC-call, which will cause the call to be cleared down, and the mobile's id is queued in the CU's call queue.
The mobile can clear down the call by transmitting a DISCON call.
Any of the called CU's can clear down the call by pressing |-/-|, which will cause a DISCON telegram to be transmitted.

Incoming status to CU(s)

Status calls can be addressed to one or more CU's. They are handled only if the base isn't busy. The calling mobile's id, route and status is queued in the called CU's incoming call queues.

Incoming priority status to CU(s)

Priority status calls can be addressed to one or more CU's.
They are handled whether the base is busy or not.
The calling mobiles id, route and status is queued in the called CU's.

Incoming alarm call from mobile alarm transmitter

This type of alarm calls can be addressed to one or many CU's.
The transmitters id and route are queued in the alarm queue in the called CU's. The alarm relay in the called CU's is activated and the alarm beep sounds in the loudspeaker. Alarm calls are handled even if the base is occupied.

Incoming alarm call with speech

This type of alarm calls can be addressed to single or multiline CU's. Any type of base station activities is cleared down. The calling mobile's id, status and route are shown in the called CU's display, the alarm relay is activated and the alarm beep sounds in the loudspeaker.
The not called CU's indicate LINE BUSY.
If multiline, when one of the called CU's answer the call, the other CU's indicate LINE BUSY, but stay with the loudspeaker open.

Alarm inputs

When any of the alarm inputs is activated a personality-specified code is queued in all the CU's.
The alarm relay is activated and the alarm beep sounds in the loudspeaker.
(**NOTE** there are only 2 inputs for LP210)

Alarm beep and relay

The alarm beep and the alarm relay are activated when an alarm call is received. The beep and the relay are inactivated as soon as any key is pressed. If it is an alarm call with speech, the beep and the relay are inactivated also when any of the called CU's answer the call.

Repeater traffic over the base

If repeater traffic is enabled and the base isn't occupied, a mobile can call another mobile, or group of mobiles. If the called mobile or group of mobiles is specified in the personality, connection is established and the CU's indicate LINE BUSY.
All CU's can listen to the call, by opening their loudspeaker, or talk, by pressing PTT.
Any CU can take control of the call by pressing |Listen| (with any route chosen). The mobiles stay connected. If |-/-| is pressed, a DISCON telegram is transmitted and repeater traffic is cleared down.
If |Listen| is pressed and |CLD| has not been pressed, the mobile call continues.
Any CU can disable repeater traffic while a mobile-mobile call is in progress. In that case a DISCON-telegram is transmitted and the call is cleared down.

Incoming data call

Data call is **removed** from MRS3000 from V3.0 and forward.

Log printer

Each CU is equipped with a serial output, which can be connected to a log printer. When connection to the LP is established, a headline is typed:

Logging of calls

Time Caller Channel Status Call type

Thereafter, all calls to the CU, including activation of the alarm inputs, are typed on the printer.
The format of the serial data is:

- 9600 baud
- One start bit
- Eight data bits
- No parity bit
- One stop bit

Outgoing calls

Address selection

The five-digit address can be chosen in several different ways:

- Dialling :
  In the personality it is specified how many digits you must dial.
  Before the call is transmitted, by pressing the |#|-, |Data| or |Status?|-key, the addresses filled up in a personality specified way to five digits and the call is transmitted.

- Copy from top of queue:
  If the address field of the display is empty, the first queue entry's address and route are copied to the address and route field of the display by pressing the |#|-key once.

- Copy from any queue position:

  Enter queue mode by pressing the |Queue|-key. Scroll queue by repeatedly pressing |Queue|. When the |#|- key is pressed, the displayed queue entry's address and route are copied to the address and route fields of the display.

- Short number:
  Dial one digit (1-9) and press |#|. The corresponding pre-programmed short number's address and route are copied to the address and route fields of the address display and the call is transmitted.
  To just view, without transmitting, a short number, dial one digit (1-9) and press |Display|.

- Last number:
  Dial |0| |#|. The last transmitted call's address is copied to the address field.
  The route remains unchanged.
  To just view, without transmitting, last transmitted number, dial |0| |Display|.

- Group number:
  Dial one digit (0-9) and press |Group|. The corresponding pre-programmed group number is copied to the address field and a group call is transmitted to the specified group.
  The group numbers don't contain any route information.

Call to mobile(s)

If the mobile doesn't answer, and the personality is programmed for handshaking requirements on the chosen channel, a short (error) beep will sound. Group calls never have any handshaking included in the signalling protocol. If the connection is established a long beep will sound in the loudspeaker. Once a connection has been established the route cannot be changed. However, the CU can make a new call to the same mobile, or to other mobiles with the same route. All other CU’s indicate LINE BUSY.

The CU can always clear down the call by pressing |-/-|, a DISCON telegram will be transmitted and the call will be cleared down.

By pressing |WHC|, a Who Has Called-signalling is started. If it succeeds, the call will be cleared down, otherwise the Who Has Called signalling must be repeated or the call must be cleared down as usual by pressing |-/-|.

No incoming DISCON-calls are accepted when the CU is A-subscriber.

Status request

If a status call succeeds, the called mobile status is displayed in the lower right corner of the display. If the status call fails a short beep will sound.

Data traffic

Data call is **removed** from MRS3000 from V3.0 and forward.

Repeater station start

Some routes may contain repeater start code (personality programmable).
In that case all outgoing calls are preceded by repeater start code.
The repeater start code is 2 tone, so called AR-code, or 5-tone code.
It is personality programmable what kind of repeater start code to use on each channel.

Call failed

If it isn't allowed to transmit a tone call, e.g. if the line is busy, a short beep sounds in the loudspeaker immediately when |#| is pressed. If the signalling has failed, e.g. no acknowledge received, a short beep will sound after a couple of seconds.

Channel busy

If the channel is busy, i.e. squelch is detected on the channel, a repeated beep will sound.
To transmit a tone call on a busy channel, you first will have to listen to the traffic on the channel.
Choose route and press |Listen|. Now you're allowed to transmit any tone call.

System functions

Listen 1

When the line is busy, any CU can listen to the traffic by just opening the loudspeaker or lifting the handset. If the loudspeaker is opened, the actual route is shown just to the right of the loudspeaker symbol. By pressing |⇗| the operator can make a break through and talk to the mobiles (if 2 wire connection also the other CU's can hear him).
Outgoing tone calls can't be made when listening in this way.

Listen 2

If mobile-mobile traffic is in progress, a CU can take control of the call by choosing the actual route and pressing the |Listen| key. The loudspeaker symbol flashes. The other CU's indicate LINE BUSY.
The CU can now also transmit tone calls to mobiles. When any outgoing calls are cleared down, the CU returns to listening.
By pressing |-/-|, a DISCON call is transmitted, and all mobile - mobile traffic is cleared down and the behaviour becomes equal to what is described below, under Listen 3.
If mobile-mobile traffic hasn't been cleared down, and |Listen| is pressed once more, the mobile-mobile traffic just continues.

Listen 3

If the base is free, by choosing a route and pressing |Listen|, a CU can lock the radio on a channel. The loudspeaker symbol flashes. Incoming calls to the CU are accepted and outgoing calls can be made. The other CU's indicate LINE BUSY.
By pressing |Listen| again the radio becomes free again.
Prior to this all-eventual incoming/outgoing calls must be cleared down.

Open traffic

Each operator can choose open traffic channels. In the personality the maximum number of open traffic channels for one CU and the total maximum number of open traffic channels for the base are specified. If squelch is detected on an open traffic channel, the base will lock on the channel as long as squelch indication remains, the loudspeaker opens and the actual route is displayed on the CU's that have chosen the channel for open traffic. If any operator presses |⇗| while locking on an open traffic channel, this CU becomes 'in charge' and the other CU's indicate LINE BUSY.
The CU in charge clears down the call by pressing |-/-|.
The behaviour at open traffic will be different if your system is personality programmed as a BFS system. In this case no CU becomes 'in charge' by pressing PTT in open traffic and the system stays in open traffic after PTT is released.

Locked channel

By choosing a route and pressing |Lock| |#|, a CU can lock the base to a channel. The base will work as squelch controlled repeater on the chosen channel. The loudspeaker symbol at the locking CU will toggle between filled and empty symbol, and the other CU's indicate LINE BUSY. Incoming calls to the CU in charge are accepted. Outgoing calls can be transmitted from the CU in charge.
Other CU's can just listen and break through.
Before leaving the locked channel state, by pressing |Lock| |*|, all incoming and outgoing calls must be cleared down.

BFS mode

By choosing a route that is defined as a BFS route and pressing |Data| |#|, a CU210 starts the channel in BFS mode. If there is any other traffic going on, it is disconnected. Observe that a CU200 cannot initiate BFS mode, it needs to be done from a CU210. The loudspeaker symbol on the CU in charge flashes while the other CU's indicate LINE BUSY. The LF from two radio channels are mixed together and transmitted to the CU's. All CU's can listen on the traffic, but only the CU in charge can transmit by pressing PTT.
If repeater traffic is enabled in the channel setup (personality programming), tone calls can be transmitted. If repeater traffic is enabled on the channel and the 'R' is visible in the display, squelch controlled repeater traffic is in progress. It is disabled by pressing |Repeater| |*|, and enabled by pressing |Repeater| |#|.
No tone calls are received when in BFS mode.

Repeater traffic enable/disable

Each CU can enable/disable repeater traffic over the base. An 'R' indicates the actual state in each CU's display. If repeater traffic is disabled when mobile-mobile traffic is in progress, the call is cleared down.

Isolated base

If the base loses contact with all CU's, it is isolated. In this case it can work as tone- or squelch-controlled repeater, personality programmable on each channel.

Transfer

Incoming call to a CU can be transferred to any other CU, mobile or a telephone number. Only individual calls are transferred to mobiles and to telephone numbers. Observe that transfer to other mobile is not affected by repeater traffic enable/disable. If, however, repeater traffic is disabled during the call, the call is cleared down. If the channel is simplex and transfer to a mobile is requested, a tone call is transmitted to the mobile, but no traffic is connected.

Keyboard functions

Clock

Press |Set-up| once. The time is displayed.

Programming

Press |Set-up| while time is displayed. The CU will prompt you for the programming password.

Locked channel

Choose a route. Press |Lock|. The text 'LOCK' flashes in the lower right corner of the display.
Press |#| to lock the channel. The loudspeaker symbol starts toggling between empty and filled symbol.
To unlock the channel, press |Lock|. The text 'LOCK' flashes in the lower right corner of the display.
Press |*| to unlock the channel.

BFS channel

Choose a route that is defined as a BFS route. Press |Data|.
The text 'VSS' flashes in the lower right corner of the display. Press |#| to start BFS mode.
The loudspeaker symbol starts flashing. To exit BFS mode, press |Data|, the text 'VSS' flashes in the lower right corner of the display.
Press |*| to exit BFS mode.

Repeater traffic enable/disable

Press |Repeater|. The R in the display starts flashing.
Press |#| to enable repeater traffic. Press |*| to disable.
When repeater is disabled, no incoming calls or outgoing group calls will start the repeater.

Open traffic channels

Press |Monitor|. The actual open traffic channel numbers are displayed. Dial the route number to enable/disable. The route is displayed with flashing digits. Press |#| to enable it, |*| to disable it.
The actual open traffic channels corresponding to selected routes are once more displayed.

Control outputs

Press |Control|. The control outputs activated (1-4) (**NOTE** there are only 2 outputs for LP210) are displayed.
Dial the output to activate/deactivate (1-4). The digit flashes.
Press |#| to activate it. Press |*| to clear it.

Route selection

Press |Route|. 'C:' flashes. Dial the route. If just one digit is dialled it will be accepted after 3 seconds.
If two digits are dialled, they will be accepted after the second digit is dialled.
If the route isn't valid, it will be neglected.

Normal call

Dial a valid address or a short number and press |#|.
A normal tone call will be transmitted.

Group call

Dial one digit and press |Group|. The group digits will be copied to the address field of the display and the call is transmitted as a group call. If repeater start on outgoing group calls is personality enabled and repeater function isn't manually disabled (by pressing |Repeater| |*|), the base is started in repeater mode.

Status call

Dial a valid address or a short number and press |Status?|.
A status call will be transmitted.
If answered then the received status will be displayed.

Data call

Data call is **removed** from MRS3000 from V3.0 and forward.

Who Has Called - call

If a CU is A-subscriber in a call, (i.e. the call was sent from the CU to the mobile), pressing the |WHC|-key causes a "Who Has Called" telegram to be transmitted. If the signalling succeeds, the call is thereafter cleared down.

Clear down

Any call is cleared down by pressing |-/-|, a DISCON telegram is always transmitted if there was a connection.

Loudspeaker

By pressing the |  |-key, the loudspeaker is turned on/off.

External alarm

The CU is equipped with two external alarm outputs. One of them is activated whenever an alarm of any kind (call from mobile, mobile alarm transmitter, alarm input activation) is received. Its activation is synchronous with the alarm beep in the loudspeaker.
This alarm can not be disabled.
The other external alarm is activated whenever an incoming call that prompts for an answer (group, multiline or individual call) is received. It is activated during the time the beep sounds in the loudspeaker.
This alarm can be enabled/disabled by pressing the |HORN|-key.

Queue handling

The CU is equipped with two queues containing the calling mobile id, status and route: the alarm queue and the normal queue.
As long as there are any calls in the alarm queue, it isn't possible to see any of the calls in the normal queue. The alarm queue's entries are displayed with flashing digits. The last incoming call is the one displayed.
When there are entries in the queue, the display may look like this:

3-17911 R 12345

The queue position digit (the digit left of the hyphen) indicates how many entries there are in the queue. The five digits following the hyphen are the id of the mobile that made the last call.

The queues can, altogether, contain a maximum of 10 entries. If the queue is full and a new entry is to be queued, the oldest entry in the normal queue will be discarded. If there are only alarm calls in queue, the oldest alarm entry is discarded only if the call to be queued also is an alarm call.

The type of calls queued in the alarm queue are:
- Unanswered alarm calls with speech
- Calls from mobile alarm transmitter
- Alarm input activation

The type of calls queued in the normal queue are:
- Priority and normal status calls
- WHC calls (status 00)

Repeated status calls from the same mobile, just updates the status and route fields, not the queue position.
Repeated WHC calls from the same mobile just updates the route, the status of WHC calls is always 00.

Repeated unanswered alarm calls with speech from the same mobile just update status and route.
Repeated calls from the same mobile alarm transmitter just updates the route, no status is transferred in this type of calls.
Repeated activation of alarm inputs does not affect the queue, no status or route information is available.

All in all a mobile can occupy three queue positions. One unanswered alarm call with speech, one normal/priority status call and one WHC call.

The queues are handled the following way:

Press |Queue|: The CU enters queue mode indicted by flashing queue position digit(s).

In queue mode, the display looks like this:

3 - 17911 : 02 : 54 12345

The two digits following the id is the route and the next two digits is the status

In queue mode the following actions can be taken:

Press |Queue|	To scroll the queue.
Press |*|	To delete the displayed queue entry.
Press |#|	To copy the queue address and route of the displayed queue entry to the address and route fields of the display and exits queue mode.

Queue mode is exited when |#| or an erroneous key is pressed or when no key has been pressed for two seconds.

Short number handling

By dialling one digit (0-9) and |Display|, the corresponding short number is displayed. Short number 1-9 is user programmable, and short number 0 is recall of the last transmitted tone call.
By dialling a five digit address, eventually choosing a route, and pressing |Display|, the CU enters short number entry mode.
Dial the short number to store it under (1-9) and press |Display| once again. To skip changing of short number entry, press |*|.

Listen

By choosing a route and pressing |Listen|, the CU occupies the radio and the line at the selected channel, or takes control of eventual mobile - mobile traffic at the channel already being in use.

Keyboard PTT

Pressing this key causes the internal microphone to be connected.

Transfer

Press |Transfer| once for transfer to CU or mobile, twice for transfer to telephone. For transfer to CU or mobile, dial the address (five digits) to transfer to. For transfer to telephone number, dial the telephone number, max. 15 digits.
If you are operating the CU with identity 0, and you want it to operate as an interface to the telephone network, you shall not dial any telephone number. Press |#| to start transfer.
Press |*| to return to normal operation. For the CU that operates as interface to the telephone network, you need to press |*| three times within three seconds to return to normal operation.
If transfer to another CU is chosen, all calls are redirected to that CU. If transfer to a mobile or a telephone number is chosen, all individual normal calls (with speech) are transferred.

When dialling the telephone number, the following codes have a special meaning:

|Set-up| = A = wait for dial tone
|Lock| = B = pause, next digit determines the length in seconds
|Repeater| = C = DTMF *
|Monitor| = D = DTMF #

Hexadecimal digits A-F used in programming modes

|Set-up| = A
|Lock| = B
|Repeater| = C
|Monitor| = D
|Control| = E
|Data| = F

Indicators

The indicators are situated in the lower left corner of the display. They are named, from left to right: Power indicator, Incoming call indicator, TX indicator, Horn indicator and Loudspeaker indicator.

Power indicator

The power indicator is always displayed when power is on.

Incoming call indicator

When there is an unanswered incoming call pending, the indicator is flashing.
When the CU is in traffic the indicator is steady.
When the radio is occupied the indicator toggles between normal and inverse video.

TX indicator

When the (keyboard, handset or external) PTT is pressed the indicator is steady.
When the LP is busy handling an incoming/outgoing call, the indicator is flashing at the CU in charge.

Horn indicator

When the external incoming call alarm is on the indicator is steady.

Loudspeaker indicator

When the loudspeaker is open, the indictor is steady.
When listening on a channel by having pressed |Listen|, the indicator is flashing.
When locking on a channel the indicator toggles between filled and empty symbol.
If the loudspeaker is opened when the radio is occupied, the actual channel is displayed to the right of the loudspeaker indicator.

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/S/MK Magnus Lindahl		MRS3000 Step by step programming guide		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KL/ECS/S/MK		1997-04-16	A	LZB 119 1661

SYSTEM 3000 STEP BY STEP PROGRAMMING GUIDE

Valid from V3.6 of LP200/210
V3.3 of CU200
V3.7 of CU210

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/S/MK Magnus Lindahl		MRS3000 Step by step programming guide		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KL/ECS/S/MK		1997-04-16	A	LZB 119 1661

The work to set-up the system software can preferably be split up into some independent parts:

1. Set-up line interface between LP200 and the attached CU200/210.

2. Make sure all units; LP200/210 and CU200/210, in the system all have the same major version number, i.e., and the same first digit in the version number.
   If you have V2.6 of LP200, you must have CU200s with version number V2.0, V2.1, V2.2 etc.
   If you have V3.0 of LP200/210, your CU200s and CU210s must have version number V3.0, V3.1, V3.2 etc. As long as the major version number is the same, the minor version number may very well be different for each unit.

3. Radio interface, physical channel select control of radio, and logical how to handle each channel, which channels to scan for tone-receiver etc.

4. Route information, translation between two-digit route number and corresponding channel number and repeater-start-digit.

5. Limitations of number of concurrent squelch checked channels, (Open Traffic) and some timing.

6. Specifications of some different time-out values.

7. Set-up of the individual tone-call numbers to receive, these are, depending of call type, split into some different subgroups.

8. Specification of different ways to dial short numbers in the CUs.

9. Signalling system specification, as default CCIR tones are used within the Swedish system specifications "Alternative A & C".
   Most of the system specification is programmed individually for RX respectively TX.

Configure line interface between LP200 and the attached CU200

For AE200 see special instructions.

Measure the line attenuation at 1000 Hz and 3000 Hz in each direction of the line.

In LP200 the amplification (at 1000 Hz) and equalization (additional amplification at 3000 Hz) is adjusted by straps, as well as proper connection for 4-wire or 2-wire line.

In CU200 the selection of 4-wire or 2-wire line is done by straps.

In CU210 the selection of 4-wire or 2-wire line is done via personality programming of Area 1 TAB 30.

In each CU connected to the LP, following coding has to be done in the local EEPROM (Area 1):

- A unique ID-digit 1 - 6 has to be dedicated for each CU200, see specifications "CU ID NUMBER" in *MRS3000 PROGRAMMERS REFERENCE MANUAL*.
  If you have a CU210 used as interface to the public telephone network or a local telephone exchange, it shall be given the ID number 0.
- Line amplification and equalization; see specification "LINE LEVEL" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

Software in the LP200/210 has to be informed if the connection is 4-wire or 2-wire.
Programming of Area 2 TAB 02 does this.

Configure radio interface

The used radio-type shall be specified, see specification "RADIO" in
MRS3000 PROGRAMMERS REFERENCE MANUAL.

The frequency divider constant given to the radio for each channel shall be specified in 2 tables, RX and TX separately. See specification "RADIO RX" and "RADIO TX" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

For each channel, the following specifications must be given:
- If it exists
- If it is tone-scanned
- If simplex/duplex radio channel
- If repeater traffic allowed
- If open traffic is allowed
- Signalling system options
- If automatic select table for tone transmission
- If squelch controlled repeater when isolated base
- If 2-tone or 5-tone repeater start

See "CHANNEL INFO" in *MRS3000 PROGRAMMERS REFERENCE MANUAL* for further specification.

Max. 15 channels (= radio frequencies) could be used.
If less than 15 frequencies are used, different channel numbers could select the same frequency at the radio, but with different options. For example you could select either of the signalling systems A and C by specifying different channel numbers.

Route information

All route information displayed in the CUs is translated by this table between a 2-digit route (01-99) and the used channel number 1-15, and the eventual corresponding relay start digit (1-9). This is specified in table "REAL CHANNEL" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

Open traffic limitations

The radio might, beside the tone-scanning, stop for squelch at the channels selected by one or more CUs. Doing this check on a bunch of channels simultaneously will probably cause a chaotic behaviour. Therefore it is possible to limit the number of squelch checked channels within the system, as well as number of channels for a single CU200.
See "MAX TOT OT CHANNELS" and "MAX CU OT CHANNELS" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

Time from lost squelch at a channel until accepting squelch detect at another open traffic channel, is specified in "OT SQ HANG TIME" in *MRS3000 PROGRAMMERS REFERENCE MANUAL*.

Specifications of different time-out values

After a connection has been established by a tone call, the time from loss of both squelch from radio and LF-detect from the CU(s) until the LP starts to give warning tones, is specified as "LF LOST TO WARN TIME" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

The maximum conversation time is specified as "MAX CONV TIME" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

Max. conversation time for a repeater-call is specified as "MAX RELAY TIME" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

During squelch controlled repeater when isolated base, the hang time after loss of squelch is specified as "SQ HANG TIME" in MRS3000 PROGRAMMERS REFERENCE MANUAL.

The maximum time a CU is allowed to continuously transmit (by PTT), is specified as "MAX TX TIME" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

The maximum time from a CU beeps for a incoming call, until it has to be answered is specified as "INC CALL WAIT TIME" in *MRS3000 PROGRAMMERS REFERENCE MANUAL*.

The maximum time for a CU to hold the radio by the function 'Listen Channel' (by choosing a route and pressing |Listen|), is specified as "MAX LISTEN CH TIME" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

Signalling system specification

As default, CCIR tones are used within the Swedish system specifications "Alternative A" and "Alternative C", (which are not described in this documentation).

Most of the system specifications are programmed individually for RX and TX respectively.
How to change these specifications is best shown in the examples.

The only information, which normally might needs to be changed, is timing specifications for tone-receiver. The table "TONLEN TAB" in *MRS3000 PROGRAMMERS REFERENCE MANUAL* specifies 16 different tone length intervals, which are referred, for each tone by tone-decoder see "TONE RECEIVERS" in *MRS3000 PROGRAMMERS REFERENCE MANUAL*.

There are a couple of special cases in the Alternative A and Alternative C signalling systems:

- After receiving ICALLINDa normally also a TSTAT_1 should be received, but this is not always necessary, you could accept it anyway.
- After transmitted an OCALLINDc normally the mobile answers with TSTAT_2, but it shall be OK even if it only transmits first half of TSTAT_2.
- After transmitted an OCALLINDb normally the mobile answers with RCPTCALL_ACK, but it is not always needed.

The LP200/210 has to wait some time before being sure that not the rest of the answer is received, this time is specified in "WAIT ACK TIME".

Set-up of the individual tone - call numbers to receive

The call numbers received are split into some different subgroups, depending on the action to take upon receiving a call.

To minimize the coding effort, you are recommended to copy and use the work sheets supplied before starting the coding. Each worksheet's header contains information of all valid destinations.

The type of call specifies which worksheet to use for it:

0: Telephone call with fixed telephone number.
1: Alarm call to LAC. Phone number to LAC shall be set up in LAC NO 1 and LAC NO 2 (see *MRS3000 PROGRAMMMERS REFERENCE MANUAL*).
2: Telephone call with free dialling of telephone number.
3: Not used
4: Destination(s) of normal call or group call.
5: Destinations of multiline call to CUs.
8: Destination(s) for normal status delivery call and WHC.
9: Destination(s) for raised priority status delivery call.
A: Destination(s) of alarm call. (CALL_ET)
B: Alarm call to telephone number.
C: Destination(s) of alarm call with speech to CU(s). (STATREQ)
D: Not used
E: Not used

Specifications of different ways to dial numbers in the CUs

These set-ups are programmed local in each CU.

The 9 short numbers are programmable in 2 ways, either from keyboard as described in *MRS3000 OVERVIEW*, or in programming mode, as specified in "SHORT NUMBERS" in *MRS3000 PROGRAMMERS REFERENCE MANUAL.*
In both cases the Route information could be included.

10 different group numbers could be specified, the corresponding call is *transmitted when pressing |Group|. See "GROUP NUMBERS" in MRS3000* PROGRAMMERS REFERENCE MANUAL.

Tone transmitting when 2, 3 or 4 digits are dialled in the display, is normally not valid, but it can be expanded to a full 5-digit address according to specifications in "FILL ADDRESS 2" - "FILL ADDRESS 4" in *MRS3000 PROGRAMMERS REFERENCE MANUAL*.

In current version "FILL ADDRESS 0" and "FILL ADDRESS 1" are not used.
Table "FILL ADDRESS 5" could be used to always force a specific digit position to a fixed digit.

It is possible to specify default Route as power-on condition, see specification "ROUTE DIGITS" in *MRS3000 PROGRAMMERS REFERENCE MANUAL*.

There are a couple of other options:
- Possibility to prevent too ever close the loudspeaker when the handset is hung up.
- For printer interface specify if a new-line is <CR><LF> or <LF>.

See specifications in "CU FLAGS" in *MRS3000 PROGRAMMERS REFERENCE MANUAL*.

How to set up a BFS system

This is a description of how to set up a BFS system with channel 1 as the national BFS channel, channel 4 as the local BFS channel and channel 4, 5, 6 and 7 as normal channels.

Channel 0 works only in BFS mode. On channel 0 no tone calls can be transmitted or received.
The LF from two receivers is mixed together to the CUs. It isn't possible to connect repeater traffic on channel 0.

When channel 4 works only in BFS mode, it is possible for the operator at the CU in charge to connect repeater traffic by pressing |Repeater| |#|, and disconnect repeater traffic by pressing |Repeater| |*|.
It is also possible to transmit tone calls, but reception of calls is disabled when in BFS mode.
The LF from two receivers is mixed together to the CUs.

On channel 4 and on channels 5, 6 and 7 the system works nearly as a normal MRS3000.
Tone calls can be transmitted and received. The only difference from a normal MRS3000 is that the system stays in open traffic even after an operator has pressed PTT while in open traffic.

The following personality programming has to be done:

- In each CU200/210 set BFS FUNCTION FLAG (AREA 1 TAB 21 ROW 06) to 1.

Area	Table	Row	Data
1	21	06	01

- In the CU210 that is supposed to work as BFS master CU set BFS MASTER FLAG (AREA 1 TAB 21 ROW 07) to

Area	Table	Row	Data
1	21	07	01

- Set the GENERAL FLAG BFS function flag in LP210 to 1 (AREA 2 TAB 01 ROW 02).

Area	Table	Row	Data
2	01	02	01

Sets the dial tone minimums detect time according to the Finish standard, the so called Morse S dial tone. This type of dial tone consists of three 200 ms 425 Hz bursts separated by 300 ms pauses. Setting the minimum tone detect time to 1.1 s and the maximum pause time to 350 ms specifies it.

Area	Table	Row	Data
2	55	01	8B
2	56	01	A3

Program CHANNEL INFO according to the following worksheet:

Options	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15
1. Channel exists	X			X	X	X	X								
2. Tone scanned				X	X	X	X								
3. Duplex channel	X			X	X	X	X								
4. Repeater traffic allowed				X	X	X	X								
5. Open traffic allowed				X	X	X	X								
6. Signal system A															
7. RCPTCALL_ACK accepted instead of TSTAT 2				X	X	X	X								
8. RCPTCALL_ACK needed after OCALLINDb															
9. Receive DISCON tone-telegram				X	X	X	X								
10.Group repeater enable				X	X	X	X								
11.Auto selectable tone transmission				X	X	X	X								
12.Squelch controlled repeater when isolated base															
13.5-tone repeater start															
14.BFS channel	X			X											
15.Xtal freq. Skew															
16.Spare															

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/S/MK Magnus Lindahl		MRS3000 PC programming tool		
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MRS 3000 PC PROGRAMMING TOOL

Valid from V3.0 of LP200/210 and CU200/210

CONTENTS

1. MRS3000 PC PROGRAMMING TOOL

To make life easier for MRS3000 managers, a programming toolkit for PC exist. The programming tool is used for programming personality parameters, tone-tables, and the short-number table.

The PC tool takes benefits of the user-friendly interface offered by a PC. Instead of the cryptic commands offered in monitor programming, the user will be able to use the **ARROW**, **PAGE UP**, **PAGE DOWN** and the function keys.

The following pages will describe the installation and use of this program.

2. INSTALLATION

To be able to use the program, the ANSI.SYS driver must be installed. To do this, if not already done, add the following line to the file CONFIG.SYS on the disk you boot from.

DEVICE = <path>\ANSI.SYS

<path> indicates the location of ANSI.SYS on your system. Note that the path must be accessible at system startup time. ANSI.SYS is distributed to you as a part of the MS-DOS operating system.

If you want to install the programming tool on your hard disk, then you just copy the file CU200.EXE from the distribution floppy disk to the desired place on your hard disk.
If you don't have a hard disk or don't want to remove your favourite games from the hard disk to make place for this program, you must do a working copy of this disk. These are done by copying the file CU200.EXE to another floppy disk and not write protecting that floppy disk.

3. USE OF THE CU200 PROGRAM.

After you installed the program you will be able to go ahead and use it.

To start the program, you change the current directory to the one where the file CU200.EXE resides, and enter CU200 followed by a carriage return.

When the program is started it will prompt you for an input file containing the current configuration. If this is the first time you use this program you probably just want to answer with a carriage return, and the program will create the default files CU200.ME1 and CU200.ME2.

3.1 THE MAIN MENU

After you answered the file question the Main menu will appear on the screen. The screen will then look as below.

cu200.mem

1. CU Programming

2. LP Programming

3. Change RX Tone tables

4. Change TX Tone tables

5. Call number tables

6. Upload/Download to CU/LP

7. Quit

Save	**Load**	**Save text**
F1	**F2**	**F3**

The current entry will be in inverse video.
You will select one option, either by moving up and done with the **UP** and **DOWN** key followed by a return at the desired entry, or by entering the digit corresponding to the desired entry.

With the function keys you will be able to select the following actions:

F1 Save

If you press the **F1** key the whole configuration will be saved on a file selected by you.
This file is in Motorola format and is possible do load down to a PROM-programmer accepting the Motorola format.

F2 Load

If you press the **F2** key you will be prompted for a file containing the configuration to load.

F3 Save text

With the F3 key you will be able to save the loaded configuration in a text file.
The text file will be named as the configuration file except that the file extension will be ".prt". The text file is readable to human beings, and is appropriate to print out on a lineprinter or a similar device. This file is useful if you would like to have a written documentation of the current configuration or a working paper.

3.2 CU PROGRAMMING

If "CU Programming" is selected in the main menu the following screen will appear

cu200.mem

1. Short Number programming

2. Group Number programming"

3. Route Digits, Cu Flags & Cu Id

4. Fill Address programming

5. Line Level programming

6. Previous menu

Use arrows to move and enter to select entry

Save Load

F1 F2

This menu works exactly as the main menu except that the function save text is not available and of course that the selections in the menu is not the same.

To get back to the main menu you may select Previous menu or press the **ESC** key

3.2.1 Short_Number_programming.

If "Short Number programming is" selected in the CU PROGRAMMING menu the following screen will appear:

cu200.mem Short Numbers

Short Number 1	01234
Route Number 1	
Short Number 2	01235
Route Number 2	
Short Number 3	81113
Route Number 3	
Short Number 4	81114
Route Number 4	
Short Number 5	81115
Route Number 5	
Short Number 6	81116

Route Number 6
Short Number 7 81117
Route Number 7
Short Number 8 81118
Route Number 8
Short Number 9 81119
Route Number 9

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

You may move forward and backward inside the entries with the **LEFT** and **RIGHT** arrows.
You can toggle between Overwrite and Insert mode by pressing the **INS** key. And you can erase digits either with the **DEL** key or the **BACKSPACE** key.

The changes you make on the entry will not really affect the entry in memory before you enter a carriage return at the entry.

The **UP** and **DOWN** arrows will move to the preceding/following entry. If the user tries to get outside the current screen the screen will scroll up/down to show the next/preceding entry if existent. You will not be able to move pass the last entry in the table or before the first.

If the user wants to move in bigger steps the **PAGE_UP, PAGE_DOWN** keys will scroll one full screen in either direction.
Notice that if there isn't enough entries in either direction, i.e., you are standing on the top or end at the table, the **PAGE_UP/PAGE_DOWN** keys will have no action.

To move to the first entry in the current menu the user can press the **HOME** key, and to move to the last entry the user can press the **END** key.

With the function keys you will be able to select the following actions:

F1 Save
If you press the **F1** key the whole configuration will be saved on a file selected by you.

F2 Load
If you press the **F2** key, you will be asked for a new configuration to be read in to memory.

To leave this menu and get back to the CU PROGRAMMING menu, press the **ESC** key.

3.2.2 **Group_Number_programming.**
If "Group Number Programming" is selected in the CU PROGRAMMING menu the following screen will appear:

cu200.mem Group Numbers

Group Number 0	01230
Group Number 1	00230
Group Number 2	12345
Group Number 3	12345
Group Number 4	12345
Group Number 5	12345
Group Number 6	12345
Group Number 7	12345
Group Number 8	12345
Group Number 9	12345

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

The commands on this screen are exactly the same as in the previous chapter "Short Numbers Programming".

3.2.3 Route_Digits,_Cu_Flags_&_Cu_ID.
If "Route Digits, Cu Flags & Cu ID" is selected in the CU PROGRAMMING menu the following screen will appear:

cu200.mem Cu flags

Default route digits

LS OFF disable	0
Printer new line	1
PTT VOX control	1
DTMF OUT (only CU210)	0
AGC used on telephone	0
CU ID number	1
Physical Four wire	1

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

The commands on this screen are exactly the same as in the chapter above "Short Number Programming".

3.2.4 Fill_Address_programming

If "Fill Address programming" is selected in the CU PROGRAMMING menu the following screen will appear:

cu200.mem Fill address parameters

Fill address 0	**000000**
Fill address 1	000000
Fill address 2	1012FF
Fill address 3	101FFF
Fill address 4	10FFFF
Fill address 5	1FFFFF

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

The commands on this screen are exactly the same as in the chapter above "Short Number Programming.

3.2.5 **Line_Level_programming**.

If "Line Level programming" is selected in the CU PROGRAMMING menu the following screen will appear:

cu200.mem Line Level

RX amplification at 1000 Hz	**0**
Amplification at 3000 Hz	0

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

The commands on this screen are exactly the same as in the chapter above "Short Number Programming".

3.2.6 **Previous_menu.**
If "Previous menu" is selected in the CU PROGRAMMING menu you will get back to the main menu.
You may also get back to the main menu by pressing the **ESC** key.

3.3 LP PROGRAMMING

If "LP Programming" is selected in the main menu the following screen will appear

cu200.mem

1. LP Flags

2. Real Channels"

3. Radio RX/TX

4. Channel Info

5. LP times and ADV variables

6. Previous menu

Use arrows to move and enter to select entry

Save Load

F1 F2

This menu works exactly as the main menu except that the function "sav text" is not available and of course the selections in the menu is not the same.

To get back to the main menu you may select Previous menu or press the **ESC** key

3.3.1 LP_Flags

If "LP Flags" is selected in the LP PROGRAMMING menu the following screen will appear:

cu200.mem Personality Parameters 1

General Flags	**FF**
Four wire	1
Max CU OT channels	2
Max total OT channels	3

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

You may move forward and backward inside the entries with the **LEFT** and **RIGHT** arrows.
You can toggle between Overwrite and Insert mode by pressing the **INS** key.
And you can erase digits either with the **DEL** key or the **BACKSPACE** key.

The changes you make on the entry will not really affect the entry in memory before you enter a carriage return at the entry.

The **UP** and **DOWN** arrows will move to the preceding/following entry.
If the user tries to get outside the current screen the screen will scroll down/up to show the preceding/next entry if existent.
You will not be able to move pass the last entry in the table or before the first.

If the user wants to move in bigger steps the **PAGE_UP, PAGE_DOWN** keys will scroll one full screen in either direction.
Notice that if there isn't enough entries in either direction, i.e., you are standing on the top or end at the table, the **PAGE_UP/PAGE_DOWN** keys will have no action.

To move to the first entry in the current menu the user can press the **HOME** key, and to move to the last entry the user can press the **END** key.

With the function keys you will be able to select the following actions:

F1 Save

If you press the **F1** key the whole configuration will be saved on a file selected by you.

F2 Load

If you press the **F2** key, you will be asked for a new configuration to be read in to memory.

To leave this menu and get back to the LP PROGRAMMING menu, press the **ESC** key.

3.3.2 Real_Channels.

If "Real Channels" is selected in the LP PROGRAMMING menu the following screen will appear:

cu200.mem Real Channels

Real Channel 1	**1**
Real Channel 2	2
Real Channel 3	3
Real Channel 4	4
Real Channel 5	5
Real Channel 6	6
Real Channel 7	7
Real Channel 8	0
Real Channel 9	0
Real Channel 10	0
Real Channel 11	11
Real Channel 12	12
Real Channel 13	13
Real Channel 14	14
Real Channel 15	15
Real Channel 16	16
Real Channel 17	17
Real Channel 18	0

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

The commands on this screen are exactly the same as in the previous chapter "LP Flags".

3.3.3 Radio_RX/TX.

If "Radio RX/TX" is selected in the LP PROGRAMMING menu the following screen will appear:

cu200.mem Personality Parameters 2

Radio	**6**
Radio RX Channel 1	FE
Radio RX Channel 2	FD
Radio RX Channel 3	FB
Radio RX Channel 4	F7
Radio RX Channel 5	EF
Radio RX Channel 6	DF
Radio RX Channel 7	BF

Radio RX Channel 8	7F
Radio RX Channel 9	0
Radio RX Channel 10	0
Radio RX Channel 11	0
Radio RX Channel 12	0
Radio RX Channel 13	0
Radio RX Channel 14	0
Radio RX Channel 15	0
Radio TX Channel 1	FE
Radio TX Channel 2	FD

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

The commands on this screen are exactly the same as in the chapter above "LP Flags".

3.3.4 **Channel_info**

If "Channel info" is selected in the LP PROGRAMMING menu the following screen will appear:

cu200.mem Channel 1

Exist	**1**
Tone Scanned	1
Duplex	1
Repeater traffic	1
Open Traffic	1
Signal System A	1
Short ACK accepted	1
ACK required	0
Receive DISCON	1
Group repeater	1
Auto select	1
Squelch controlled repeater	0
Five tone repeater	0
Xtal frequency scew	0

Save	**Load**	**Previous table**	**Next table**
F1	**F2**	**F3**	**F4**

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

You may move and update entrie in the same way as in the chapter above "LP Flags".

With the function keys you will be able to select the following actions:

F1 Save

If you press the **F1** key the whole configuration will be saved on file.

F2 Load

If you press the **F2** key, you will be asked for a new configuration to be read in to memory.

F3 Previous table

If you press the **F3** key the "channel info table" for the previous channel will appear on the screen. The cursor will reside at the corresponding entry in the new table. This is, together with the command “Next table”, very convenient when you are changing the same entries in several tables. The current table name is shown at the top of the screen so it will be easier to update the correct table.

F4 Next table

If you press the **F4** key the "channel info table" for the next channel will appear on the screen. The cursor will reside at the corresponding entry in the new table. This is, together with the command Previous table, very convenient when you are changing the same entries in several tables. The current table name is shown at the top of the screen so it will be easier to update the correct table

3.3.5 LP_times_and_ADV_variables.

If "LP times and ADV variables" is selected in the LP PROGRAMMING menu the following screen will appear:

cu200.mem LP TIMES

LF lost to warn time (s)	**20**
Max conversation time (s)	300
Max TX time (s)	2
Incoming call wait time (s)	120
Max listen ch time (s)	30
Max repeat time (s)	1270
Max data traffic time (s)	300
Squelch hang time (s)	5
Scan tone time (ms)	80
OT scan debounce time (ms)	50
Squelch debounce on (ms)	5
Squelch debounce off (ms)	5
OT squelch hang time (ms)	4000
DTMF on time (ms)	100
DTMF off time (ms)	100

Pulse OC time (ms)	60
Pulse SC time (ms)	40
Pulse Pause time (ms)	650
Max ring busy tones	10

Save Load

F1 F2

For the interpretation of each independent entry see
MRS3000 PROGRAMMERS REFERENCE MANUAL.

The commands on this screen are exactly the same as in the chapter above "LP Flags".

3.3.6 Previous_menu.

If "Previous menu" is selected in the LP PROGRAMMING you will get back to the main menu. You may also get back to the main menu by pressing the ESC key.

3.4 CHANGE RX TONE TABLES

If "Change RX Tone table" is selected in the main menu, the following screen will appear.

cu200.mem Receiver tone table 1: ICALLINDx To ADV fixed nr

Call Type 1	**4**
Start Condition 1	0
Call Type 2	C
Start Condition 2	0
Call Type 3	1
Start Condition 3	0
Function Number	1
Priority	0
Accept tone 1	F
Length	F
Tone	0
Accept tone 2	A
Length	3
Tone	AD
Accept tone 3	0
Length	B
Tone	10
Accept tone 4	2

Save	**Load**	**Previous table**	**Next table**	**Tone lengths**	**Call Param**	**Double check**		**Times**
F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	

You will move and update entries in the exact same way as in the "Short Number programming" menu.

With the function keys you will be able to select the following actions:

F1 Save

If you press the **F1** key the whole configuration will be saved on file.

F2 Load

If you press the **F2** key, you will be asked for a new configuration to be read in to memory.

F3 Previous table

If you press the **F3** key the previous RX tone-table will appear on the screen. The cursor will reside at the corresponding entry in the new table.
This is, together with the command “Next table”, very convenient when you are changing the same entries in several tables. The current table name is shown at the top of the screen so it will be easier to update the correct table.

F4 Next table

If you press the **F4** key the next RX tone-table will appear on the screen. The cursor will reside at the corresponding entry in the new table. This is, together with the command Previous table, very convenient when you are changing the same entries in several tables. The current table name is shown at the top of the screen so it will be easier to update the correct table

F5 Tone lengths

If you press the **F5** key you will enter a menu very much like the "RX tone table" menu.
The only differences are the variable names, the meaning of them, and the function line at the lower part of the screen. The only choices in this function line are “Save” and “Load”, which have the same meaning in all tables.

F6 Call parameter

If you press the **F6** key you will enter a menu very much like the "RX tone table" menu.
The only difference is the variable names, and the meaning of them, and the function line at the lower part of the screen. The only choice in this function line is “Save”, which has the same meaning in all tables. To get the meaning of these parameters see the *MRS3000 PROGRAMMERS REFERENCE MANUAL.*

F7 Double check calls

If you press the **F7** key you will enter a menu very much a like the "RX tone table" menu.
The only differences are the variable names, the meaning of them, and the function line at the lower part of the screen. The choices in this function line is “Save” and “Load”, which have the same meaning in all tables.

F8 Times

If you press the **F8** key you will enter a menu very much a like the "RX tone table" menu. The only differences are the variable names, the meaning of them, and the function line at the lower part of the screen. The choices in this function line is “Save” and “Load”, which have the same meaning in all tables.

For detailed information about the data in the RX Tone Tables, please refer to the *MRS3000 PRGRAMMERS REFERENCE.*

3.5 CHANGE TX TONE TABLES

If "Change TX Tone table" is selected in the main menu, the following screen will appear.

cu200.mem Transmit tone table 1: OCALLINDb

Tone System		**41**
Repeater code telegram Enable		52
Prolonged tone		77
Prolonged tones length (ms)	510	
Preamble length (ms)		50
Tone value 1		4C
Tone value 2		41
Tone value 3		52
Tone value 4		4D
Tone value 5		34
Tone value 6		0
Tone value 7		1
Tone value 8		1
Tone value 9		0
Tone value 10		FF
Tone value 11		B1

Save	**Load**	**Previous table**	**Next table**	**Fill address**
F1	**F2**	**F3**	**F4**	**F5**

You will move and update entries in the exact same way as in the "Change RX tone tables" menu.

With the function keys you will be able to select between the following actions:

F1 Save

If you press the **F1** key the whole configuration will be saved on file.

F2 Load

If you press the **F2** key, you will be asked for a new configuration to be read in to memory.

F3 Previous table

If you press the **F3** key the previous TX tone-table will appear on the screen. The cursor will reside at the corresponding entry in the new table. This is, together with the command “Next table”, very convenient when you are changing the same entries in several tables. The current table name is shown at the top of the screen so it will be easier to update the correct table.

F4 Next table

If you press the **F4** key the next TX tone-table will appear on the screen. The cursor will reside at the corresponding entry in the new table. This is, together with the command Previous table, very convenient when you are changing the same entries in several tables. The current table name is shown at the top of the screen so it will be easier to update the correct table

F5 Def tone system

If you press the **F5** key you will enter a menu very much a like the "TX tone table" menu. The only differences are the variable names, the meaning of them, and the function line at the lower part of the screen. The choices in this function line is “Save” and “Load”, which have the same meaning in all tables.

F6 ID tables

If you press the **F6** key you will enter a menu very much like the "TX tone table" menu.
The only differences are the variable names, the meaning of them, and the function line at the lower part of the screen.
The only choice in this function line is “Save” and “Load”, which have the same meaning in all tables.

To get the meaning of these parameters see the
MRS3000 PROGRAMMER REFERENCE MANUAL.

F7 Alarm inputs

If you press the **F7** key you will enter a menu very much like the "TX tone table" menu.
The only differences are the variable names, the meaning of them, and the function line at the lower part of the screen. The only choice in this function line is “Save” and “Load”, which have the same meaning in all tables. To get the meaning of these parameters see the *MRS3000 PROGRAMMER REFERENCE MANUAL.*

For detailed information about the TX Tone Tables' data, please refer to the *MRS3000 PROGRAMMERS REFERENCE.*

3.6 CALL NUMBER TABLES.

If "Call number tables" is selected in the main menu the following screen will appear.

cu200.mem

10001	**1**	**1122334445**	
10003	0	009A21302335461	Algerian Headquarter
10004	1		
10005	0	555555	
11002	1	45345	
11111	3		
12121	2		
12345	0	1234567	
12788	0	029364857	Plastic and Junk Ltd
13284	1		
21976	2	1*1*#	
46326	2	23465	Roy's and Roger's Gas
51215	0	083287648	
55555	2	1234567	
66666	0	34521	

Save	**Search sh_nr**	**Search ph_nr**	**New entry**	**Erase entry**	**Entry lengths**
F1	**F2**	**F3**	**F4**	**F5**	**F6**

You can move forward and backward inside the entries with the **LEFT** and **RIGHT** arrows. You can move between the fields inside an entry with the **TAB** band **BACKTAB** keys. You can toggle between Overwrite and Insert mode by pressing the **INS** key and you can erase digits either with the **DEL** key or the **BACKSPACE** key.

Allowed entries in the different fields are:

ADDRESS field 0 - 9, A - E, a - e.

FUNCTION field 0 - 9, A - E, a - e.

PHONE field 0 - 9, A - E, a - e. * #
Observe that the digits C, c and D, d will be presented as *, # respectively.

COMMENT fields All printable characters.

To make the changes you made on the entry permanent, you enter a carriage return at the entry.

The **UP** and **DOWN** arrows will move to the preceding/following entry. If the user tries to get outside the current screen the screen will scroll up/down to show the next/preceding entry if existent. You will not be able to move past the last or before the first entry in the table.

If the user wants to move in bigger steps, the **PAGE_UP, PAGE_DOWN** keys will scroll one full screen in either direction. Notice that if there isn't enough entries in either direction, i.e., you are standing on the top or end at the table or if the whole table is displayed in one screen, the **PAGE_UP/PAGE_DOWN** key will have no action.

To move to the first entry in the list you press the **HOME** key, and the last entry in the list is reached by pressing the **END** key.

Note that you only can change the phone number entry and the comment entry in this menu. The reason is that a short-number function digit pair must be unique for a consistent table.
If you want to change the short number or a function digit of an entry, you must erase that entry and create a new one as described below.
With the function keys you will be able to select the following actions:

F1 Save

If you press the **F1** key the whole configuration will be saved on a file selected by you.

F2 Search sh_nr

If you press the **F2** key you will be prompted for a short number and function digit to search for in the table. You will be able to use the **LEFT, RIGHT, INSERT** and **DEL** keys as stated above. When you have entered the desired short number, you press enter to start the searching. You may also press **ESC** to get back to the "Call number" menu without searching. If the short number is found in the table, you will return to the "Call number" menu with the cursor at the matching entry. If the entry is not found, you will be informed.

F3 Search ph_nr

If you press the **F3** key you will be prompted for a phone-number to search for in the table. You will be able to use the **LEFT, RIGHT, INSERT** and **DEL** keys as stated above. When you have entered the desired phone number you press enter to start the searching. You may also press **ESC** to get back to the "Call number" menu without searching. All entries with a matching phone number will be printed on the screen. You will be able to move between them with the **UP** and **DOWN** arrows and to edit or erase them in the same manner as in the Short-number programming menu. To get back to the "Call number" menu you press the **ESC** key.

F4 New entry

If you press the **F4** key you will be prompted for a short-number and function digit for the new entry. If the same short number with the same function digit already exist in the table it will be displayed on the screen for you to modify. If the entry doesn't exist, an empty entry will appear on the screen. After you have changed the entry you press carriage return to update the entry and return to the "Call number" menu, or **ESC** to just return.

F5 Erase entry

If you press the **F5** key the entry at the cursor position (i.e. the entry displayed in inverse video mode) will be erased.

F6 Entry lengths

If you press the **F6** key you will enter a menu for changing the entry lengths. You will be able to use the **LEFT, RIGHT, INSERT** and **DEL** keys to change the entry and **UP** and **DOWN** keys to move between the entries.
In this menu it is not enough to press carriage return to change the parameters. You must also press the **F3** key in this menu to update these fields. If you do this you will be informed that changing the field lengths will clean the whole short-number table and be asked to press carriage return to continue or **ESC** to cancel.

Detailed information of what data to program the short number table with, is found in *MRS3000 PROGRAMMER REFERENCE MANUAL.*

3.7 UPLOAD/DOWNLOAD TO CU/LP

If "Upload/Download to CU/LP" is selected in the main menu the following screen will appear

cu200.mem

1. Upload to CU

2. Download from CU

3. Default values in CU

4. Upload to LP

5. Download from LP

6. Default values in LP

7. Previous menu

Use arrows to move and enter to select entry

Save Load

F1 F2

This menu works exactly as the main menu except that the function "save text" is not available and of course that the selections in the menu is not the same.

To get back to the main menu you may select Previous menu or press the **ESC** key

With the upload command you will be able to load the configuration in the PC, including the short-number table, to the CU200 or the LP200. This requires that the CU200 be connected to the COM1 port of the PC via modem or a direct cable.
If the PC is connected to the CU210, select Upload. The data transfer will start within a couple of seconds.
Note that the uploading takes quit some time.

With the download command you will be able to fetch the configuration, including the short-number table, from the CU200 or LP200 in to the PC. This requires that the CU200 be connected to the COM1 port of the PC via modem or a direct cable.

If the PC is connected to the CU200, select Download. The data transfer will start within a couple of seconds.
Note that the downloading takes quit some time.

If you select the "Default values in CU" the program will inform you that all the EEPROM in CU200 will be overwritten by the default-values. If you select the "Default values in LP" the program will inform you that all the EEPROM parameters except the short-number table in the LP200 will be overwritten by the default-values. If you answer this warning with an **Y** followed by a **carriage return** the program will try to send the CU200/LP200 a command to move the parameters from the default area in prom to the EEPROM.
Otherwise it will be cancelled.

This command will not affect the short number table in memory.

3.7.1 Previous_menu.

If "Previous menu" is selected in the UPLOAD/DOWNLOAD you will get back to the main menu. You may also get back to the main menu by pressing the <ESC> key.

3.8 QUIT

With the “quit” selection in the main menu you will exit the program. If you have changed the configuration and not saved it, the program will warn you about this and give you the possibility to save the file.

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/SMK Magnus Lindahl		MRS3000 Programmers reference manual		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KL/ECS/S/MK		1997-04-16	A	LZB 119 1661

MRS3000 PROGRAMMERS REFERENCE MANUAL

Valid from V3.7 of LP200/210
V3.3 of CU200
V3.7 of CU210

INTRODUCTION

This is a description how to customize MRS3000's EEPROMs.

The EEPROMs can easily be reprogrammed from the CU, by entering any of the programming modes.

EEPROM structure

The EEPROM is split in some different areas:

- Area 1, local in each CU 200/210, determining it's identity number for the internal communication, it's local short-numbers, and line attenuation. Remaining areas are common for all CUs:
- Area 2 with tables specifying some general options, radio interface etc.
- Area 3 with tables specifying the tone system, transmitter tables, receiver sequence's general structure etc.
- Area 4 with the call number-tables, specifying all individual call numbers to receive.

Each EEPROM area has it's own checksum.
If there is a checksum error in any EEPROM area, the connected CUs will not operate in the normal way, their display will show: "EEPROM ERROR: code X".
To fix the error, the programming mode shall be entered, the set-up should be checked, or default values restored, and programming mode exited again.
The programming areas for the different error codes are:

Error code	Area
1 & 2	2
3	3
4	4

PROGRAMMING

Programming of area 1 will not affect any other part of the system than the CU being programmed, to which the LP will consider the connection as broken. As soon as programming mode is left, connection will be established again.
Programming of area 2-4 will bring the whole system, all CUs and the LP, down. No regular traffic will be handled as long as programming is going on. When programming mode is left, connection will be established with the CUs, and the system will start operating normally.

Programming mode is entered by pressing the upper leftmost key once or twice to get the display "PASSWORD:", enter actual password and programming mode is entered. For programming of area 4, please refer to the *MRS3000 RECEIVER CALL NUMBERS PROGRAMMING GUIDE*.

For area 1-3 there are EEPROM default values residing in PROM. To restore the default values, press the |TFR|-key and dial the additional password described below.

The EEPROM content is organized in TABLES and ROWS. Each TABLE consists of a collection of functionally connected data. The amount of data in a
TABLE is divided into ROWs.

PASSWORDS

Area	Enter Password	Additional Password	Comment
1	11111	12345	Local CU
2	22222	12345	System options
3	33333	12345	Call tables
4	44444	12345	Call numbers
4	00000	12345	Tele numbers only
5	55555	-----	Clock adjust
	99999		Reset LP210

After having entered the password, the display shows the content of the first row of the first table of the selected programming area. If you for example have dialled the password 11111, you will have entered area 1 and the display will look like this:

```
TAB:01 ROW:01 DAT:00
      Short number 1
```

The TAB field flashes. You can now enter any TAB to change to, by either dialling the two digit number or pressing the |+| and |-| keys to increment and decrement the TAB number.
If you want to change ROW, press |#|. The ROW field now flashes, and you can change the ROW in the same way as the TAB, described above.
If you want to change DAT (data), press |#| once more. The DAT field now flashes. Enter the data and press |⇗| to make it permanent. If you don't press |⇗|, the entered data will be forgotten as soon as you step to another TAB/ROW. When the DAT field flashes, you can increment and decrement the ROW field by pressing the |+|- and |-|-keys respectively. By pressing |#| once more, the TAB field starts flashing again.
Exit programming mode is done by pressing |PTT| three times.

|#| : Switch between TAB-, ROW- and DAT-fields.
|+| : When TAB flashing : increment TAB.
When ROW or DAT flashing : increment ROW.
|-| : When TAB flashing : decrement TAB.
When ROW or DAT flashing : decrement ROW.
|⇗| : Pressed once: save the data entered.
Pressed three times : exit programming mode.

The TAB and ROW fields are displayed in decimal representation, but the data is hexadecimal. The keys corresponding to the hexadecimal digits A-F are:

|Set-up| = A
|Lock| = B
|Repeater| = C
|Monitor| = D
|Control| = E
|Data| = F

Data in EEPROM

Name	Area	Table	Rows	Short description
SHORT NUMBERS	1	1-9	7	9 short numbers tables
GROUP NUMBERS	1	10-19	5	10 group numbers tables
ROUTE DIGITS	1	20	2	Default route at power on
CU FLAGS	1	21	8	Mixed CU options
CU ID NUMBER	1	22	1	Own CU's modem number among CU's
FILL ADDRESS 0	1	23	6	Digits filled up if pressed |#|, |DATA| or |STAT| with blank display.
FILL ADDRESS 1	1	24	6	Digits filled up if pressed |#|, |DATA| or |STAT| with 1 digit dialled.
FILL ADDRESS 2	1	25	6	Digits filled up if pressed |#|, |DATA| or |STAT| with 2 digits dialled.
FILL ADDRESS 3	1	26	6	Digits filled up if pressed |#|, |DATA| or |STAT| with 3 digits dialled.
FILL ADDRESS 4	1	27	6	Digits filled up if pressed |#|, |DATA| or |STAT| with 4 digits dialled.
FILL ADDRESS 5	1	28	6	Digits filled up if pressed |#|, |DATA| or |STAT| with 5 digits dialled.
CU LINE LEVEL	1	29	2	RX line level amplification and equalization in CU.
4-WIRE	1	30	1	2-wire or 4-wire connection to this CU. Only for CU210.
GENERAL FLAGS	2	1	8	Mixed system options
FOUR WIRE	2	2	1	2-wire or 4-wire to CUs
MAX CU OT CHANNELS	2	3	1	Max. open traffic channels / CU
MAX TOT OT CHANNELS	2	4	1	Max. total open traffic channels
REAL CHANNEL	2	5	99	Route > Channel+repeater convert
RADIO	2	6	1	Radio type used F600/F700
RADIO RX	2	7	15	Channel pattern to radio
RADIO TX	2	8	15	Channel pattern to radio
CHANNEL INFO	2	9-23	16	Options for channel 1-15
LF LOST TO WARN TIME	2	24	1	Start WARN tone after lost LF/SQ
MAX CONV TIME	2	25	1	Max. conversation time
MAX TX TIME	2	26	1	Max. transmission time, speech
INC CALL WAIT TIME	2	27	1	Max. time wait for CU to answer
MAX LISTEN CH TIME	2	28	1	Max. time for listening
MAX REPEAT TIME	2	29	1	Max. time for repeater traffic
SQ HANG TIME	2	30	1	Hang time, squelch ctrl repeater
SCAN TONE TIME	2	31	1	Tone scan time / channel
OT SCAN DEBOUNCE TIME	2	32	1	Squelch scan time / channel
SQ DEBOUNCE ON	2	33	1	Sq time to start open traffic
SQ DEBOUNCE OFF	2	34	1	Sq lost to restart tone-scan
OT SQ HANG TIME	2	35	1	Sq lost to restart squelch-scan
DTMF ON TIME	2	36	1	DTMF tone on time when dialling
DTMF OFF TIME	2	37	1	DTMF tone pause when dialling
PULSE OC TIME	2	38	1	Open circuit time when dialling with pulses
PULSE SC TIME	2	39	1	Short circuit time when dialling with pulses
PULSE PAUSE TIME	2	40	1	Pause between digits when dialling with pulses

Name Area Table Rows Short description

MAX RING BUSY TONES	2	41	1	Max. number of ring/busy tones before disconnect
RING TONE MIN TIME	2	42	1	Minimum time for the ring tone
RING TONE EXTRA TIME	2	43	1	Max. extra time for the ring tone
RING TONE OFF MIN TIME	2	44	1	Min time for the pause between the ring tones
RING TONE OFF EXTRA	2	45	1	Max. extra time for the pause between the ring tones
BUSY TONE MIN TIME	2	46	1	Minimum time for the busy tone
BUSY TONE EXTRA TIME	2	47	1	Max. extra time for the busy tone
BUSY TONE OFF MIN TIME	2	48	1	Min time for the pause between the busy tones
BUSY TONE OFF EXTRA	2	49	1	Max. extra time for the pause between the busy tones
RING SIGNALS LIMIT	2	50	1	Number of ring signals before accepting a telephone call
RING DETECT MIN TIME	2	51	1	Min time for the ring signal
RING DETECT EXTRA TIME	2	52	1	Max. extra time for the ring signal
RING DETECT OFF MIN	2	53	1	Min off time for the ring signal
RING DETECT OFF EXTRA	2	54	1	Max. extra off time for the ring signal
DIAL TONE MIN TIME	2	55	1	Min time for accepting a dial tone
DIAL TONE DEB OFF TIME	2	56	1	Max. pause in a dial tone
LINE VOICE DEB ON TIME	2	57	1	Radio LF detect time for the line squelch detector in CU210
LINE VOICE DEB OFF TIME	2	58	1	Radio LF no detect time for the line squelch detector in CU210
TPH VOICE DEB ON TIME	2	59	1	Telephone LF detect time for the telephone line squelch detector in CU210
TPH VOICE DEB OFF TIME	2	60	1	Telephone LF no detect time for the telephone line squelch detector in CU210
RX MAX TIME	2	61	1	Continuous radio LF Max. time in speech switching
TX MAX TIME	2	62	1	Continuous telephone LF Max. time in speech switching
RX SHUT OFF TIME	2	63	1	Shut off time for the radio LF in speech switching
TX SHUT OFF TIME	2	64	1	Shut off time for the telephone LF in speech switching
RX DEB OFF TIME	2	65	1	Radio LF no detect time in speech switching
TX DEB OFF TIME	2	66	1	Telephone LF no detect time in speech switching
MAX DIAL TONE WAIT TIME	2	67	1	Max. time between lifting the hook and dial tone detect
BLOCK TONE ON TIME	2	68	1	Length of the block tone
BLOCK TONE OFF TIME	2	69	1	Length of the pause between the block tones
ERROR TONE ON TIME	2	70	1	Length of the error tone
ANSWER TONE ON TIME	2	71	1	Length of the answer tone

Name	Area	Table	Rows	Short description
PTT ON DTMF CODE	2	72	1	DTMF code used for PTT ON in speech switching
PTT OFF DTMF CODE	2	73	1	DTMF code used for PTT OFF in speech switching
WHC DTMF CODE	2	74	1	DTMF code used for WHC
CLD DTMF CODE	2	75	1	DTMF code used for disconnect
LAC NO 1	2	76	12	First choice telephone number to LAC
LAC NO 2	2	77	12	Second choice telephone number to LAC
LAC 1 TIME	2	78	1	
LAC 2 TIME	2	79	1	
LAC 3 TIME	2	80	1	Time limits when connecting an alarm call to LAC
DIAL MAX TIME	2	81	1	Max. time between dialling digits from a telephone
ACCESS PASSW	2	82	5	Five digit access password
AUTOMATIC CALL	2	83	8	Call to transmit when no access password or no function code is dialled
TEL DIGITS 0	2	84	8	Tone call (group call) specification for dialled function code 0
TEL DIGITS 1	2	85	8	Tone call (normal call) specification for dialled function code 1
TEL DIGITS 2	2	86	8	Tone call (normal call) specification for dialled function code 2
TEL DIGITS 3	2	87	8	Tone call (normal call) specification for dialled function code 3
TEL DIGITS 4	2	88	8	Tone call (normal call) specification for dialled function code 4
TEL DIGITS 5	2	89	8	Tone call (normal call) specification for dialled function code 5
TEL DIGITS 6	2	90	8	Tone call (normal call) specification for dialled function code 6
TEL DIGITS 7	2	91	8	Tone call (normal call) specification for dialled function code 7
TEL DIGITS 8	2	92	8	Tone call (normal call) specification for dialled function code 8
TEL DIGITS 9	2	93	8	Tone call (group call) specification for dialled function code 9.
PULSE TRANS TABLE	2	94	10	Specification of number of pulses for each digit
LP LINE LEVEL	2	95	2	TX line level amplification and equalization in LP

Name	Area	Table	Rows	Short description
TONE SYSTEM	3	1	1	Default tone system
CU0 ID	3	2	5	CU 0's tone-call address
CU1 ID	3	3	5	CU 1's tone-call address
CU2 ID	3	4	5	CU 2's tone-call address
CU3 ID	3	5	5	CU 3's tone-call address
CU4 ID	3	6	5	CU 4's tone-call address
CU5 ID	3	7	5	CU 5's tone-call address
CU6 ID	3	8	5	CU 6's tone-call address
ALARM INPUT 1	3	9	6	Display code for alarm input 1
ALARM INPUT 2	3	10	6	Display code for alarm input 2
ALARM INPUT 3	3	11	6	Display code for alarm input 3
ALARM INPUT 4	3	12	6	Display code for alarm input 4
TX OCALLINDb	3	13	16	Normal call Alternative A
TX RELa	3	14	16	2 tone repeater start
TX RELb	3	15	16	5 tone repeater start
TX STATREQ	3	16	16	WHC call
TX OCALLINDc	3	17	16	Normal call Alternative C
TX CALLSTAT	3	18	16	Status request
TX spare	3	19	16	Not used
TX CALLIND_ACK	3	20	16	Ack on ICALLINDa STAT_ACK, ack on STATREQ STAT_LARM_ACK, ack on LAC LARM
TX STAT_1	3	21	16	Ack on STAT_ACK
TX DISCON	3	22	16	Disconnect
TX DISCON_REL	3	23	16	Disconnect repeater station
TX RCPTCALL_ACK	3	24	16	Audible tone QUEUE_TONE, audible tone
TX UNOB_TONE	3	25	16	Audible tone
TX WARN_TONE	3	26	16	Audible tone
TX WAIT_TONE	3	27	16	Audible tone
DOUBLE CHECK CALLS	3	28	1	Set to enhance tone-receiver
TONELENGTH TABLE 0	3	29	3	Receivers tone-length type 0
TONELENGTH TABLE 1	3	30	3	Receivers tone-length type 1
TONELENGTH TABLE 2	3	31	3	Receivers tone-length type 2
TONELENGTH TABLE 3	3	32	3	Receivers tone-length type 3
TONELENGTH TABLE 4	3	33	3	Receivers tone-length type 4
TONELENGTH TABLE 5	3	34	3	Receivers tone-length type 5
TONELENGTH TABLE 6	3	35	3	Receivers tone-length type 6
TONELENGTH TABLE 7	3	36	3	Receivers tone-length type 7
TONELENGTH TABLE 8	3	37	3	Receivers tone-length type 8
TONELENGTH TABLE 9	3	38	3	Receivers tone-length type 9
TONELENGTH TABLE A	3	39	3	Receivers tone-length type A
TONELENGTH TABLE B	3	40	3	Receivers tone-length type B
TONELENGTH TABLE C	3	41	3	Receivers tone-length type C
TONELENGTH TABLE D	3	42	3	Receivers tone-length type D
TONELENGTH TABLE E	3	43	3	Receivers tone-length type E
TONELENGTH TABLE F	3	44	3	Receivers tone-length type F
LAST INIT CALL	3	45	1	Telegram no, last normal call
LAST DISCONNECT CALL	3	46	1	Telegram no, last discon call

Name	Area	Table	Rows	Short description
Receiver Telegram 1	3	47	56	Dial fixed telephone number.
Receiver Telegram 2	3	48	56	Alarm call to LAC.
Receiver Telegram 3	3	49	56	Free dialling of telephone number.
Receiver Telegram 4	3	50	56	Spare.
Receiver Telegram 5	3	51	56	Normal or group call to CU/Mobile.
Receiver Telegram 6	3	52	56	Multiline call to CU's.
Receiver Telegram 7	3	53	56	Status report to CU(s) / WHC.
Receiver Telegram 8	3	54	56	Priority status report to CU(s).
Receiver Telegram 9	3	55	56	Alarm transmitter (CALL_ET).
Receiver Telegram 10	3	56	56	Normal alarm call to CU(s).
Receiver Telegram 11	3	57	56	Alarm call to telephone number.
Receiver Telegram 12	3	58	56	TELDIG version a.
Receiver Telegram 13	3	59	56	TELDIG version b (missed first).
Receiver Telegram 14	3	60	56	TELDIG version c (missed second).
Receiver Telegram 15	3	61	56	Disconnect.
Receiver Telegram 16	3	62	56	Disconnect repeater.
Receiver Telegram 17	3	63	56	Status acknowledge.
Receiver Telegram 18	3	64	56	Busy tone.
Receiver Telegram 19	3	65	56	Data disconnect from CU.
Receiver Telegram 20	3	66	56	RCPTCALL_ACK
Receiver Telegram 21	3	67	56	STAT_1 version a
Receiver Telegram 22	3	68	56	STAT_1 version b (missed first).
Receiver Telegram 23	3	69	56	STAT_1 version c (missed second).
Receiver Telegram 24	3	70	56	TSTAT_1 version a
Receiver Telegram 25	3	71	56	TSTAT_1 version b (missed first).
Receiver Telegram 26	3	72	56	TSTAT_1 version c (missed second).
Receiver Telegram 27	3	73	56	DSTAT_1 version a
Receiver Telegram 28	3	74	56	DSTAT_1 version b (missed first).
Receiver Telegram 29	3	75	56	DSTAT_1 version c (missed second).
Receiver Telegram 30	3	76	56	Spare.
Receiver Telegram 31	3	77	56	Spare.
Receiver Telegram 32	3	78	56	Spare.
WAIT ACK TIME	3	79	1	Max. ack wait in Alternative C.

TIMER CONCEPT, USED BY ALL TIMERS

All timers have two timebases (can't be modified), one low and one high.
The most significant bit of the timer value is used to determine which timebase is to be used. If the most significant bit of the timer value is cleared, the low timebase is used, if it is set the high timebase is used.

The timers, except the tone receiver and transmitter timers, have a range of [0..127] times the chosen timebase.

The tone receiver and transmitter timers have a range of [0..2500] ms.

The resolution of the timers is +/- timebase.

The internally used timer resolution is 250 μs, thus a timebase which is lower than this (for programming convenience) results in rounding the calculated time to nearest 250 μs.

The accuracy of the timers is ± 250 μs, independent of timebase.

To calculate what to put in the byte:
a) Divide wanted time by low timebase (usually 1 ms)
b) If value is less than 128, use it as it is,
c) Otherwise divide wanted time by high timebase.
Use the divided value, which must NOT exceed 127, + 80h
(To indicate that the high timebase is used).

Example 1: Wanted time 70 ms, timebase = 1 ms/10 ms.
70/1 = 70, the value 70 is less than 128:
use 70 = 46h.

Example 2: Wanted time 45s, timebase = 100 ms/1 s.
45000/100 = 450, which is greater than 127:
use 45 + 128 = 2Dh + 80h = ADh.

Example 3: Wanted time 1.2s, timebase = 1 ms/10 ms.
1200/1 = 1200 which is greater than 127:
use 1200/10 + 128 = 120 + 128 = 78h + 80h = F8h.
(Which is close to maximum time with this timebase)

Example 4: Wanted time 400 us, timebase = 100 μs/1 ms.
400/100 = 4, which is less than 128, use 4 = 04h.
But internally used resolution is 250 μs, so in reality the time will be set to 500 μs.

AREA 1 OF EEPROM (local for each CU)

SHORT NUMBERS (AREA 1 TAB 1 - 9)

Value range: 0 - 9 in ROW 2 - 5.
Value range: 0 - 9, Fh in ROW 1, 6, 7.

Each short number occupies one table consisting of seven rows. One row for each address digit and two digits route information.
The value Fh in ROW 1 corresponds to short number disabled.
The value Fh in ROW 6 and ROW 7 corresponds to no route information in the short number.
The short numbers are also programmable via the |Display| key functions.

TAB 01	ROW 01	1'st digit of short number 1.
TAB 01	ROW 02	2'nd digit of short number 1.
TAB 01	ROW 03	3'rd digit of short number 1.
TAB 01	ROW 04	4'th digit of short number 1.
TAB 01	ROW 05	5'th digit of short number 1.
TAB 01	ROW 06	1'st route digit of short number 1.
TAB 01	ROW 07	2'nd route digit of short number 1.
TAB 02	ROW 01	1'st digit of short number 2.
TAB 02	ROW 02	2'nd digit of short number 2.
.	.	.
.	.	.
TAB 09	ROW 04	4'th digit of short number 9.
TAB 09	ROW 05	5'th digit of short number 9.
TAB 09	ROW 06	1'st route digit of short number 9.
TAB 09	ROW 07	2'nd route digit of short number 9.

GROUP NUMBERS (AREA 1 TAB 10 -19)

Value range: 0 - 9

Each group number occupies one table consisting of five rows, one row for each address digit.
Group number cannot be disabled.

TAB 10	ROW 01	1'st digit of group number 0.
TAB 10	ROW 02	2'nd digit of group number 0.
TAB 10	ROW 03	3'rd digit of group number 0.
TAB 10	ROW 04	4'th digit of group number 0.
TAB 10	ROW 05	5'th digit of group number 0.
TAB 11	ROW 01	1'st digit of group number 1.
TAB 11	ROW 02	2'nd digit of group number 1.
.	.	.
.	.	.
.	.	.
TAB 19	ROW 04	4'th digit of group number 9.
TAB 19	ROW 05	5'th digit of group number 9.

ROUTE DIGITS (AREA 1 TAB 20)

Value range: ROW0 = 0 - 9, Fh
ROW1 = 0 - 9, Fh

01-99 = Default route digits at power on.
FFh = No repeater code selected, blank display position.

ROW 01: Default first route digit.
ROW 02: Default second route digit.

CU FLAGS (AREA 1 TAB21)

Value range: 0 or 1 in each ROW.

ROW 01: LS OFF DISABLE.
ROW 02: PRINTER NEW LINE.
ROW 03: PTT DTMF CONTROL (only CU210).
ROW 04: DTMF OUT (only CU210).
ROW 05: AGC USED ON TELEPHONE (only CU210).
ROW 06: BFS FUNCTION FLAG.
ROW 07: BFS MASTER FLAG (only CU210).
ROW 08: Not used.

PURPOSE OF THE FUNCTIONS

LS OFF DISABLE
1 = The loudspeaker is not allowed to be closed while the handset is hung up.
0 = Loudspeaker may be closed at any time.

PRINTER NEW LINE
1 = The printer attached to the serial output requires the sequence <CR><LF>, hexadecimal codes Dh, Ah to make a new line.
0 = The printer requires only <LF> to make a new line.

PTT DTMF CONTROL
1 = The speech switching in simplex can be enabled and disabled by dialling DTMF digits.
0 = The operator has no possibility to enable and disable the VOX when speech switching is used.

DTMF OUT
1 = DTMF tones are used for dialling a telephone number.
0 = Pulses are used for dialling a telephone number.

AGC USED ON TELEPHONE
1 = Automatic gain control is used on the LF received from the telephone line.
0 = No automatic gain control is used on the LF received from the telephone line.

BFS FUNCTION FLAG

1 = The CU is use in a BFS system.
0 = The CU isn't used in a BFS system.

BFS MASTER FLAG

1 = The CU is allowed to use the BFS channel.
0 = The CU is not allowed to use the BFS channel.

CU ID NUMBERS (AREA 1 TAB 22)

Value range: 0 - 6

ROW 01: ID digit. All CUs must have different ID:s.
Giving the same ID-number to different CU's will cause malfunction of the system.
This number is the one referred to as destination from tone receiver tables.
ID digit 0 is reserved for the CU210 serving as interface to the telephone line.

FILL ADRESS 0 (AREA 1 TAB 23)

Address digits to fill up with when no digits are dialled on a CU.

ROW 01: Tone call transmission when no digits are dialled enabled/disabled

Value range 0 - 1.

ROW 02: First address digit
ROW 03: Second address digit
ROW 04: Third address digit
ROW 05: Fourth address digit
ROW 06: Fifth address digit

Value range: 0 - 9.

Example:

In the current version of CU200, no digits dialled corresponds to a copy from queue, i.e. this table is never used and the programming of it doesn't matter.

Table	Row	Data	Comment
23	01-06	Doesn't matter	

FILL ADRESS 1 (AREA 1 TAB 24)

Address digits to fill up with when one digit is dialled on a CU.

ROW 01: Tone call transmission when one digit is dialled enabled/disabled.

Value range 0 - 1.

ROW 02: First address digit.
ROW 03: Second address digit.
ROW 04: Third address digit.
ROW 05: Fourth address digit.
ROW 06: Fifth address digit.

Value range: 0 - 9, Fh

Example:

In the current version of CU200/CU210, one digit dialled corresponds to a short number, i.e. this table is never used and the programming of it doesn't matter.

Table	Row	Data	Comment
24	01-06	Doesn't matter	

FILL ADRESS 2 (AREA 1 TAB 25)

Address digits to fill up with when two digits are dialled on a CU.

ROW 01: Tone call transmission when two digits are dialled enabled/disabled.

Value range 0 - 1.

ROW 02: First address digit.
ROW 03: Second address digit.
ROW 04: Third address digit.
ROW 05: Fourth address digit.
ROW 06: Fifth address digit.

Value range: 0 - 9, Fh.

Example:

If two digits, A1 A2, are dialled, the address shall be filled up to 0 1 2 A1 A2.

Table	Row	Data	Comment
25	01	1	Address fill enabled
25	02	0	First digit is 0
25	03	1	Second digit is 1
25	04	2	Third digit is 2
25	05	0F	Fourth digit is the first dialled digit
25	06	0F	Fifth digit is the second dialled digit

FILL ADRESS 3 (AREA 1 TAB 26)

Address digits to fill up with when three digits are dialled on a CU.

ROW 01: Tone call transmission when three digits are dialled enabled/disabled

Value range 0 - 1.

ROW 02: First address digit
ROW 03: Second address digit
ROW 04: Third address digit
ROW 05: Fourth address digit
ROW 06: Fifth address digit

Value range: 0 - 9, Fh.

Example:
If three digits, A1 A2 A3, are dialled, the address shall be filled up to 0 1 A1 A2 A3.

Table	Row	Data	Comment
26	01	1	Address fill enabled
26	02	0	First digit is 0
26	03	1	Second digit is 1
26	04	0F	Third digit is the first dialled digit
26	05	0F	Fourth digit is the second dialled digit
26	06	0F	Fifth digit is the third dialled digit

FILL ADRESS 4 (AREA 1 TAB 27)

Address digits to fill up with when four digits are dialled on a CU.

ROW 01: Tone call transmission when four digits are dialled enabled/disabled

Value range 0 - 1.

ROW 02: First address digit
ROW 03: Second address digit
ROW 04: Third address digit
ROW 05: Fourth address digit
ROW 06: Fifth address digit

Value range: 0 - 9, Fh.

Example:

If four digits, A1 A2 A3 A4, are dialled, the address shall be filled up to 0 A1 A2 A3 A4.

Table	Row	Data	Comment
27	01	1	Address fill enabled
27	02	0	First digit is 0
27	03	0F	Second digit is the first dialled digit
27	04	0F	Third digit is the second dialled digit
27	05	0F	Fourth digit is the third dialled digit
27	06	0F	Fifth digit is the fourth dialled digit

FILL ADRESS 5 (AREA 1 TAB 28)

Address digits to fill up with when five digits are dialled on a CU.

ROW 01: Tone call transmission when five digits are dialled enabled/disabled

Value range 0 - 1.

ROW 02: First address digit
ROW 03: Second address digit
ROW 04: Third address digit
ROW 05: Fourth address digit
ROW 06: Fifth address digit

Value range: 0 - 9, Fh.

Example:

If five digits, A1 A2 A3 A4 A5, are dialled, the address shall not be modified, i.e., A1 A2 A3 A4 shall be transmitted.

Table	Row	Data	Comment
28	01	1	Address fill enabled
28	02	0F	First digit is the first dialled digit
28	03	0F	Second digit is the second dialled digit
28	04	0F	Third digit is the third dialled digit
28	05	0F	Fourth digit is the fourth dialled digit
28	06	0F	Fifth digit is the fifth dialled digit

CU LINE LEVEL (AREA 1 TAB 29)

ROW 01 : RX amplification at 1000 Hz to compensate line attenuation

Value range: 0 - 7

0 ⇔ 0 dB
1 ⇔ 3 dB
2 ⇔ 6 dB
3 ⇔ 9 dB
4 ⇔ 12 dB
5 ⇔ 15 dB
6 ⇔ 18 dB
7 ⇔ 21 dB

ROW 02 : Line equalizer additional amplification at 3000 Hz

Value range: 0 - 3

0 ⇔ 0 dB
1 ⇔ 3 dB
2 ⇔ 6 dB
3 ⇔ 9 dB

Example:

Line attenuation is 12 dB at 1000 Hz and 15 dB at 3000 Hz.

Table	Row	Data	Comment
31	01	4	RX line attenuation = 12 dB.
31	02	1	Line equalizer = 12+3 dB at 3000 Hz

FOUR WIRE (AREA 1 TAB 30)

Value range: 0 - 1

ROW 01

1 = 4-wire connection to CU210.
0 = 2-wire connection to CU210.

This is applicable only for CU210, **not for CU200**. In CU200 the choice between 2 and 4-wire connection is done by hardware straps, see installation notes.
Note that it is the physical connection to the CU210 that shall be given here, not necessary the connection to LP200/210. It is possible, in a system with many CU210s, to have a 2-wire connection between the site and LP200/210, but a four 4-wire connection between the CU210s on the site.
In this case this parameter shall be set to 1 for the CU210s not directly connected to the LP200/210, and set to 0 for the CU210 directly connected to the LP200/210.

AREA 2 of EEPROM

GENERAL FLAG (AREA 2 TAB 01)

ROW 01 : Repeater traffic enabled as default (at start-up)
Value range: 0 - 1

0 = Repeater traffic disabled as default
1 = Repeater traffic enabled as default

ROW 02 : BFS function flag (only LP210)
Value range: 0 - 1

0 = The LP is not in use in a BFS system
1 = The LP is in use in a BFS system

FOUR WIRE (AREA 2 TAB 02)

Value range : 0-1, Default 0.

0 = 2-wire connection to CUs
1 = 4-wire connection to CUs

NOTE: Hardware straps must be changed according to this set-up. See installation note.

Example:
2-wire connection is used.

Table	Row	Data	Comment
02	01	00	2-wire connection

MAX CU OT CHANNELS (AREA 2 TAB 03)

Value range: 0-F, Default 2

Defines the maximum number of channels to be scanned to stop for squelch, (Open Traffic), for each individual CU.

Example:
Max. two open traffic channels for each CU.

Table	Row	Data	Comment
03	01	02	Max. two open traffic channels

MAX TOT OT CHANNELS (AREA 2 TAB 04)

Value range: 0-F, Default 3

Defines the maximum of channels to be scanned to stop for squelch, (Open Traffic), for all CUs together.

Example:
Max. three open traffic channels totally.

Table	Row	Data	Comment
04	01	03	Max. three open traffic channels

REAL CHANNEL (AREA 2 TAB 05)

ROW 01 - ROW 99 :
Value range low nibble: 0-F, default 0
Value range high nibble: 0-9, default 0

Table converting Route numbers to repeater code + Channel, Route number is equal to ROW number.
Low nibble defines channel number, (0 = no channel).
High nibble defines repeater-code, (0 = no repeater-code).

Example:
Route 01 shall be channel 1, no repeater start.
Route 17 shall be channel 10, repeater start 7.
Route 21 shall be channel 1, repeater start 2.

Table	Row	Data	Comment
05	01	01	Channel 1, no repeater start
05	17	7A	Channel 10, repeater start 7
05	21	21	Channel 1, repeater start 2

RADIO (AREA 2 TAB 06)

Value range: 6-7, Default 6

Specifies which radio-interface to use:
6 = F600
7 = F700
(The interfaces are now identical)

Example:
Radio F600 shall be used

Table	Row	Data	Comment
06	01	6	Radio F600

RADIO RX (AREA 2 TAB 07)

Value range: 0-FF

One ROW for each channel specifies the 8 bit pattern output to the radio to select the channel for receiving.
Bit set = value 1 represents high level, bit clear = value 0 represents low level (0 V).
(The PTT (S/M) is not affected by this programming)

Example:

Eight channels exist.
For channel 1, bit 0 should be set, the rest cleared.
For channel 2, bit 1 should be set, the rest cleared.
For channel 3, bit 2 should be set, the rest cleared.
For channel 4, bit 3 should be set, the rest cleared.
For channel 5, bit 4 should be set, the rest cleared.
For channel 6, bit 5 should be set, the rest cleared.
For channel 7, bit 6 should be set, the rest cleared.
For channel 8, bit 7 should be set, the rest cleared.

Table	Row	Data	Comment
07	01	01	Bit 0 set in byte for channel 1
07	02	02	Bit 1 set in byte for channel 2
07	03	04	Bit 2 set in byte for channel 3
07	04	08	Bit 3 set in byte for channel 4
07	05	10	Bit 4 set in byte for channel 5
07	06	20	Bit 5 set in byte for channel 6
07	07	40	Bit 6 set in byte for channel 7
07	08	80	Bit 7 set in byte for channel 8

Since only eight channels exist, channels 9-15 is disabled in CHANNEL INFO, the programming of ROW 9 - ROW 15 doesn't matter.

RADIO TX (AREA 2 TAB 08)

Value range: 0-FF

One ROW for each channel specifies the 8 bit pattern output to the radio to select the channel for transmitting.
Bit set = value 1 represents high level, bit clear = value 0 represents low level (0 V).
(The PTT (S/M) is not affected by this programming)

Example:

Eight channels exist.
For channel 1, bit 0 should be set, the rest cleared.
For channel 2, bit 1 should be set, the rest cleared.
For channel 3, bit 2 should be set, the rest cleared.
For channel 4, bit 3 should be set, the rest cleared.
For channel 5, bit 4 should be set, the rest cleared.
For channel 6, bit 5 should be set, the rest cleared.
For channel 7, bit 6 should be set, the rest cleared.
For channel 8, bit 7 should be set, the rest cleared.

Table	Row	Data	Comment
08	01	01	Bit 0 set in byte for channel 1
08	02	02	Bit 1 set in byte for channel 2
08	03	04	Bit 2 set in byte for channel 3
08	04	08	Bit 3 set in byte for channel 4
08	05	10	Bit 4 set in byte for channel 5
08	06	20	Bit 5 set in byte for channel 6
08	07	40	Bit 6 set in byte for channel 7
08	08	80	Bit 7 set in byte for channel 8

Since only eight channels exist, channels 9-15 are disabled in CHANNEL INFO, the programming of ROW 9 - ROW 15 doesn't matter.

CHANNEL INFO (AREA 2 TAB 9 - 23)

One table for each channel:
ROW 01: Exist
Value range: 0-1
0 = The channel does not exist.
1 = The channel exists.
ROW 02: Tone scanned
Value range: 0-1
0 = The channel is not tone-scanned.
1 = The channel is included in tone scanning.
ROW 03: Duplex
Value range: 0-1
0 = The radio works at simplex at the channel.
1 = The radio works at duplex at the channel.
ROW 04: Repeater traffic
Value range: 0-1
0 = The radio is not enabled for repeater at channel.
1 = The radio allowed as repeater at the channel.
ROW 05: Open traffic
Value range: 0-1
0 = The radio is not enabled for Open Traffic at channel.
1 = The radio allowed for Open Traffic at channel.
ROW 06: Signal system A
Value range: 0-1
0 = Signalling at channel follows system C.
1 = Signalling at channel follows system A.
ROW 07: Short ack accepted
Value range: 0-1, don't care if system A selected
0 = TSTAT_2 telegram must be received in handshaking.
1 = RCPTCALL_ACK accepted instead of TSTAT_2 telegram when handshaking a call to a mobile.
ROW 08: Ack required
Value range: 0-1
0 = No RCPTCALL_ACK needed after a transmitted OCALLINDb.
1 = RCPTCALL_ACK needed after a transmitted OCALLINDb.

ROW 09: Receive DISCON

Value range: 0-1
0 = Never disconnect when received DISCON telegram.
1 = Disconnect when received DISCON telegram as B-station.

ROW 10: Group repeater
Value range: 0-1
0 = Repeater is never started on outgoing group calls on this channel.
1 = Repeater is started on outgoing group calls on this channel if repeater function isn't manually disabled (by pressing |Repeater| |*|) no specific channel is selected.

ROW 11: Auto select
Value range: 0-1
0 = The channel not autoselected for tone-calls.
1 = Channel usable for transmitting a tone-call when no specific channel is selected.

ROW 12: Squelch controlled repeater
Value range: 0-1
0 = Only tone-started repeater at channel.
1 = Squelch controlled repeater at channel while isolated base if Open Traffic is set to 1 as well.

ROW 13: Five tone repeater
Value range: 0-1
0 = Transmit 2-tone repeater-start.
1 = Transmit 5-tone repeater-start.

ROW 14: BFS channel
Value range: 0-1
0 = This is not a BFS channel.
1 = This is a BFS channel, used only in exception cases.

ROW 15: Xtal frequency skew
Value range 0-1
0 = nominal CPU crystal frequency used when having stopped on this channel.
1 = crystal frequency skewed a bit when having stopped on this channel.

ROW 16: Not used now

Example:

Channel 1 - 6:
Exist, tone scanned, duplex, enabled for repeater operation, enabled for open traffic, signal system C is used for outgoing calls, RCPTCALL_ACK accepted when waiting for TSTAT_2, able to receive DISCON when B station, start repeater on outgoing group calls, auto selected for outgoing tone calls.

Channel 7:
Exist, tone scanned, duplex, disabled for repeater operation, enabled for open traffic, signal system
A is used for outgoing calls, does not require RCPTCALL_ACK as acknowledge on outgoing calls, able to receive DISCON when B station, auto selected for outgoing tone calls, squelch controlled repeater on this channel when isolated base.
Furthermore, the crystal frequency disturbs the traffic on this channel, so it must be a little bit skewed.

Channel 8-15:
Don't exist.
For channel 1-6 ROWs 1,2,3,4,5,7,9,10,11 should be set to 1.
For channel 7 ROWs 1,2,3,5,6,9,11,12,15 should be set to 1.
For channel 8-15, ROW 1 should be set to 0.

Table	Row	Data	Comment
09-14	01	01	Exist
09-14	02	01	Tone scanned

09-14	03	01	Duplex
09-14	04	01	Repeater enable
09-14	05	01	Open traffic enable
09-14	06	00	Signal system C for outgoing calls
09-14	07	01	Accept RCPTCALL_ACK as acknowledge
09-14	08	00	Doesn't matter since signal system C is used
09-14	09	01	Receive DISCON when B station
09-14	10	01	Start repeater on outgoing group calls
09-14	11	01	Auto selected for outgoing calls
09-14	12	00	Not squelch controlled repeater when isolated
09-14	13	00	Two tone repeater start, TX RELa telegram used
09-14	14	09	Not used
09-14	15	00	No frequency skew.
09-14	16	00	Not used
15	01	01	Exist
15	02	01	Tone scanned
15	03	01	Duplex
15	04	00	Repeater disable
15	05	01	Open traffic enable
15	06	01	Signal system A for outgoing calls
15	07	00	Doesn't matter since signal system A is used
15	08	00	Don't require RCPTCALL_ACK as acknowledge
15	09	01	Receive DISCON when B station
15	10	00	Don't start repeater outgoing group calls
15	11	01	Auto selected for outgoing calls
15	12	01	Squelch controlled repeater when isolated base
15	13	00	Two tone repeater start
15	14	00	Data traffic disabled
09-14	14	09	Not used
09-14	15	00	No frequency skew.
09-14	16	00	Not used
16-23	00	00	Doesn't exist

LF LOST TO WARN TIME (AREA 2 TAB 24)

Value range: 00-FFh, Default 14h (= 20)
Timebase: 1 s/10 s

Specifies the delay from the last occurrence of lost squelch (from radio) or lost LF detect (from CUs), until the WARNing tone starts to sound. (The WARN tone is fixed to 10 beeps in length.)

Example:
After 20 seconds of silence, i.e. no LF or squelch, the warning tone shall start beeping. After 10 beeps (normally 10 seconds) the call is disconnected.

Table	Row	Data	Comment
24	01	14	20 seconds until beeping starts

MAX CONV TIME (AREA 2 TAB 25)

Value range: 00-FFh, Default 9Eh (= 30+80h = 300 s = 5 min)
Timebase: 1 s/10 s

Max. conversation time.

Example:
Maximum conversation time shall be five minutes.

Table	Row	Data	Comment
25	01	9E	9Eh = 80h+30 = 30*10 s = 300 s = 5 min

MAX TX TIME (AREA 2 TAB 26)

Value range: 00-FFh, Default 78h (= 120 = 120 s)
Timebase: 1 s/10 s

Max. continuos transmission time from a CU by pressing PTT.

Example:
Maximum time that PTT is allowed to be pressed, shall be 2 minutes.

Table	Row	Data	Comment
26	01	78	78h = 120 = 120 s

INC CALL WAIT TIME (AREA 2 TAB 27)

Value range: 00-FFh, Default 1Eh (= 30 s)
Timebase: 1 s/10 s

Max. time to wait for the CU operator to answer an incoming call.

Example:
After 30 seconds with no answer from the operator, the call is disconnected.

Table	Row	Data	Comment
27	01	1E	1Eh = 30 s

MAX LISTEN CH TIME (AREA 2 TAB 28)

Value range: 00-FFh, Default FFh
Timebase: 1 s/10 s

= 0-FEh: Normal timer concept.
= FFh: Unlimited time

Max. time for listening at a channel from a CU. Selected by |Listen| key.

Example:
Listen can be done for unlimited time.

Table	Row	Data	Comment
28	01	FF	Forever

MAX REPEAT TIME (AREA 2 TAB 29)

Value range: 00-FFh, Default 9Eh (= 30+80h = 300 s = 5 min)
Timebase: 1 s/10 s

Max. time for repeater traffic started by tone-call.

Example:
Max. time for a mobile-mobile call shall be five minutes.

Table	Row	Data	Comment
29	01	9E	9Eh = 80h + 30 = 30*10 s = 300 s = 5 min

SQ HANG TIME (AREA 2 TAB 30)

Value range: 00-FFh, Default 05h
Timebase: 1 s/10 s

Hang time after lost squelch while base is acting as squelch controlled repeater.

Example:
The radio shall continue it's scanning after squelch has been lost for five seconds.

Table	Row	Data	Comment
30	01	5	5 seconds

SCAN TONE TIME (AREA 2 TAB 31)

Value range: 19h-FFh, Default 50h (= 80 ms)
Timebase: 1 ms/10 ms

Tone-decoders time to stop radio at each channel during tone-scanning.
The value should minimum be set to the time the radio receiver needs to stabilize after a channel change, with additional 25 ms.

The number of channels, which can be scanned, is primary limited by this value.

Example:
The scanning is stopped 80 ms on each channel to check for tone detects.

Table	Row	Data	Comment
31	01	50	50h = 80 ms

OT SCAN DEBOUNCE TIME (AREA 2 TAB 32)

Value range: 00-FFh, Default 32h (= 50 ms)
Timebase: 1 ms/10 ms

Open traffic controller’s time to stop radio at each of selected open-traffic channels to check for squelch.
The value should minimum be set to the time the radio receiver needs to guarantee proper level of the squelch signal after a channel change.
If this delay is long, it could influence in the number of channels, which can be tone-scanned, especially if many channels could be selected for open traffic simultaneously.

Example:
The scanning is stopped 50 ms on each channel to check for squelch detects.

Table	Row	Data	Comment
32	01	32	32H = 50 ms

SQ DEBOUNCE ON (AREA 2 TAB 33)

Value range: 00-FFh, Default 05
Timebase: 1 ms/10 ms

After first detecting squelch at an open-traffic channel it has to stay active this time, until accepted.

Example:
Squelch has to be detected for at least five milliseconds before starting open traffic and stopping tone scanning.

Table	Row	Data	Comment
33	01	5	5 ms

SQ DEBOUNCE OFF (AREA 2 TAB 34)

Value range: 00-FFh, Default 05
Timebase: 1 ms/10 ms

After stopped for squelch and accepted open traffic at a channel, the tone-scanner will restart in background if squelch is lost and not transmitting going on, (squelch on other open traffic channels is ignored).
This value specifies the delay from loss of squelch to the tone-scanning restarts.

Example:
After squelch has been lost for five milliseconds, tone scanning is restarted, but the system remains in open traffic state.

Table	Row	Data	Comment
34	01	5	5 ms

OT SQ HANG TIME (AREA 2 TAB 35)

Value range: 00-FFh, Default 28h (= 40 = 4 s)
Timebase: 100 ms/1 s

After stopped for squelch and accepted open traffic at a channel, the tone-scanner will restart in background if squelch is lost and not transmitting going on, (squelch on other open traffic channels is ignored).
This value specifies the delay from loss of squelch to the open traffic state in the CU(s) is released and squelch-check on other channels restarts.

Example:
After squelch has been lost for four seconds, open traffic state is finally left.

Table	Row	Data	Comment
35	01	28	28h = 40 * 100 ms = 4 seconds

The rest of AREA 2 is of any importance only if a CU210 with ADV functions is used in the system, i.e., the system is connected to the public telephone network or a local telephone exchange.

DTMF ON TIME (AREA 2 TAB 36)

Value range: 00-FFh, Default 64H (= 100 = 100 ms)
Timebase: 1 ms/10 ms

DTMF tone on time when dialling with DTMF tones.

Example:
The DTMF tone shall be 100 ms long.

Table	Row	Data	Comment
36	01	64	100 ms

DTMF OFF TIME (AREA 2 TAB 37)

Value range: 00-FFh, Default 64h (= 100 = 100 ms)
Timebase: 1 ms/10 ms

DTMF tone off time when dialling with DTMF tones.

Example:
The pause between the DTMF tones shall be 100 ms long.

Table	Row	Data	Comment
37	01	64	100 ms

PULSE OC TIME (AREA 2 TAB 38)

Value range: 00-FFh, Default 3Ch (= 60 = 60 ms)
Timebase: 1 ms/10 ms

Open circuit time when dialling with pulses.

Example:
The open circuit time shall be 60 ms.

Table	Row	Data	Comment
38	01	3C	60 ms

PULSE SC TIME (AREA 2 TAB 39)

Value range: 00-FFh, Default 28h (= 40 = 40 ms)
Timebase: 1 ms/10 ms

Short circuit time when dialling with pulses.

Example:
The short circuit time shall be 40 ms.

Table	Row	Data	Comment
39	01	28	40 ms

PULSE PAUSE TIME (AREA 2 TAB 40)

Value range: 00-FFh, Default C1h (= 65 + 80h = 650 ms)
Timebase: 1 ms/10 ms

Pause between digits when dialling with pulses.

Example:
The pause time shall be 650 ms.

Table	Row	Data	Comment
40	01	C1	650 ms

MAX RING BUSY TONES (AREA 2 TAB 41)

Value range: 00-FFh, Default 0Ah (= 10)

The maximum number of consecutive ring- or busy-tones that may be detected when a telephone call is connected.

Example:
After ten ring- or busy-tones, the call shall be disconnected.

Table	Row	Data	Comment
41	01	0A	10 ring- or busy-tones

RING TONE MIN TIME (AREA 2 TAB 42)

Value range: 00-FFh, Default 50h (= 80 = 800 ms)
Timebase: 10 ms/100 ms

The minimum on-time for the ring tone.

RING TONE EXTRA TIME (AREA 2 TAB 43)

Value range: 00-FFh, Default 94h (= 20 + 80h = 2 s)
Timebase: 10 ms/100 ms
The maximum on-time for the ring tone after RING TONE MIN TIME has expired.

RING TONE OFF MIN TIME (AREA 2 TAB 44)

Value range: 00-FFh, Default A8h (= 40 + 80h = 4 s)
Timebase: 10 ms/100 ms

The minimum off-time for the ring tone.

RING TONE OFF EXTRA (AREA 2 TAB 45)

Value range: 00-FFh, Default E4h (= 100 + 80h = 10 s)
Timebase: 10 ms/100 ms

The maximum off time for the ring tone after RING TONE OFF MIN TIME has expired.

Example:

The ring tone must be between 0.8 and 2.8 seconds long.
The pause between the ring tones must be between 4 and 14 seconds.

Table	Row	Data	Comment
42	01	50	Min 800 ms
43	01	94	Max. 800 ms + 2 s = 2.8 s
44	01	A8	Min 4 s
45	01	E4	Max. 4 s + 10 s = 14 s

BUSY TONE MIN TIME (AREA 2 TAB 46)

Value range: 00-FFh, Default 08h (= 8 = 80 ms)
Timebase: 10 ms/100 ms

The minimum on-time for the busy tone.

BUSY TONE EXTRA TIME (AREA 2 TAB 47)

Value range: 00-FFh, Default 20h (= 320 ms)
Timebase: 10 ms/100 ms

The maximum on-time for the busy tone after BUSY TONE MIN TIME has expired.

BUSY TONE OFF MIN TIME (AREA 2 TAB 48)

Value range: 00-FFh, Default 08h (= 8 = 80 ms)
Timebase: 10 ms/100 ms

The minimum off-time for the busy tone.

BUSY TONE OFF EXTRA (AREA 2 TAB 49)

Value range: 00-FFh, Default 28h (= 400 ms)
Timebase: 10 ms/100 ms

The maximum off-time for the busy tone after BUSY TONE OFF MIN TIME has expired.

Example:

The busy tone must be between 80 and 400 ms long. The pause between the busy tones must be between 80 and 480 ms.

Table	Row	Data	Comment
46	01	08	Min 80 ms
47	01	20	Max. 80 ms + 320 ms = 400 ms
48	01	A8	Min 80 ms
49	01	E4	Max. 80 ms + 400 ms = 480 ms

RING SIGNALS LIMIT (AREA 2 TAB 50)

Value range: 00-FFh, Default 1

This is the number of ring signals that need to be detected before the call is answered by lifting the phone off the hook.

Example:

After one ring signal the call shall be answered.

Table	Row	Data	Comment
50	01	01	Answer after one ring signal

RING DECECT MIN TIME (AREA 2 TAB 51)

Value range: 00-FFh, Default 1Ch (= 28 = 280 ms)
Timebase: 10 ms/100 ms

The minimum on-time for the ring detects.

RING DETECT EXTRA TIME (AREA 2 TAB 52)

Value range: 00-FFh, Default 94h (= 20 + 80h = 2 s)
Timebase: 10 ms/100 ms

The maximum on-time for the ring detect after RING DETECT MIN TIME has expired.

RING DETECT OF MIN TIME (AREA 2 TAB 53)

The minimum off time for the ring detects.

Value range: 00-FFh, Default 9Eh (= 30 + 80h = 3 s)
Time base: 10 ms/100 ms

RING DETECT OF EXTRA (AREA 2 TAB 54)

Value range: 00-FFh, Default C6h (= 70 + 80H = 7 s)
Timebase: 10 ms/100 ms

The maximum off time for the ring detect after RING DETECT OFF MIN TIME has expired.

Example:
The ring detect must be between 0.28 and 2.28 seconds long.
The pause between the ring detects must be between 3 and 10 seconds.

Table	Row	Data	Comment
51	01	1C	Min 280 ms
52	01	94	Max. 280 ms + 2 s = 2.28 s
53	01	9E	Min 3 s
54	01	C6	Max. 3 s + 7 s = 10 s

DIAL TONE MIN TIME (AREA 2 TAB 55)

Value range: 00-FFh, Default 94h (= 20 + 80H = 2 s)
Timebase: 10 ms/100 ms

The minimum length of a dial tone.

Example:
The length of the dial tone shall be at least 2 s.

Table	Row	Data	Comment
55	01	94	2 s

DIAL TONE DEB OFF TIME (AREA 2 TAB 56)

Value range: 00-FFh, Default 50h (= 80 ms)
Timebase: 1 ms/10 ms

The maximum length of a pause in the middle of a dial tone.

Example:
The maximum length of a pause in the middle of a dial tone shall be set to 80 ms.

Table	Row	Data	Comment
56	01	50	80 ms

LINE VOICE DEB O TIME (AREA 2 TAB 57)

Value range: 00-FFh, Default 2 (= 20 ms)
Timebase: 10 ms/100 ms

The minimum continuous on-time for the line-squelch detector for the radio LF in CU210.

Example:
Line-squelch shall go on after 20 ms with sound.

Table	Row	Data	Comment
57	01	2	20 ms

LINE VOICE DEB OFF TIME (AREA 2 TAB 58)

Value range: 00-FFh, Default 64 (= 1 s)
Timebase: 10 ms/100 ms

The minimum continuous off-time for the line-squelch detector for the radio LF in CU210.

Example:
Line-squelch shall go off after 1 s with no sound.

Table	Row	Data	Comment
58	01	64	1 s

TPH VOICE DEB ON TIME (AREA 2 TAB 59)

Value range: 00-FFh, Default 2 (= 20 ms)
Timebase: 10 ms/100 ms

The minimum continuous on-time for the line-squelch detector for the telephone LF in CU210.

Example:
Line-squelch shall go on after 20 ms with sound.

Table	Row	Data	Comment
59	01	2	20 ms

TPH VOICE DEB OFF TIME (AREA 2 TAB 60)

Value range: 00-FFh, Default 64 (= 1 s)
Timebase: 10 ms/100 ms

The minimum continuous off-time for the line-squelch detector for the telephone LF in CU210.

Example:
Line-squelch shall go off after 1 s with no sound.

Table	Row	Data	Comment
60	01	64	1 s

RX MAX TIME (AREA 2 TAB 61)

Value range: 00-FFh, Default 94h (20 + 80h = 20 s)
Timebase: 100 ms/1 s

The maximum time for continuos radio LF when simplex channel or two-wire connection and speech switching with VOX in CU210.
After this time, all LF is shut off for RX SHUT OFF TIME and the telephone LF is given a chance.

Example:
After 20 seconds of continuous radio LF, the LF is temporarily shut off.

Table	Row	Data	Comment
61	01	94	20 s

TX MAX TIME (AREA 2 TAB 62)

Value range: 00-FFh, Default 94h (20 + 80h = 20 s)
Timebase: 100 ms/1 s

The maximum time for continuos telephone LF when simplex channel or two-wire connection and speech switching with VOX in CU210.
After this time, all LF is shut off for TX SHUT OFF TIME and the radio LF is given a chance.

Example:
After 20 seconds of continuous telephone LF, the LF is temporarily shut off.

Table	Row	Data	Comment
62	01	94	20 s

RX SHUT OFF TIME (AREA 2 TAB 63)

Value range: 00-FFh, Default 3 (= 300 ms)
Timebase: 100 ms/1 s

The time the radio LF is forced off after RX MAX TIME has expired.

Example:
After radio LF has been continuously on for RX MAX TIME, the LF is temporarily shut off for 300 ms.

Table	Row	Data	Comment
63	01	03	300 ms

TX SHUT OFF TIME (AREA 2 TAB 64)

Value range: 00-FFh, Default 3 (= 300 ms)
Timebase: 100 ms/1 s

The time the telephone LF is forced off after TX MAX TIME has expired.

Example:
After telephone LF has been continuously on for TX MAX TIME, the LF is temporarily shut off for 300 ms.

Table	Row	Data	Comment
64	01	03	300 ms

RX DEB OFF TIME (AREA 2 TAB 65)

Value range: 00-FFh, Default 2 (= 200 ms)
Timebase: 100 ms/1 s

The time after the radio LF has silenced until it is regarded as off when speech switching with VOX is used.

Example:
After radio LF has been gone for 200 ms, radio LF shall be shut off and both telephone and radio voice detect shall be treated equally.

Table	Row	Data	Comment
65	01	02	200 ms

TX DEB OFF TIME (AREA 2 TAB 66)

Value range: 00-FFh, Default 4 (= 400 ms)
Timebase: 100 ms/1 s

The time after the telephone LF has silenced until it is regarded as off when speech switching with VOX is used. From V3.1 of CU210 a 256 ms delay of the LF from the telephone line has been added,
This time must be compensated for in this parameter. Setting it to 400 ms will in practice mean 144 ms.

Example:
After telephone LF has been gone for 400 ms, telephone LF shall be shut off and both telephone and radio voice detect shall be treated equally.

Table	Row	Data	Comment
66	01	04	400 ms

MAX DIAL TONE WAIT TIME (AREA 2 TAB 67)

Value range: 00-FFh, Default 32h (= 50 = 5 s)
Timebase: 100 ms/1 s

The maximum time after the hook has been lifted or having reached a 'wait for dial tone-code in a pre-programmed telephone number, until the dial tone must have been detected.

Example:
Wait a maximum of 5 seconds for the dial tone.

Table	Row	Data	Comment
67	01	32	5 s

BLOCK TONE ON TIME (AREA 2 TAB 68)

Value range: 00-FFh, Default 19h (= 25 = 250 ms)
Timebase: 10 ms/100 ms

The length of each of the five block tones, transmitted to the telephone line before hanging up.

BLOCK TONE OFF TIME (AREA 2 TAB 69)

Value range: 00-FFh, Default 4Bh (= 75 = 750 ms)
Timebase: 10 ms/100 ms

The length of the pause between each of the five block tones, transmitted to the telephone line before hanging up.

Example:
The block tone shall consist of the sequence:
250 ms on - 750 ms off - 250 ms on etc.

Table	Row	Data	Comment
68	01	19	250 ms
69	01	4B	750 ms

ERROR TONE ON TIME (AREA 2 TAB 70)

Value range: 00-FFh, Default 1E (= 30 = 300 ms)
Timebase: 10 ms/100 ms

The length of the error tone, transmitted to the telephone line upon erroneous dialling or a failed WHC-call.

Example:
The length of the error tone shall be 300 ms.

Table	Row	Data	Comment
70	01	1E	300 ms

ANSWER TONE ON TIME (AREA 2 TAB 71)

Value range: 00-FFh, Default 64 (= 100 = 1 s)
Timebase: 10 ms/100 ms

The length of the answer tone, transmitted to the telephone line when answering an incoming telephone call and a telephone to mobile call is allowed.

Example:
The length of the error tone shall be 1 s.

Table	Row	Data	Comment
71	01	64	1 s

The following four parameters describe DTMF tones used for different functions in telephone-mobile calls. DTMF tone 0-D is programmed with the corresponding hexadecimal codes 00-0D. DTMF * is programmed by the hexadecimal code 0E. DTMF # is programmed by the hexadecimal code 0F.

PTT ON DTMF CODE (AREA 2 TAB 72)

Value range: 00-0Fh, Default 07h

The DTMF tone used for PTT ON when a telephone-mobile call is connected on a simplex channel or on a two wire connection between CU210 and LP200/210, and the flag PTT VOX CONTROL (Area 1 TAB 21 ROW 03) is set to 0.

Example:

DTMF digit 7 shall be used for PTT ON.

Table	Row	Data	Comment
72	01	07	DTMF digit 7

PTT OFF DTMF CODE (AREA 2 TAB 73)

Value range: 00-0Fh, Default 08h

The DTMF tone used for PTT OFF when a telephone-mobile call is connected on a simplex channel or on a two wire connection between CU210 and LP200/210, and the flag PTT VOX CONTROL (Area 1 TAB 21 ROW 03) is set to 0.

Example:

DTMF digit 8 shall be used for PTT OFF.

Table	Row	Data	Comment
73	01	08	DTMF digit 8

WHC DTMF CODE (AREA 2 TAB 74)

Value range: 00-0Fh, Default 0Eh

The DTMF tone used for transmitting a WHC-telegram to the mobile when connected in a telephone-mobile call with the telephone as A-subscriber.

Example:

DTMF digit * shall be used for WHC.

Table	Row	Data	Comment
74	01	0E	DTMF digit *

CLD DTMF CODE (AREA 2 TAB 75)

Value range: 00-0Fh, Default 0Fh

The DTMF tone used for disconnecting the call when connected in a telephone-mobile call.

Example:
DTMF digit # shall be used for disconnect.

Table	Row	Data	Comment
75	01	0F	DTMF digit #

LAC NO 1 (AREA 2 TAB 76)

Value range: 00-09h = DTMF digits 0 through 9
- 0Ah = Wait for dial tone
- 0Bh = Pause. The next digit determines the pause length in seconds
- 0Ch = DTMF *
- 0Dh = DTMF #
- 0Eh = Not used
- 0Fh = End of telephone number

Default 0Fh in all 12 ROWs

This is the first telephone number to dial when connecting an alarm call to LAC. If no answer is received after having dialled this number two times, LAC NO 2 is dialled the following two times.

Example 1:
The telephone number shall be:
0 - wait for dial tone - 08 12 34 56

Table	Row	Data	Comment
76	01	00	DTMF digit 0
76	02	0A	Wait for dial tone
76	03	00	DTMF digit 0
76	04	08	DTMF digit 8
76	05	01	DTMF digit 1
76	06	02	DTMF digit 2
76	07	03	DTMF digit 3
76	08	04	DTMF digit 4
76	09	05	DTMF digit 5
76	10	06	DTMF digit 6
76	11	0F	End of telephone number

Example 2:

The telephone number shall be:
0 - 2 seconds pause - 90 510

Table	Row	Data	Comment
76	01	00	DTMF digit 0
76	02	0B	Pause
76	03	02	for 2 seconds
76	04	09	DTMF digit 9
76	05	00	DTMF digit 0
76	06	05	DTMF digit 5
76	07	01	DTMF digit 1
76	08	00	DTMF digit 0
76	09	0F	End of telephone number

Example 3:

The telephone number shall be disabled.

Table	Row	Data	Comment
76	01	0F	End of telephone number

LAC NO 2 (AREA 2 TAB 77)

Value range: 00-09h = DTMF digits 0 through 9
- 0Ah = Wait for dial tone
- 0Bh = Pause. The next digit determines the pause length in seconds
- 0Ch = DTMF *
- 0Dh = DTMF #
- 0Eh = Not used
- 0Fh = End of telephone number

Default 0Fh in all ROWs

This is the telephone number to dial when connecting an alarm call to LAC and LAC NO 1 has failed two times. If no answer is received after having dialled this number two times, the call is disconnected.

Example:

The telephone number shall be disabled.

Table	Row	Data	Comment
77	01	0F	End of telephone number

LAC 1 TIME (AREA 2 TAB 78)

Value range: 00-FFh, Default 9Eh (= 30 + 80h = 30 s)
Timebase: 100 ms/1 s

The maximum time after having dialled the telephone number until detecting a ring tone or an answer from LAC with a DTMF B.

Example:
Wait for a maximum time of 30 seconds for the ring tone or the DTMF B after having dialled the telephone number.

Table	Row	Data	Comment
78	01	9E	30 seconds

LAC 2 TIME (AREA 2 TAB 79)

Value range: 00-FFh, Default 9Eh (= 30 + 80h = 30 s)
Timebase: 100 ms/1 s

The maximum time after having detected the first ring tone until an answer from LAC with a DTMF B is received.

Example:
Wait for a maximum time of 30 seconds after the first ring tone for the DTMF B.

Table	Row	Data	Comment
79	01	9E	30 seconds

LAC 3 TIME (AREA 2 TAB 80)

Value range: 00-FFh, Default 9Eh (= 30 + 80h = 30 s)
Timebase: 100 ms/1 s

The maximum time after having detected the two DTMF B-tones until detecting the first DTMF A.

Example:
Wait for a maximum time of 30 seconds after the two DTMF B-tones until the first DTMF A.

Table	Row	Data	Comment
80	01	9E	30 seconds

DIAL MAX TIME (AREA 2 TAB 81)

Value range: 00-FFh, Default 32h (= 50 = 5 s)
Timebase: 100 ms/1 s

The maximum time between DTMF digits when dialling access password, function code, route and address or WHC address.

Example:
The maximum time between the dialled DTMF digits shall be 5 seconds.

Table	Row	Data	Comment
81	01	32	5 seconds

ACCESS PASSW (AREA 2 TAB 82)

Value range: 00-09h, 0Fh in each ROW
Default: ROW 01 = 01h
ROW 02 = 02h
ROW 03 = 03h
ROW 04 = 04h
ROW 05 = 05h

The access password that must be dialled to gain access to the CU210 from a telephone. An 0Fh in ROW01 disables the password, i.e., no access password will be needed to gain access, an 0Fh in ROW02 makes the password consist of one digit, an 0Fh in ROW03 makes the password consist of two digits, and so on.

Example:
The access password shall be 1 2 3 4 5.

Table	Row	Data	Comment
82	01	01	1
82	02	02	2
82	03	03	3
82	04	04	4
82	05	05	5

AUTOMATIC CALL (AREA 2 TAB 83)

Value range: 00-09h or 0Fh in each ROW
Default 0Fh in all ROWs

If access password is enabled and no access password is dialled or no function code is dialled, an automatic call is transmitted if enabled. The automatic call can be a group tone call or a normal tone call.
The meaning of the ROWs in the AUTOMATIC CALL TAB are:

ROW 01: First route digit
ROW 02: Second route digit
ROW 03: First address digit

ROW 04: Second address digit
ROW 05: Third address digit
ROW 06: Fourth address digit
ROW 07: Fifth address digit
ROW 08: Call type
= 0: group call
> 0: normal call

If ROW 01 and ROW 02 are set to 0Fh, the channel is auto-selected. If ROW 03 and ROW 04 are set to 0Fh, the automatic call is disabled.

Example 1:

Send the group tone call 0 0 0 0 0 as automatic call on an auto-selected channel.

Table	Row	Data	Comment
83	01	0F	
83	02	0F	Auto-selected channel
83	03	00	
83	04	00	
83	05	00	
83	06	00	
83	07	00	
83	08	00	Transmit group tone call 0 0 0 0 0

Example 2:

Send the normal tone call 1 2 3 4 5 as automatic call on route 66.

Table	Row	Data	Comment
83	01	06	
83	02	06	Route 66
83	03	01	
83	04	02	
83	05	03	
83	06	04	
83	07	05	
83	08	01	Transmit normal tone call 1 2 3 4 5

Example 3:

Automatic call shall be disabled.

Table	Row	Data	Comment
83	03	0F	
83	04	0F	Disabled

TEL DIGITS 0 (AREA 2 TAB 84)

ROW 01-ROW 02:
Route
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit
Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 0 has been dialled. The transmitted tone call will be a group call.

Example (default) :
When function code 0 has been dialled, seven DTMF digits shall be dialled, two for the route and five for the address of the tone call.

Table	Row	Data	Comment
84	01	0E	Dial first route digit
84	02	0E	Dial second route digit
84	03	0E	Dial first tone call digit
84	04	0E	Dial second tone call digit
84	05	0E	Dial third tone call digit
84	06	0E	Dial fourth tone call digit
84	07	0E	Dial fifth tone call digit
84	08	07	Seven digits to dial

TEL DIGITS 1 (AREA 2 TAB 85)

ROW 01-ROW 02:
Route
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit
Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 1 has been dialled. The transmitted tone call will be a normal call.

Example (default) :
When function code 1 has been dialled, no more DTMF digits shall be dialled, and the tone call 1 2 3 4 5 shall be transmitted on route 12.

Table	Row	Data	Comment
85	01	01	First route digit = 1
85	02	02	Second route digit = 2
85	03	01	First tone call digit = 1
85	04	02	Second tone call digit = 2
85	05	03	Third tone call digit = 3
85	06	04	Fourth tone call digit = 4
85	07	05	Fifth tone call digit = 5
85	08	00	No digits to dial

TEL DIGITS 2 (AREA 2 TAB 86)

ROW 01-ROW 02:
Route
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit

Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 2 has been dialled. The transmitted tone call will be a normal call.

Example (default) :
When function code 2 has been dialled, the two digit route shall be dialled and the tone call 1 2 3 4 5 will be transmitted on that route.

Table	Row	Data	Comment
86	01	0E	Dial first route digit
86	02	0E	Dial second route digit
86	03	01	First tone call digit = 1
86	04	02	Second tone call digit = 2
86	05	03	Third tone call digit = 3
86	06	04	Fourth tone call digit = 4
86	07	05	Fifth tone call digit = 5
86	08	02	Two digits to dial

TEL DIGITS 3 (AREA 2 TAB 87)

ROW 01-ROW 02:
Route
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit
Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 3 has been dialled. The transmitted tone call will be a normal call.

Example (default) :
When function code 3 has been dialled, the two digit route and the last three digits of the tone call shall be dialled. The first and the second digits of the tone call are always 1 and 2.

Table	Row	Data	Comment
87	01	0E	Dial first route digit
87	02	0E	Dial second route digit
87	03	01	First tone call digit = 1
87	04	02	Second tone call digit = 2
87	05	0E	Dial third tone call digit
87	06	0E	Dial fourth tone call digit
87	07	0E	Dial fifth tone call digit
87	08	05	Five digits to dial

TEL DIGITS 4 (AREA 2 TAB 88)

ROW 01-ROW 02:
Route
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit
Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 4 has been dialled. The transmitted tone call will be a normal call.

Example (default) :
When function code 4 has been dialled, the two digit route and the first three digits of the tone call shall be dialled. The fourth and the fifth digits of the tone call are always 4 and 5.

Table	Row	Data	Comment
88	01	0E	Dial first route digit
88	02	0E	Dial second route digit
88	03	0E	Dial first tone call digit
88	04	0E	Dial second tone call digit
88	05	0E	Dial third tone call digit
88	06	04	Fourth tone call digit = 4
88	07	05	Fifth tone call digit = 5
88	08	05	Five digits to dial

TEL DIGITS 5 (AREA 2 TAB 89)

ROW 01-ROW 02:
Route.
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit.
Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial.
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 5 has been dialled. The transmitted tone call will be a normal call.

Example (default) :
When function code 5 has been dialled, the third and the fourth digits of the tone call shall be dialled. The route is always 12 and the first, second and fifth digits in the tone call are always 1, 2 and 5 respectively.

Table	Row	Data	Comment
89	01	01	First route digit = 1
89	02	02	Second route digit = 2
89	03	01	First tone call digit = 1
89	04	02	Second tone call digit = 2
89	05	0E	Dial third tone call digit
89	06	0E	Dial fourth tone call digit
89	07	05	Fifth tone call digit = 5
89	08	02	Two digits to dial

TEL DIGITS 6 (AREA 2 TAB 90)

ROW 01-ROW 02:
Route.
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit.
Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial.
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 6 has been dialled. The transmitted tone call will be a normal call.

Example (default) :
When function code 6 has been dialled, the five tones in the tone call shall be dialled.
The route is always 12.

Table	Row	Data	Comment
90	01	01	First route digit = 1
90	02	02	Second route digit = 2
90	03	0E	Dial first tone call digit
90	04	0E	Dial second tone call digit
90	05	0E	Dial third tone call digit
90	06	0E	Dial fourth tone call digit
90	07	0E	Dial fifth tone call digit
90	08	05	Five digits to dial

TEL DIGITS 7 (AREA 2 TAB 91)

ROW 01-ROW 02:

Route.
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit.

Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial.
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 7 has been dialled. The transmitted tone call will be a normal call.

Example (default) :
When function code 7 has been dialled, the five tones in the tone call shall be dialled.
The route is auto-selected.

Table	Row	Data	Comment
91	01	0F	
91	02	0F	Auto-selection of route
91	03	0E	Dial first tone call digit
91	04	0E	Dial second tone call digit
91	05	0E	Dial third tone call digit
91	06	0E	Dial fourth tone call digit
91	07	0E	Dial fifth tone call digit
91	08	05	Five digits to dial

TEL DIGITS 8 (AREA 2 TAB 92)

ROW 01-ROW 02:
Route.
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit.

Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:

Number of DTMF digits to dial.

Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 8 has been dialled. The transmitted tone call will be a normal call.

Example (default):
When function code 8 has been dialled, the second route digit and the third tone in the tone call shall be dialled. The first route digit is always 1 and the first, second fourth and fifth tones are always 1, 2, 4 and 5 respectively.

Table	Row	Data	Comment
92	01	01	First route digit = 1
92	02	0E	Dial second route digit
92	03	01	First tone call digit = 1
92	04	02	Second tone call digit = 2
92	05	0E	Dial third tone call digit
92	06	04	Fourth tone call digit = 4
92	07	05	Fifth tone call digit = 5
92	08	02	Two digits to dial

TEL DIGITS 9 (AREA 2 TAB 93)

ROW 01-ROW 02:
Route.
Value range:
00-09h = Route digits 0 through 9
0Eh = Reference to dialled DTMF digit
0Fh = In both ROW 01 and ROW 02 means auto selection of route.

ROW 03-ROW 07:
Tones to transmit.
Value range:
00-09h = Tones 0 through 9 in choose tone system
0Eh = Reference to dialled DTMF digit

ROW 08:
Number of DTMF digits to dial.
Value range: 00-07h

This TAB describes the transmitted tone call and the DTMF digits to dial when function code 8 has been dialled. The transmitted tone call will be a group call.

Example (default) :
When function code 9 has been dialled, the first route digit shall be dialled.
The second route digit is always 2 and the tone call digits are always are always 1, 2, 3, 4 and 5 respectively.

Table	Row	Data	Comment
93	01	0E	Dial first route digit
93	02	02	Second route digit = 2
93	03	01	First tone call digit = 1
93	04	02	Second tone call digit = 2
93	05	03	third tone call digit = 3
93	06	04	Fourth tone call digit = 4
93	07	05	Fifth tone call digit = 5
93	08	01	One digit to dial

PULSE TRANS TABLE (AREA 2 TAB 94)

Value range: 01-0Ah in each row.
Default: ROW 01 = 01h
ROW 02 = 02h
ROW 03 = 03h
ROW 04 = 04h
ROW 05 = 05h
ROW 06 = 06h
ROW 07 = 07h
ROW 08 = 08h
ROW 09 = 09h
ROW 10 = 0Ah (= 10)

This table determines how many pulses that shall be made for dialling each of the digits 0 through 9. That is of any importance only if the CU210 flag DTMF OUT (Area 1 TAB 21 ROW 04) is set.
ROW 01 determines the number of pulses for digit 0, ROW 02 the number of pulses for digit 1 and so on.

Example 1:

The Swedish type of pulse dialling shall be used, i.e., one pulse for digit 0, two pulses for digit 1 and ten pulses for digit 9.

Table	Row	Data	Comment
94	01	01	One pulse for digit 0
94	02	02	Two pulses for digit 1
94	03	03	Three pulses for digit 2
94	04	04	Four pulses for digit 3
94	05	05	Five pulses for digit 4
94	06	06	Six pulses for digit 5
94	07	07	Seven pulses for digit 6
94	08	08	Eight pulses for digit 7
94	09	09	Nine pulses for digit 8
94	10	0A	Ten pulses for digit 9

Example 2:

The international type of pulse dialling shall be used, i.e., one pulse for digit 1, two pulses for digit 2 and ten pulses for digit 0.

Table	Row	Data	Comment
94	01	0A	Ten pulse for digit 0
94	02	01	One pulses for digit 1
94	03	02	Two pulses for digit 2
94	04	03	Three pulses for digit 3
94	05	04	Four pulses for digit 4
94	06	05	Five pulses for digit 5
94	07	06	Six pulses for digit 6
94	08	07	Seven pulses for digit 7
94	09	08	Eight pulses for digit 8
94	10	09	Nine pulses for digit 9

LP LINE LEVEL (AREA 2 TAB 95)

ROW 01: TX line amplification at 1000 Hz to compensate line attenuation.
Value range: 0 - 7

0 ⇔ 0 dB
1 ⇔ 3 dB
2 ⇔ 6 dB
3 ⇔ 9 dB
4 ⇔ 12 dB
5 ⇔ 15 dB
6 ⇔ 18 dB
7 ⇔ 21 dB

ROW 02: Line equalizer additional amplification at 3000 Hz.
Value range: 0 - 3

0 ⇔ 0 dB
1 ⇔ 3 dB
2 ⇔ 6 dB
3 ⇔ 9 dB

Example:
Line attenuation is 12 dB at 1000 Hz and 15 dB at 3000 Hz.

Table	Row	Data	Comment
95	01	4	TX line attenuation = 12 dB.
95	02	1	Line equalizer = 12+3 dB at 3000 Hz

AREA 3 of EEPROM

TONE SYSTEM (AREA 3 TAB 01)

Value range: 1-5

Tone system used by tone receiver.
Default tone system for tone transmitter.

ZVEI1	ZVEI2	ZVEI3	CCIR	ZVEIS
1	2	3	4	5

NOTE1: When changing tone system, timing specifications for transmitted tones change automatically, but not for received tones. To change them, you must modify TONLEN TAB (AREA 3 TAB 29-44).

NOTE2: The decoder IC in **LP200** (not LP210) also has to be changed:
CCIR: CML FX 003 QC
ZVEIS:CML FX 003 QS
ZVEI1,2,3: CML FX 003 QZ

Example:
Tone system CCIR shall be used by the tone receiver and as default by the tone transmitter.

Table	Row	Data	Comment
01	01	4	Default tone system is CCIR.

ID TABLE (AREA 3 TAB 2 - 8)

All CUs' own tone call address, used for A-digits in tone transmission. One table for each CU.

NOTE: For the tone receiver to work, the IDs have to be coded in call numbers table (AREA 4) as well.

Value range: 0-9 in each ROW.

ROW 01:	1'st digit
ROW 02:	2'nd digit
ROW 03:	3'rd digit
ROW 04:	4'th digit
ROW 05:	5'th digit

Example:
CU 0's address: 11009
CU 1's address: 11001
CU 2's address: 11002
CU 3's address: 11003
CU 4's address: 11004
CU 5's address: 11005
CU 6's address: 11006

Table	Row	Data	Comment
02	01	01	First address digit = 1
02	02	01	Second address digit = 1
02	03	00	Third address digit = 0
02	04	00	Fourth address digit = 0
02	05	09	Fifth address digit = 9
03	01	01	First address digit = 1
03	02	01	Second address digit = 1
03	03	00	Third address digit = 0
03	04	00	Fourth address digit = 0
03	05	01	Fifth address digit = 1
04	01	01	First address digit = 1
04	02	01	Second address digit = 1
04	03	00	Third address digit = 0
04	04	00	Fourth address digit = 0
04	05	02	Fifth address digit = 2
05	01	01	First address digit = 1
05	02	01	Second address digit = 1
05	03	00	Third address digit = 0
05	04	00	Fourth address digit = 0
05	05	03	Fifth address digit = 3
06	01	01	First address digit = 1
06	02	01	Second address digit = 1
06	03	00	Third address digit = 0
06	04	00	Fourth address digit = 0
06	05	04	Fifth address digit = 4
07	01	01	First address digit = 1
07	02	01	Second address digit = 1
07	03	00	Third address digit = 0
07	04	00	Fourth address digit = 0
07	05	05	Fifth address digit = 5
08	01	01	First address digit = 1
08	02	01	Second address digit = 1
08	03	00	Third address digit = 0
08	04	00	Fourth address digit = 0
08	05	06	Fifth address digit = 6

ALARM INPUT (AREA 3 TAB 9 - 12)

One table for each of the 4 alarm inputs.
The code specified here is the code displayed in the CUs' displays when alarm input is activated.

Value range:

ROW 01:

5, number of characters.

ROW 02 - 06:

0 - 9, correspond to digits 0 - 9.

10 - FF, correspond to the ASCII character with the given code.

Example:

Alarm input 1 text = LARM1
Alarm input 2 text = LARM2
Alarm input 3 text = LARM3
Alarm input 4 text = LARM4

Table	Row	Data	Comment
09	01	05	Five characters
09	02	4C	ASCII 'L'
09	03	41	ASCII 'A'
09	04	52	ASCII 'R'
09	05	4D	ASCII 'M'
09	06	31	ASCII '1'
10	01	05	Five characters
10	02	4C	ASCII 'L'
10	03	41	ASCII 'A'
10	04	52	ASCII 'R'
10	05	4D	ASCII 'M'
10	06	32	ASCII '2'
11	01	05	Five characters
11	02	4C	ASCII 'L'
11	03	41	ASCII 'A'
11	04	52	ASCII 'R'
11	05	4D	ASCII 'M'
11	06	33	ASCII '3'
12	01	05	Five characters
12	02	4C	ASCII 'L'
12	03	41	ASCII 'A'
12	04	52	ASCII 'R'
12	05	4D	ASCII 'M'
12	06	34	ASCII '4'

TONE TRANSMITTER TELEGRAMS (AREA 3 TAB 13 - 27)

The tone transmitter telegrams follow the Alternative A/C specification.
The telegrams defined are;

TAB 13:	OCALLINDb	Normal call Alternative A.
TAB 14:	RELa	Two tone repeater starts (AR-code).
TAB 15:	RELb	Five tone repeater starts.
TAB 16:	STATREQ	WHC call Alternative C.
TAB 17:	OCALLINDc	Normal call Alternative C.
TAB 18:	CALLSTAT	Status request Alternative C.
TAB 19:	Spare	
TAB 20:	CALLIND_ACK	Acknowledge on ICALLINDa.
	STAT_ACK	Acknowledge on STAREQ.
	STAT_LARM_ACK	Acknowledge on alarm towards LAC.
TAB 21:	STAT_1	Acknowledge on STAT_ACK.
TAB 22:	DISCON	Disconnect call.
TAB 23:	DISCON_REL	Disconnect of repeater station.

TAB 24:	RCPTCALL_ACK	Audible tone
	QUEUE_TONE	Audible tone
TAB 25:	UNOB_TONE	Audible tone
TAB 26:	WARN_TONE	Audible tone
TAB 27:	WAIT_TONE	Audible tone

Each transmitter/acknowledge telegram looks briefly as follows:

ROW 01: Tone system
ROW 02: Repeater code telegram enable
ROW 03: Prolonged tone
ROW 04: Prolonged tones length
ROW 05: Preamble length
ROW 06-
ROW 16: Telegram tone values

All the telegrams may use all the ROWs 6-16 for tones, otherwise telegrams must be ended with an end-of-telegram instruction.

All tone-transmitter timers have a timebase of 10 ms/100 ms.
Maximum time for the tone-transmitter timers is 2.5 s, which is achieved by setting the timer value to 80h+25 = 99h.

ROW 01, TONE SYSTEM:
Value range : 0-5

0 = Default tone system, as specified in AREA 3, TAB 01.
1 = ZVEI1 selected
2 = ZVEI2 selected
3 = ZVEI3 selected
4 = CCIR selected
5 = ZVEIS selected

ROW 02, REPEATER CODE TELEGRAM ENABLE
Value range: 0-1

0 = No repeater code telegram is sent, even if route contains repeater start.
1 = If route contains repeater start, RELa or RELb, depending on the programming of ROW 13 of CHANNEL INFO, is transmitted prior to this telegram.

ROW 03, PROLONGED TONE:
Value range : 0-9

0 = No prolonged tone in the telegram.
1-9 = Prolonged tone number

ROW 04, PROLONGED TONES LENGTH:
Value range : 0-FFh

0 = Default long tone
1-FFh = Value in 10 ms (timer concept mentioned above used)

Default long tones for the tone-systems:

CCIR	ZVEI	
700	500	[ms]

ROW 05, PREAMBLE LENGTH:
Value range: 0-FFh

FFh = Default preamble time for the tone-system.
0-Feh = Specified time:

Default preamble time for the tone-systems:

CCIR	ZVEI	
200	140	[ms]

ROW 06-16, TELEGRAM TONE VALUE:

00-0F:	References to fixed tones.
40:	Reference to repeater code.
70:	Pause, double normal tone length, not allowed as first digit.
71-7F:	Pause, 1..15 times normal tone length, not allowed as first digit.
A1-A5:	References to "A"-digits according to the specification of the signalling system. A1 is the leftmost digit.
B1-B5:	References to "B"-digits according to the specification of the signalling system. B1 is the leftmost digit.
FF:	End of telegram reached.
Other values:	Reserved, do not use.

General remarks:
A tone-transmitter telegram might consist of Max. 11 tones.
If the telegram is shorter, it must be ended with the 'End-Of-Telegram'-instruction, FFh, after the last tone.

Example:
The WHC call, STATREQ defined by TAB 16, begins with the called mobiles five address digits, followed by the S-tone, represented by tone 13, and concluded by the calling CU’s five address digits.

Table	Row	Data	Comment
16	01	00	Default tone system (defined by TAB 01)
16	02	00	No repeater start preceding this telegram
16	03	00	No prolonged tone
16	04	00	Doesn't matter (no prolonged tone)
16	05	FF	Default preamble
16	06	B1	First B-digit
16	07	B2	Second B-digit
16	08	B3	Third B-digit
16	09	B4	Fourth B-digit
16	10	B5	Fifth B-digit
16	11	0D	S-tone
16	12	A1	First A-digit
16	13	A2	Second A-digit
16	14	A3	Third A-digit
16	15	A4	Fourth A-digit
16	16	A5	Fifth A-digit

Example:

The normal Alternative C call, OCALLINDc defined by TAB 17, is a 6-tone call. Its first tone shall be prolonged and if the route contains a repeater start code, the repeater start telegrams (RELa or RELb, which is defined by CHANNEL INFO).
The 6-tones transmitted are the called mobiles five address digits, followed by the T-tone, represented by tone 11.

Table	Row	Data	Comment
17	01	00	Default tone system (defined by TAB 01)
17	02	01	Repeater start enabled
17	03	01	Tone 1 prolonged
17	04	00	Default long tone length
17	05	FF	Default preamble
17	06	B1	First B-digit
17	07	B2	Second B-digit
17	08	B3	Third B-digit
17	09	B4	Fourth B-digit
17	10	B5	Fifth B-digit
17	11	0B	T-tone
17	12	FF	End of telegram
17	13-16	XX	Don't matter

DOUBLE CHECK CALLS (AREA 3 TAB 28)

Value range 0-1, default 1.

By clearing this byte, the tone decoder will not restart from first tone-position until all telegrams being checked have ended or failed. This could cause problems when there are tones sent before the first tone, such as repeater start. In a system with many unstructured numbers and many channels to scan, it could improve throughput to clear this flag.

Example:

The tone decoder shall restart from the first tone even if there are telegrams that haven't failed. This is necessary for most systems to work, vital if repeater start codes can be included in the telegrams.

Table	Row	Data	Comment
28	01	01	Shouldn't be changed

TONLEN TAB (AREA 3 TAB 29 - 44)

Table with 16 entries.
This table makes it possible for the tone receiver to distinguish between 16 different tone lengths.
The content of this table is NOT changed automatically when changing the default tone system.
Each entry in the table has 3 ROWs with the following content:

- ROW 1: Flag:
  - 0 = accept at end of tone if length within interval.
  - 1 = accept as soon as length has reached min length, Max. length shall be set long, exact value doesn't matter. Useful for repeater-start-code.
- ROW 2 : Min length(Normal timer concept, timebase 10 ms/100 ms)
- ROW 3 : Max. length (Normal timer concept, timebase 10 ms/100 ms)

Default content of TONLEN_TAB (CCIR as default):

Length			[ms]		Hex	ROW	content	
Code	Typical usage	Flag	Min	Max.	TAB	01	02	03
0					29	00	00	00
1					30	00	00	00
2	First long tone	0	10	1500	31	00	01	8F
3					32	00	00	00
4	Normal short tone	0	80	120	33	00	08	0C
5		0	150	250	34	00	0F	19
6	Busy tones	0	200	300	35	00	14	1E
7	Acknowledge tone	0	200	550	36	00	14	37
8		0	650	750	37	00	41	4B
9		0	700	800	38	00	46	50
A	Disconnect tone	0	900	1500	39	00	5A	8F
B					40	00	00	00
C	First after repeater-start	1	40	12.7s	41	01	04	FF
D	Invalid aft repeater-start	0	40	120	42	00	04	0C
E	Last tone, no length limit	1	10	12.7s	43	01	01	FF
F		0	3500	4500	44	00	A3	AD

LAST INIT CALL (AREA 3 TAB 45)

Value range 10-20, default 0Bh (= 11)

Number of the last tone receiver table used for a always decoded call.
First group of calls as specified on the next page.

Example:

The first thirteen Receiver Telegrams are always decoded, i.e. they are the first part of an alternative A/C telegram exchange.

Table	Row	Data	Comment
45	01	0B	0Bh = 11

LAST DISC CALL (AREA 3 TAB 46)

Value range 15-25, default 10h (= 16)

Number of the last tone receiver table used for disconnect call, before the handshaking calls.
Must be greater than LAST INIT CALL.
Second group of calls as specified on the next page.

Example:

The last of the initial calls is Receiver Telegram number 13.
The first of the handshaking calls is Receiver Telegram number 17, in between them are the disconnect telegrams.
Thus the last telegram in this group is number 16.

Table	Row	Data	Comment
46	01	10	10h = 16

TONE RECEIVERS (AREA 3 TAB 47 - 78)

Each receiver table looks briefly as follows:

ROW 01-03: Call type
ROW 04-06: Start condition
ROW 07: Function number
ROW 08: Priority
ROW 09: First tones accept code
ROW 10: First tones length-spec
ROW 11: First tones tone value
ROW 12: Second tones accept code
ROW 13: Second tones length-spec
ROW 14: Second tones tone value
.....
ROW 54: Last tones accept code
ROW 55: Last tones length-spec
ROW 56: Last tones tone value

There are 32 different receiver tables, grouped into 3 types of calls:

- First group is the always-decoded calls.
- Second group is the disconnect calls, only decoded when receiver is steady on a channel.
- Third group is the handshaking sequences, specified by "Alternative C", only decoded in handshaking situations.

The calls, according to "Alternative C", use following default receiver tables:

First group:

TAB 47	RXtab 1	ICALLINDx to fixed telephone number.
TAB 48	RXtab 2	STATREQ as alarm call to LAC.
TAB 49	RXtab 3	ICALLINDx as telephone call with free dialling of phone-number.
TAB 50	RXtab 4	Spare
TAB 51	RXtab 5	ICALLINDx normal call to single unit or group of units.
TAB 52	RXtab 6	ICALLINDx to one among several CU200/CU210 (multiline).
TAB 53	RXtab 7	STATREQ as normal delivery of status digits.
TAB 54	RXtab 8	STATREQ as raised priority delivery of status digits.
TAB 55	RXtab 9	CALL_ET call from alarm-transmitter.
TAB 56	RXtab 10	STATREQ alarm to CU(s).
TAB 57	RXtab 11	ICALLINDx as alarm call to fixed telephone number.
TAB 58	RXtab 12	TELDIG (PRTPR, PRTP, PRT)
TAB 59	RXtab 13	TELDIG (RTPR, RTP)
TAB 60	RXtab 14	TELDIG (TPR, TP)

Second group:

TAB 61	RXtab 15	DISCON.
TAB 62	RXtab 16	DISCON_REL

Third group:

TAB 63	RXtab 17	STAT_ACK, CALLIND_ACK, STAT_LARM_ACK.
TAB 64	RXtab 18	BUSY_TONE, RCPTCALL_BSY, UNOB_TONE, WAIT_TONE.
TAB 65	RXtab 19	Spare
TAB 66	RXtab 20	RCPTCALL_ACK, QUEUE_TONE.
TAB 67	RXtab 21	STAT_1 (MNSMN, MNSM, MNS)
TAB 68	RXtab 22	STAT_1 (NSMN, NSM)
TAB 69	RXtab 23	STAT_1 (SMN)
TAB 70	RXtab 24	TSTAT_1 (MNTMN, MNTM, MNT)
TAB 71	RXtab 25	TSTAT_1 (NTMN, NTM)
TAB 72	RXtab 26	TSTAT_1 (TMN)
TAB 73	RXtab 27	DSTAT_1 (MNDMN, MNDM, MND)
TAB 74	RXtab 28	DSTAT_1 (NDMN, NDM)
TAB 75	RXtab 29	DSTAT_1 (DMN)
TAB 76	RXtab 30	Spare
TAB 77	RXtab 31	Spare
TAB 78	RXtab 32	Spare of phone-number.

Some signalling system C calls don't have their own RXtab, instead they are detected as combinations of other calls:

STAT_2 = STAT_ACK followed by STAT_1
TSTAT_2 = STAT_ACK followed by TSTAT_1
DSTAT_2 = STAT_ACK followed by DSTAT_1

ROW 01-03, CALL_TYPE: Value range: 0-1F

The same decoder might end with 1 of 3 different call-types accepted, depending on how many tones that have been received.

= 00: No action.
= 01: ICALLINDa
= 02: ICALLINDb
= 03: Not used
= 04: Not used
= 05: STATREQ
= 06: CALL_ET
= 07: OCALLINDc
= 08: CALLSTAT
= 09: Not used
= 0A: Not used
= 0B: STAT_ACK, CALLIND_ACK, STAT_LARM_ACK
= 0C: STAT_1 (STAT_2 = STAT_ACK + STAT_1)
= 0E: TSTAT_1 (TSTAT_2 = STAT_ACK + TSTAT_1)
= 10: DSTAT_1 (DSTAT_2 = STAT_ACK + DSTAT_1)
= 12: TELDIG
= 13: DISCON
= 14: DISCON_REL, REL_KOD, DISCON_CRB
= 15: Not used
= 16: RCPTCALL_ACK, RCPTCALL_BUSY, QUEUE_TONE
= 17: BUSY_TONE, UNOB_TONE
= 18: WARN_TONE
= 19: WAIT_TONE
= 1A-
= 1E: Not used
= 1F: No action.

ROW 04-06, START_CONDITION: Value range: 0-3, default 0.

Corresponding to CALL_TYPE 1-3 respectively.

0 = Might be preceded by any tone, or pause.
1 = Might be preceded by any tone, except T,D or S.
2 = Might be preceded only by repeat or pause.
3 = Might be preceded only by pause.

ROW 07, FUNCTION NUMBER: Value range 0-F, default F.

If any B-digit references are made in the RXtab FUNCTION NUMBER must be set to a value different from F. The possible B-digit combinations to receive shall be declared in the call number tables (AREA 4).
FUNCTION NUMBER specifies which one of the fifteen (0-E) call number tables to use.

The different call number tables and function digits are used as follows:
0: Telephone call to fixed telephone number.
1: Alarm call to LAC.
2: Telephone call with free dialling.
3: Not used.
4: Normal call or group call to CU(s) or mobile(s).
5: Multiline call to CU(s).

6: Not used.
7: Not used.

8: Normal status delivery call and WHC to CU(s).
9: Raised priority status delivery call to CU(s).
A: Alarm call (CALL_ET) to CU(s).
B: Alarm call to fixed telephone number.
C: Alarm call (STATREQ) to CU(s).
D: Not used.
E: Not used.
F: No B-digit references.

ROW 08, PRIORITY: Value range 0-7, default 0.

If several decoders end with the same sequence of tones, the one with the highest priority number will be accepted.
If the priority level is the same, the call specified last in the TONE RECEIVER with the highest number will have priority. If a sequence is multiply defined in call numbers-table with same function number, the priority order is undefined.

ROW 09,12,15,18,21,24,27,30,33,36,39,42,45,48,51,54, ACCEPT_CODE:
Value range 0-3, default 0.

If the sequence is allowed to end at the actual tone-position, the ACCEPT_CODE shall be set to index one of the 3 CALL_TYPE bytes in beginning of the table, otherwise ACCEPT_CODE shall be 0.

ROW 10,13,16,19,22,25,28,31,34,37,40,43,46,49,52,55
LENGTH SPECIFICATION: Value range 0-F, no default.

Index into TONLEN_TAB, which makes it possible to distinguish between 16 different tone-lengths.
Tone-lengths are to be specified in a separate table, TONLEN_TAB, with following content for each entry, indexed by length-code:
- Min length [*10 ms] (Normal timer concept)
- Max. length [*10 ms] (Normal timer concept)
- Flag:
  0 = accept at end of tone if length within interval
  1 = accept as soon as length has reached min length, Max. length shall be set long, exact value doesn't matter. (Useful for repeater-start-code)

Default content of TONLEN_TAB (CCIR as default):

See Area 3 TAB 29-44.

ROW 11,14,17,20,23,26,29,32,35,38,41,44,47,50,53,56
TELEGRAM TONE VALUE:

00-09: Fixed tones 0-9.
0A: Fixed QTC-tone A
0B: Fixed QTC-tone B = Ericsson T-tone

0C: Fixed QTC-tone C = Ericsson Data-tone
0D: Fixed QTC-tone D = Ericsson Status-tone
0E: Fixed QTC-tone E (Repeat) valid ONLY in first position.
0F: Pause, or any invalid tone outside actual tone-system.
10: Any tone 0-9
11-1x: Any tone 0-x
51-52: References to storage-area for tone-decoders saved status digits. Only tones 0-9 accepted.
A1-Ax: References to storage-area for tone-decoders saved A-subscriber digits.
To be used as complement to put code in call numbers-table. Any tone 0-9 accepted.
B1-Bx: Call numbers table reference digit 1-5 (1-9),
'FUNCTION NUMBER' specifies which call number table.
Tone-system specification usually mention these digits as B-subscriber digits.
C1-Cx: References to storage-area for tones transmitted in last transmitted tone call.
Used in acknowledge calls.
FF: End of telegram, no more tones.

Other values: Reserved, do not use.

Example 1:
Normal call or Group call to a CU or mobile.
Normal calls primary specification is Tone Receiver Telegram 5, which has following content:

ROW 1:	02	= ICALLINDb, first type of accept-code, 5 tones
ROW 2:	01	= ICALLINDa, second type of accept-code, 11 tones
ROW 3:	00	= No action, no third accept-code
ROW 4:	01	= The ICALLINDb not allowed to be preceded by T,D or S
ROW 5:	00	= The ICALLINDa might be preceded by any tone
ROW 6:	00	= Don't care, no third accept-code in ROW 3
ROW 7:	04	= The Bx references below are to call numbers-table 4
ROW 8:	00	= Normal priority
ROW 9:	00	= First tone is not the last one
ROW 10:	02	= First tones length type 2 (10-1500 ms)
ROW 11:	B1	= First tone specified as first tone in a sequence in call numbers-table 4
ROW 12:	00	= Second tone is not the last one
ROW 13:	04	= Second tones length type 4 (80-120 ms)
ROW 14:	B2	= Second tone specified as second tone in a sequence in call numbers table 4
ROW 15:	00	= Third tone is not the last one
ROW 16:	04	= Third tones length type 4 (80-120 ms)
ROW 17:	B3	= Third tone specified as third tone in a sequence in call numbers-table 4
ROW 18:	00	= Fourth tone is not the last one
ROW 19:	04	= Fourth tones length type 4 (80-120 ms)
ROW 20:	B4	= Fourth tone specified as third tone in a sequence in call numbers-table 4
ROW 21:	01	= Fifth tone is allowed to be the last one with accept-type as specified in ROW 1.
ROW 22:	04	= Fifth tones length type 4 (80-120 ms)
ROW 23:	B5	= Fifth tone specified as third tone in a sequence in call numbers-table 4
ROW 24:	00	= Sixth tone is not the last one
ROW 25:	04	= Sixth tones length type 4 (80-120 ms)
ROW 26:	0B	= Sixth tone is tone B = Ericsson T-tone.

ROW 27:	00	= Seventh tone is not the last one
ROW 28:	04	= Seventh tones length type 4 (80-120 ms)
ROW 29:	A1	= Seventh tone allowed to be any tone 0-9, displayed at position 1.
ROW 30:	00	= Eight tone is not the last one
ROW 31:	04	= Eight tones length type 4 (80-120 ms)
ROW 32:	A2	= Eight tone allowed to be any tone 0-9, displayed at position 2.
ROW 33:	00	= Ninth tone is not the last one
ROW 34:	04	= Ninth tones length type 4 (80-120 ms)
ROW 35:	A3	= Ninth tone allowed to be any tone 0-9, displayed at position 3.
ROW 36:	00	= Tenth tone is not the last one
ROW 37:	04	= Tenth tones length type 4 (80-120 ms)
ROW 38:	A4	= Tenth tone allowed to be any tone 0-9, displayed at position 4.
ROW 39:	02	= Eleventh tone is allowed to be the last one with accept-type as specified in ROW 2.
ROW 40:	04	= Eleventh tones length type 4 (80-120 ms)
ROW 41:	A5	= Eleventh tone allowed to be any tone 0-9, displayed at position 5.
ROW 42:	03	= Don't care when ROW 44 = FF
ROW 43:	0F	= Don't care when ROW 44 = FF
ROW 44:	FF	= No more tones
ROW 45-56:		= Don't care

This is only the primary description of the call, which will be the same for a lot of different calls. To specify as example that call address 11001 is allowed and is destined to CU 1 we have to do that in the SYSTEM 3000 CALL NUMBERS programming mode. Selecting function digit 4 (see ROW 4), address 11001 and destination 1.

Example 2:

Group call to CU number 1 and 2, tone-call address 11000.
Here we will use the same table as in example 1. Only an entry in the call numbers-table has to be added; function 4, address 11000 and destination 12.

Example 3:

Handshaking sequence STAT_2 looks like:
5 tones identical to the ones in the previous sent call, followed by silence, and thereafter the sequence MNSMN, where MN are the 2 status digits and S is the S-tone.
The specification says that MNSMN shall be accepted as any of the combinations MNSMN, MNSM, MNS, NSMN, NSM, SMN.

For this reason the decoding is split up in 2 halves:
First half is identical to STAT_ACK which primary specification is tone-receiver table 17.
Second half is identical to STAT_1, which has to be split up in three tables, because all sequences sharing a table have to start at the same position, the tables used are 21,22,23.

Tone Receiver Telegram 17 has following content:

ROW 1:	09	= STAT_ACK, first type of accept-code.
ROW 2:	00	= No action, no second accept-code
ROW 3:	00	= No action, no third accept-code
ROW 4:	00	= The STAT_ACK might be preceded by any tone
ROW 5:	00	= Don't care, no second accept-code in ROW 2
ROW 6:	00	= Don't care, no third accept-code in ROW 3
ROW 7:	0F	= No Bx references to any call number-table
ROW 8:	00	= Normal priority
ROW 9:	00	= First tone is not the last one
ROW 10:	04	= First tones length type 4 (80-120 ms)
ROW 11:	C1	= First tone shall be checked against the first tone saved from last sent call.
ROW 12:	00	= Second tone is not the last one
ROW 13:	04	= Second tones length type 4 (80-120 ms)
ROW 14:	C2	= Second tone shall be checked against the second tone saved from last sent call.
ROW 15:	00	= Third tone is not the last one
ROW 16:	04	= Third tones length type 4 (80-120 ms)
ROW 17:	C3	= Third tone shall be checked against the third tone saved from last sent call.
ROW 18:	00	= Fourth tone is not the last one
ROW 19:	04	= Fourth tones length type 4 (80-120 ms)
ROW 20:	C4	= Fourth tone shall be checked against the fourth tone saved from last sent call.
ROW 21:	00	= Fifth tone is not the last one
ROW 22:	04	= Fifth tones length type 4 (80-120 ms)
ROW 23:	C5	= Fifth tone shall be checked against the fifth tone saved from last sent call.
ROW 24:	01	= Sixth tone is allowed to be the last one, with accept-type as specified in ROW 1.
ROW 25:	0E	= Sixth tones length type E (minimum 10 ms)
ROW 26:	0F	= Sixth tone-code is F = Pause = No valid CCIR tone.
ROW 27:	03	= Don't care when ROW 29 = FF
ROW 28:	0F	= Don't care when ROW 29 = FF
ROW 29:	FF	= No more tones
ROW 30-56:		Don't care

Tone Receiver Telegram 21 has following content:

ROW 1:	0A	= STAT_1, first type of accept-code.
ROW 2:	00	= No action, no second accept-code
ROW 3:	00	= No action, no third accept-code
ROW 4:	01	= T, S or D might not precede The STAT_1
ROW 5:	00	= Don't care, no second accept-code in ROW 2
ROW 6:	00	= Don't care, no third accept-code in ROW 3
ROW 7:	0F	= No Bx references to any call number-table
ROW 8:	00	= Normal priority
ROW 9:	00	= First tone is not the last one
ROW 10:	02	= First tones length type 2 (10-1500 ms)
ROW 11:	51	= First tone shall be saved as the first status digit.
ROW 12:	00	= Second tone is not the last one
ROW 13:	04	= Second tones length type 4 (80-120 ms)
ROW 14:	52	= Second tone shall be saved as the second status digit.
ROW 15:	01	= Third tone is allowed to be the last one, with accept-type as specified in ROW 1.

ROW 16: 04 = Third tones length type 4 (80-120 ms)
ROW 17: 0D = Third tone is tone D = Ericsson S-tone.
ROW 18: 01 = Fourth tone is allowed to be the last one, with accept-type as specified in ROW1.
ROW 19: 04 = Fourth tones length type 4 (80-120 ms)
ROW 20: 51 = Fourth tone has to be the same as the one saved as the first status digit from ROW 11.
ROW 21: 01 = Fifth tone is allowed to be the last one with accept-type as specified in ROW 1.
ROW 22: 04 = Fifth tones length type 4 (80-120 ms)
ROW 23: 52 = Fifth tone has to be the same as the one saved as the second status digit from ROW 14.
ROW 24: 03 = Don't care when ROW 26 = FF
ROW 25: 0F = Don't care when ROW 26 = FF
ROW 26: FF = No more tones
ROW 27-56: = Don't care

Tone Receiver Telegram 22 has following content:

ROW 1: 0A = STAT_1, first type of accept-code.
ROW 2: 00 = No action, no second accept-code
ROW 3: 00 = No action, no third accept-code
ROW 4: 01 = T, S or D might not precede The STAT_1
ROW 5: 00 = Don't care, no second accept-code in ROW 2
ROW 6: 00 = Don't care, no third accept-code in ROW 3
ROW 7: 0F = No Bx references to any call number-table
ROW 8: 00 = Normal priority
ROW 9: 00 = First tone is not the last one
ROW 10: 02 = First tones length type 2 (10-1500 ms)
ROW 11: 52 = First tone shall be saved as the second status digit.
ROW 12: 00 = Second tone is not the last one
ROW 13: 04 = Second tones length type 4 (80-120 ms)
ROW 14: 0D = Second tone is tone D = Ericsson S-tone.
ROW 15: 01 = Third tone is allowed to be the last one, with accept-type as specified in ROW 1.
ROW 16: 04 = Third tones length type 4 (80-120 ms)
ROW 17: 51 = Third tone shall be saved as the first status digit.
ROW 18: 01 = Fourth tone is allowed to be the last one, with accept-type as specified in ROW 1.
ROW 19: 04 = Fourth tones length type 4 (80-120 ms)
ROW 20: 52 = Fourth tone has to be the same as the one saved as the second status digit from ROW 11.
ROW 21: 03 = Don't care when ROW 23 = FF
ROW 22: 0F = Don't care when ROW 23 = FF
ROW 23: FF = No more tones
ROW 24-56: = Don't care

Tone Receiver Telegram 23 has following content:

ROW 1:	0A	= STAT_1, first type of accept-code.
ROW 2:	00	= No action, no second accept-code
ROW 3:	00	= No action, no third accept-code
ROW 4:	01	= T, S or D might not precede the STAT_1
ROW 5:	00	= don't care, no second accept-code in ROW 2
ROW 6:	00	= don't care, no third accept-code in ROW 3
ROW 7:	0F	= No Bx references to any call number-table
ROW 8:	00	= Normal priority
ROW 9:	00	= First tone is not the last one
ROW 10:	02	= First tones length type 2 (10-1500 ms)
ROW 11:	0D	= First tone is tone D = Ericsson S-tone.
ROW 12:	00	= Second tone is not the last one
ROW 13:	04	= Second tones length type 4 (80-120 ms)
ROW 14:	51	= Second tone shall be saved as the first status digit.
ROW 15:	01	= Third tone is allowed to be the last one, with accept-type as specified in ROW 1.
ROW 16:	04	= Third tones length type 4 (80-120 ms)
ROW 17:	52	= Third tone shall be saved as the second status digit.
ROW 18:	03	= Don't care when ROW 20 = FF
ROW 19:	0F	= Don't care when ROW 20 = FF
ROW 20:	FF	= No more tones
ROW 21-56:		= Don't care

WAIT ACK TIME (AREA 3 TAB 79)

Value range 00-FFh, default 4.
Timebase: 1 s/10 s

Waiting time for acknowledge, after transmitted a sequence within a tone telegram, according to the Alternative C signalling protocol.

Example:

If no acknowledge has been detected within four seconds after we transmitted a tone telegram, the signalling is considered failed, if acknowledge is required.

Table	Row	Data	Comment
79	01	4	4 seconds

DEFAULT FREQUENCIES IN Hz

Tone	ZVEI1	ZVEI2	ZVEI3	CCIR	ZVEIS
0	2400	2400	2200	1981	2400
1	1060	1060	970	1124	1060
2	1160	1160	1060	1197	1160
3	1270	1270	1160	1275	1270
4	1400	1400	1270	1358	1400
5	1530	1530	1400	1446	1530
6	1670	1670	1530	1540	1670
7	1830	1830	1670	1640	1830
8	2000	2000	1830	1747	2000
9	2200	2200	2000	1860	2200
A	2800	885	885	2400	885
B	810	810	2800	930	810
C	970	2800	810	2247	740
D	885	2600	2600	991	680
E	2600	970	2400	2110	970
F	-/(680)	-/(680)	-/(680)	-/(1055)	-

If an encoder-telegram contains code 0Fh, tone F will be sent, otherwise a pause is characterized by no tone sent.

MRS3000 RECEIVED CALL NUMBERS PROGRAMMING GUIDE

Valid from V3.1 of LP200/210 and CU200/210

The manual describes how to program the number specifications of the different calls to receive in MRS3000.

1) Press |Set-up|.
- Actual time is displayed.

2) Press |Set-up| again.
- CU200 prompts you for the password.
- Enter the password for received call number programming.
- There are two different passwords. 44444 gives access to all received call numbers, 00000 gives access only to received call numbers to telephone, i.e., those with function digits 0, 1, 2 or B.

3) Display looks like:

```
Size: Adr 5,Phone 16
      Max calls 0590
```

- "Adr" is the number of address digits, usually 5. The address digits correspond to B-digits in signalling systems A and C.

- "Phone" is the number of destination digits or phone number digits. Default value is 16.

- "Calls" specifies how many different call numbers there is room for in the received call number table. The bigger the size of the "Adr"- and "Phone"-fields, the fewer number of calls can fit into the table.

- There shouldn't be any reason for changing the "Adr"-field. If you have telephone numbers with more than 16 digits, however, you will have to change the "Phone"-field.

- If you don't want to change the "Adr"- or "Phone"-field, just press |↗| (PTT) and carry on with 7) below.

4) Press |#|.
- "Adr" flashes. If you want to change the "Adr"-field, do it by entering any value between 1 and 9. If you don't want to change the value of the "Adr"-filed, continue with 5).

5) Press |#|.
- "Phone" flashes. If you want to change the content of the "Phone" field, do it entering any value between 1 and 29.

6) Press |PTT|.
- The CU200/210 prompts you for a password. If you want to save the changes you have made to the "Adr"- and "Phone"-fields, enter the correct password. NB! THIS WILL ERASE THE WHOLE RECEIVED CALL NUMBERS TABLE.
- If you want to skip the changes, enter any incorrect password. No changes will be saved. After this, either you have entered a correct or an incorrect password, continue with 3).

7) Display looks like: o F: A:

The "F" is flashing.

- "F" is the function digit, which selects one of fifteen different received call numbers subtables. Please refer to the chapter "*How the different function digits are used*" for a summary of the different function digits.

- "A" is the address. The digits in this field correspond to the B- digits in the signalling systems A and C specification.

- The entire upper row of the display is used for the phone number to dial or the destination of the call. Please refer to the chapter "*Content of the phone number/destination field*" for a summary of the valid contents of this field.

8) Enter a valid function digit, 0-9, A, B, C, D or E. In received call numbers programming mode, some of the keys have been redefined to enable you to dial the hexadecimal digits A-E.

|Set-up| = A
|Lock| = B
|Repeater| = C
|Monitor| = D
|Control| = E

- The "F" stops flashing, and the "A" starts flashing.

- If there are any numbers programmed in the subtable, the first of these will be displayed. If the subtable is empty, a short beep will sound.

- If you want to change/clear an existing number, continue with 10) or 11). If the actual subtable contains many numbers, it can be a good idea to continue with 12) instead.

- If you want to add a new number, continue with 12).

- If you want to exit programming mode, continue with 9)

9) Press |↩| three times.

- LP200/210 will reset and after a while CU200/210 will also reset.

10) Press |+|.

- If the displayed number is the last in the subtable, the "A"-field will be cleared and a short beep will sound, otherwise the next number in the subtable will be displayed.
- When you have found the number you want to change, press |#| and the "A" stops flashing. Continue with 13).

11) Press |-|.

- If the displayed number is the first in the subtable, the last number in the subtable will be displayed; otherwise the previous number in the subtable will be displayed.

- When you have found the number you want to change, press |#| and the "A" stops flashing. Continue with 13).

12)Enter the address manually with the numeric keys 0-9 and A-E.
- After having entered all address digits, the "A" stops flashing.

- If the number exists in the subtable, the content of the phone number/destination field is displayed in the upper row of the display.

- If the number is non-existent, the upper row of the display will be blank.

13) Enter the wanted content of the phone number/destination field.
- By pressing |*| the phone number/destination field is cleared.
  This will make the number being removed from the subtable.

- By |0|-|9|- and |A|-|E|-keys, you can edit the phone number/ destination field.

- Make the changes permanent by pressing |⏎|. The next number in the subtable will be displayed with the "A" flashing. Continue with 9), 10), 11) or 12).

- To choose another number and skip eventual changes, continue with 14), 15) or 16).

14) Press |#|.
- The "A" starts flashing. Continue with 9), 10), 11) or 12).

15) Press |+|.
- The next number in the subtable is displayed. Continue with 13).

16) Press |-|.

- The next number in the subtable is displayed. Continue with 13).

17) Press |Group|.
- The "F", "A" and phone number/destination fields of the display are cleared and "F" starts flashing. Continue with 8).

How to add a number in the received call numbers table

The number 12345 shall be destined to CU1 and CU3. It is a normal call, i.e., it shall be written in subtable 4.
When this example begins, you have entered received call numbers programming mode and have a display with a flashing "F" which looks like this:

```
o      F:     A:
```

Key pressings	Action	Display
|4|	Function digit	o F:4 A: "A" flashes
|1|	Call address digit 1	o F:4 A:1 "A" flashes
|2|	Call address digit 2	o F:4 A:12 "A" flashes
|3|	Call address digit 3	o F:4 A:123 "A" flashes
|4|	Call address digit 4	o F:4 A:1234 "A" flashes
|5|	Call address digit 5	o F:4 A:12345 "A" stops flashing.
|1|	Destination CU1	1 o F:4 A:12345

|3|	Destination CU3	13 o F:4 A:12345
|PTT|	Save changes	o F:4 A:
|PTT| |PTT| |PTT|	Exit programming mode	Connecting to base o CU200 VX.Y

How to remove a number from the received call numbers table

The number 12345 in subtable 4 shall be removed.
When this example begins, you have entered received call numbers programming mode and have a display with a flashing "F" which looks like this:

o F: A:

Key pressings	Action	Display
|4|	Function digit	7 o F:4 A:76987 "A" flashes
|+| or |-|	Until display shows call number 12345	13 o F:4 A:12345 "A" flashes
|#|	Choose phone number/ destination field	13 o F:4 A:12345 "A" stops flashing
|*|	Erase phone number/ destination field.	o F:4 A:12345

|PTT| Save changes Next number in the display.

|PTT|
|PTT|
|PTT| Exit programming mode

```
Connecting to base
o       CU200 VX.Y
```

How to check the numbers in the received call numbers table.

We want to check what numbers are programmed in subtable 4 and A.
When this example begins, you have entered received call numbers programming mode and have a display with a flashing "F" which looks like this:

```
o       F:      A:
```

Key pressings	Action	Display
|4|	Function digit The first number in subtable 4 is displayed	13 o F:4 A:12345 "A" flashes
|+|	The next number in subtable 4 is displayed	7 o F:4 A:11111 "A" flashes
|Group|	Chose new function digit	o F:4 A:11111 "F" flashes
|Set-up|	Function digit A First number of subtable A is displayed	145 o F:A A:90000 "A" flashes
|-|	Previous number in subtable A is displayed	7 o F:A A:91000 "A" flashes
|-|	Previous number in subtable A is displayed	2 o F:A A:92000 "A" flashes

|-| We have seen all numbers, the first number is displayed again

```
145
o       F:A     A:90000
```

"A" flashes

|PTT| Save changes

```
o       F:4     A:
```

|PTT|
|PTT|
|PTT| Exit programming mode

```
Connecting to base
o       CU200 VX.Y
```

How the different function digits are used.

Each function digit corresponds to a different call-type, and there is a worksheet supplied for each one of them.

The address field has the same meaning for all function digits. Digits 0 through 9 correspond to the tones 0 through 9 in the tone system.
Digit A through D is not valid and digit E refers to "any tone".

The phone number/destination field, however, has different meanings depending on the function digit.

CALL TO A FIXED TELEPHONE NUMBER

Function digit 0

Phone number/destination field content:

- 0 - 9: Dial corresponding DTMF or pulse digit
- A: Wait for dial tone
- B: Pause. Next digit determines the number of seconds.
- C: Dial DTMF *.
- D: Dial DTMF #.
- E: Not used

Example 1:

On the received tone sequence 12345 the telephone number "0 - wait for dial tone - 90510" shall be dialled.

Addr	Func	Phone number/dest
12345	0	0A90510

Example 2:

On the received tone sequence 987XY, where X and Y denote any valid tones, the following telephone number shall be dialled: "0 - wait for dial tone - 00947 - 3 seconds pause - 123456".

Addr	Func	Phone number/dest
987EE	0	0A00947B3123456

ALARM CALL TO LAC

Function digit 1

Phone number/destination field content:

Eight digit alarm code to send to LAC (The two different telephone numbers to LAC are programmed in Area 2 TAB 76 and TAB 77).

- 0 - 9 : Alarm code digits to send to LAC.
- E: Reference to received A-subscriber digits.

Example 1:

On the received tone sequence 90000 the alarm code 12345678 shall be transmitted to LAC.

Addr	Func	Phone number/dest
90000	1	12345678

Example 2:

On the received tone sequence 99999 an eight digit alarm code beginning with the three digits 120 and continuing with the five received A-digits, containing the calling mobile's id.

Addr	Func	Phone number/dest
99999	1	120EEEEE

TELEPHONE CALL WITH DIRECT DIALING

Function digit 2

Phone number/destination field content:

- 0 - 9: Dial corresponding DTMF or pulse digit
- A: Wait for dial tone
- B: Pause. Next digit determines the number of seconds.
- C: Dial DTMF *.
- D: Dial DTMF #.
- E: An alone E denotes an empty telephone number

Example 1:

On the received tone sequence 11111 the telephone number "0 - wait for dial tone" shall be dialled.
Thereafter the operator at the mobile continues with direct dialling of the rest of the telephone number.

Addr	Func	Phone number/dest
11111	2	0A

Example 2:

On the received tone sequence 12121 the hook shall be lifted and LF connected when the dial tone has been detected. No telephone number shall be dialled automatically.
The operator at the mobile continues with direct dialling.

Addr	Func	Phone number/dest
12121	2	E

NORMAL CALL OR GROUP CALL TO CU200 (S) AND MOBILE (S)

Function digit 4

Phone number/destination field content:

One digit position for each unit called.
Valid destination units are:

0: Unit_CU0, valid only for a CU210 with both control unit and ADV-functions.
1: Unit_CU1
2: Unit_CU2
3: Unit_CU3
4: Unit_CU4
5: Unit_CU5
6: Unit_CU6
7: Unit_ALL_CUs, mustn't be used if an ADV-version CU210 is used in the system.
8: Unit_MOB_RETX, retransmit same number to a mobile, handshake.
9: Unit_MOB_GROUP, retransmit same number to mobile(s), no handshake.

Example:

The CU with ID number 1 (CU 1) shall be called with the tone sequence 11001.
The CU with ID number 2 (CU 2) shall be called with the tone sequence 11002.
The tone sequence 11000 is a group call to both CU 1 and CU 2.
The 100 different tone sequences 321XY, where X and Y denote any valid tones, are each a call to a single mobile.
The tone sequence 32000 is a group call to mobiles.
The tone sequence 10000 is a group call to mobiles and CU 1.

Addr	Func	Phone number/dest
11001	4	1
11002	4	2
11000	4	12
321EE	4	8
32000	4	9
10000	4	19

MULTILINE CALL TO CU200S

Function digit 5

Phone number/destination field content:
One digit position for each unit called.
Valid destination units are:
0: Unit_CU0, valid only for a CU210 with both control unit- and ADV-functions.
1: Unit_CU1
2: Unit_CU2
3: Unit_CU3
4: Unit_CU4
5: Unit_CU5
6: Unit_CU6
7: Unit_ALL_CUs mustn't be used if an ADV-version CU210 is used in the system.

Example:
The tone sequence 11111 is a multiline call to CU 1, CU 2, CU 3 and CU 6.
The tone sequence 00000 is a multiline call to CU 1, CU 4 and CU 5.
The tone sequence 10101 is a multiline call to CU 1, CU 2, CU 3, CU 4, CU 5 and CU 6.

Addr	Func	Phone number/dest
11111	5	1236
00000	5	145
10101	5	23456

STATUS DELIVERY CALL AND WHC TO CU200S

Function digit 8

Phone number/destination field content:
One digit position for each unit called.
Valid destination units are:
0: Unit_CU0, valid only for a CU210 with both control unit- and ADV-functions.
1: Unit_CU1
2: Unit_CU2
3: Unit_CU3
4: Unit_CU4
5: Unit_CU5
6: Unit_CU6
7: Unit_ALL_CUs mustn't be used if an ADV-version CU210 is used in the system.

Example:
The CU with ID number 1 (CU 1) shall be called with the tone sequence 11001.
The CU with ID number 2 (CU 2) shall be called with the tone sequence 11002.
The tone sequence 11000 is a group call to both CU 1 and CU 2.

Addr	Func	Phone number/dest
11001	8	1
11002	8	2
11000	8	12

PRIORITY STATUS DELIVERY CALL TO CU200S

Function digit 9

Phone number/destination field content:

One digit position for each unit called.

Valid destination units are:

0: Unit_CU0, valid only for a CU210 with both control unit- and ADV-functions.
1: Unit_CU1
2: Unit_CU2
3: Unit_CU3
4: Unit_CU4
5: Unit_CU5
6: Unit_CU6
7: Unit_ALL_CUs mustn't be used if an ADV-version CU210 is used in the system.

Example:

The CU with ID number 1 (CU 1) shall be called with the tone sequence 91001.
The CU with ID number 2 (CU 2) shall be called with the tone sequence 91002.
The tone sequence 91000 is a group call to both CU 1 and CU 2.

Addr	Func	Phone number/dest
91001	9	1
91002	9	2
91000	9	12

ALARM CALL WITHOUT SPEECH (CALL ET TELEGRAM) TO CU200S

Function digit A

Phone number/destination field content:

One digit position for each unit called.

Valid destination units are:

0: Unit_CU0, valid only for a CU210 with both control unit- and ADV-functions.
1: Unit_CU1
2: Unit_CU2
3: Unit_CU3
4: Unit_CU4
5: Unit_CU5
6: Unit_CU6
7: Unit_ALL_CUs mustn't be used if an ADV-version CU210 is used in the system.

Example:

The CU with ID number 1 (CU 1) shall be called with the tone sequence 99001.
The CU with ID number 2 (CU 2) shall be called with the tone sequence 99002.
The tone sequence 99000 is a group call to both CU 1 and CU 2.

Addr	Func	Phone number/dest
99001	A	1
99002	A	2
99000	A	12

ALARM CALL TO FIXED TELEPHONE NUMBER

Function digit B

Phone number/destination field content:

- 0 - 9: Dial corresponding DTMF or pulse digit
- A: Wait for dial tone
- B: Pause. Next digit determines the number of seconds.
- C: Dial DTMF *.
- D: Dial DTMF #.
- E: Not used

Example:

On the received tone sequence 92345 the telephone number "0 - wait for dial tone - 90510" shall be dialled.

Addr	Func	Phone number/dest
92345	B	0A90510

ALARM CALL (STATREQ) TOP CU200S

Function digit C

Phone number/destination field content:

One digit position for each unit called.
Valid destination units are:

- 0: Unit_CU0, valid only for a CU210 with both control unit- and ADV-functions.
- 1: Unit_CU1
- 2: Unit_CU2
- 3: Unit_CU3
- 4: Unit_CU4
- 5: Unit_CU5
- 6: Unit_CU6
- 7: Unit_ALL_CUs mustn't be used if an ADV-version CU210 is used in the system.

Example:

The CU with ID number 1 (CU 1) shall be called with the tone sequence 99901.
The CU with ID number 2 (CU 2) shall be called with the tone sequence 99902.
The tone sequence 99900 is a group call to both CU 1 and CU 2.

Addr	Func	Phone number/dest
99901	C	1
99902	C	2
99900	C	12

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/S/ML Magnus Lindahl		MRS3000 Telephone interface version		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KI/ECS/S/MLC		1997-01-14	E	LZB 119 1661

MRS3000 TELEPHONE INTERFACE VERSION, CU210

Valid from V3.6 of LP200/210
V3.3 of CU200
V3.7 of CU210

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/S/ML Magnus Lindahl		MRS3000 Telephone interface version		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KI/ECS/S/MLC		1997-01-14	E	LZB 119 1661

Overview

From V3.0 of MRS3000 there exists a possibility to connect the rest of the system to the public telephone network or a local telephone exchange. To this you need a CU210.
There exist to ways of establishing contact between a mobile and the telephone line, manual telephone connection and automatic telephone connection. A manual telephone connection can be established on any CU210, but an automatic telephone connection can be made only on a CU210 which has the identity number 0. When neither manual nor automatic telephone connection has been chosen, the CU210 functions as an ordinary CU200.
The only thing that differs is that the CU210 is able to function as a BFS master control unit, *see* ***MRS3000 OVERVIEW*****.**

MANUAL TELEPHONE CONNECTION

Whenever the CU210 is involved in a call it is possible to make a manual telephone connection. Just press |Transfer| once. The telephone line will be connected and the display will show:

MANUAL TELE CONNECT

The operator is able to hear everything both from the telephone line and the radio in the CU210's built in loudspeaker or the handset loudspeaker. The operator can break into the call by pressing PTT, and what he says will be transmitted to both the radio and the telephone line. To disconnect the telephone line , press |Transfer| again. Note that it isn't possible to disconnect the call without having disconnected the telephone line first.
If the call should be disconnected from the LP200/210, due to maximum conversation time or silence and no squelch for too long, the telephone line will be disconnected automatically.

Simplex and 2 wire operation

If the chosen channel is a simplex channel or a 2 wire connection to LP200/210 is used, the traffic has to be simplex, i.e., speech in one direction at a time.
The direction is chosen by the CU210 with a so called VOX.
However, if personality enabled, the telephone operator can enable the VOX by dialling DTMF 7 and disabling the VOX by dialling DTMF 8. If the VOX is disabled, PTT is immediately shut off.
In the case of a 2 wire connection, the operator at the CU can hear the telephone line LF only when the transmission path from the telephone to the radio is open.

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
KL/ECS/S/ML Magnus Lindahl		MRS3000 Telephone interface version		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KI/ECS/S/MLC		1997-01-14	E	LZB 119 1661

AUTOMATIC TELEPHONE CONNECTION

This functions exists only if you have a CU210 with identity number 0. To enable the automatic telephone connection function press |Transfer| twice. The display flashes:

TRANSFER TO TEL

Press |#|, and the CU210 enters automatic telephone connection mode. Press |*| three times within three seconds to exit this mode.
In automatic telephone connection mode no normal calls to the CU210 are accepted and no keys have any meaning except |Loudspeaker|, |Keyboard PTT|, |Horn| and |*|.
To have transfer to telephone numbers work you need to set the CU210 in automatic telephone connection mode.
Whenever the CU210 is connected in a call in the automatic telephone connection mode, the operator can hear everything in the built in loudspeaker or in the handset loudspeaker. It
is also possible for the operator to break in by pressing PTT.
What the operator says will then be transmitted to both the radio and the telephone line.
The rest of this manual concerns the automatic telephone connection mode of the CU210.

Incoming calls

Telephone call from mobile to pre-programmed number

CU210 lifts the hook, waits for the dial tone and dials the pre-programmed telephone number.
Two different situations can arise:

- Dial tone detect failure. This can happen either when first lifting the hook or when a dial tone is needed before in the middle of a telephone number, before continuing dialling. The call will be disconnected.
- Telephone number is successfully dialled. The LF between the telephone line and the radio will be connected.

The other CUs in the system indicate LINE BUSY, and cannot break in.
The call can be disconnected in a number of different ways:

- Detection of ten consecutive ring- or busy-tones.
- The operator by the telephone dials a DTMF #.
- The mobile transmits a WHC-call.
- The mobile transmits a DISCON call (personality programmable if allowed or not).

Telephone call from mobile with free dialling

CU210 lifts the hook and waits for the dial tone and dials the pre-programmed telephone digits if there are any. From now on the mobile can transmit TELDIG telegrams, each one making one telephone digit to be dialled. Except from the free dialling of telephone digits, this traffic state is identical to the one described above. If free dialling is taking place on a simplex channel or on a 2 wire connection, a detected dial tone will be transmitted to the mobile and then interrupted, to give the mobile operator a chance to dial. Furthermore after each dialled digit, the LF from telephone to radio is blocked during 5 seconds.

Alarm call to telephone

When an alarm call to telephone is received, eventual traffic going on, except alarm traffic, will be disconnected.
The hook is lifted and the pre-programmed telephone number is dialled. Thereafter the behaviour is identical as a normal call from a mobile to telephone. If alarm traffic is already going on when an alarm call is received, the alarm call will be ignored.

Alarm call to LAC

When an alarm call to LAC is received, eventual traffic going on, except alarm traffic, will be disconnected. The hook is lifted, the telephone number to LAC is dialled and the alarm code is transferred. Thereafter the LF between the radio and LAC is connected. For further information of the signalling protocol between CU210 and LAC, please refer to ERA document no F/KTF 83:145 "Personlarmsignalering mot LAC". The call is disconnected by DTMF # or DTMF C from the LAC operator. If alarm traffic is already going on when an alarm call to LAC is received, the alarm call to LAC will be ignored. During the connecting phase of alarm call to LAC it is not possible for the operator to break in by pressing PTT.

Outgoing calls

Call from telephone to mobile

When CU210 has detected a ring signal, the hook is lifted and one of two different answer tones is generated:

- LP200/210 is involved in traffic. It is not possible to make a call from telephone. A block tone consisting of 250 ms long 425 Hz tone followed by a 750 ms pause is repeated five times before hanging up.
- LP200/210 is idle and is ready to accept a call from telephone. A 1 second long 425 Hz answer tone is transmitted.

Access code

To gain access to the CU210 from telephone, an access code must be dialled. If an erroneous or incomplete access code is dialled, a block tone will be generated and the phone will be hung up. After five digits have been dialled CU210 answers with a DTMF #.
If no access code is dialled, an automatic call, if personality programmed, will be transmitted.

Function code

After the five digit access code, a one digit function code shall be dialled. CU210 will answer to this with a DTMF #. The function code determines the number of digits needed to form a complete route and address and if it is a group or normal call.
If no function digit is dialled, an automatic call, if personality programmed, will be transmitted.

Route and address selection

Depending on the dialled function code, a different number of digits shall be dialled to choose route and address. The default coding of the CU210 regarding function code, route and address selection is the following:

Function code	Route	Address	Call type
1	12	12345	Normal
2	__	12345	Normal
3	__	12___	Normal
4	__	___45	Normal
5	12	12__5	Normal
6	12	_____	Normal
7	00	_____	Normal
8	1_	12_45	Normal
9	_2	12300	Group
0	__	_____	Group

If function code 1 is dialled, no further address selection is made.
The tone call "1 2 3 4 5" will be transmitted on route 12.
The transmitted call will be a normal call.

If function code 2 is dialled, the two digit route shall be dialled.
Thereafter the tone call "1 2 3 4 5" will be transmitted on the dialled route. The transmitted call will be a normal call.

If function code 8 is dialled, the second digit of the route, say X, and the third digit of the address, say Y, shall be dialled. The tone call "1 2 Y 4 5" will be transmitted on route 1Y. The transmitted call will be a normal call.

If function code 0 is dialled, both the route and the address is completely chosen by the operator, who shall dial seven digits.
The transmitted call will be a group call.
If an incomplete address is dialled, the call will be disconnected and the phone will be hung up.

Automatic call

The automatic call, if personality enabled is transmitted when
- Access code enabled and no access code is dialled or
- No function code is dialled

The automatic call can be programmed to a fixed route or to automatic selection of a route. If the automatic call is disabled and any of the three situations described above occur, the block tone will be transmitted to the telephone and the phone will be hung up.

Connected call

When the initial tone call has been made, the LF between the radio and the telephone line will be connected. The other CUs in the system will indicate LINE BUSY, and cannot break in.
The telephone operator can disconnect the call in two different ways:
- By dialling a DTMF #. A DISCON telegram will be sent on the radio and the call is disconnected.
- By dialling a DTMF * and five more digits. A WHC call will be transmitted. If it succeeds the call will be disconnected.

A call is also disconnected if ten consecutive ring or busy tones are detected.

Call termination

Aside from the possibilities to disconnect a call mentioned above, the following conditions will also cause a disconnect:
- Maximum call time reached. This time is usually set to 5 minutes, but is a matter of personality programming and may differ from system to system. Ten seconds before this time expires, LP200/210 will start transmitting a warning tone.
- Silence and no squelch for 30 seconds. This time is also personality programmable. Ten seconds before this time expires, LP200/210 will start transmitting a warning tone.

No matter the disconnect condition, a block tone is always transmitted to the telephone line before hanging up.

Simplex and 2 wire operation

If the chosen channel is a simplex channel or a 2 wire connection to LP200/210 is used, the traffic has to be simplex, i.e., speech in one direction at a time. The direction is chosen by the CU210 with a so called VOX.
However, if personality enabled, the telephone operator can enable the VOX by dialling DTMF 7 and disabling the VOX by dialling DTMF 8. If the VOX is disabled, PTT is immediately shut off.
In the case of a 2 wire connection, the operator at the CU can hear the telephone line LF only when the transmission path from the telephone to the radio is open.

ERICSSON Ericsson Radio Systems

Installa... ...tning
Installatio... ...Drawing

Blad · Sheet 1(3)

Uppgjord · Prepared	Faktaansvarig · Subject responsible	Nr · No.
KI/ERA/XLB/IAn	F/TRK/AAD	1531-KDV 120 1002 UEn

Dokansvi/Godk · Doc respons/Approved	Datum · Date	Rev	File
R/FTC P Spur	91-10-14	D	

Benämning	Title
MANÖVERAPPARATSATSER CU 200	CONTROL UNIT KITS CU 200

Art. nr för denna ritn: LZT 123 235
Part no. for this drawing: LZT 123 235

INSTALLATION DRAWING FOR 4-WIRE SYSTEMS

Line to radio Maximum attenuation 20 dB
Rx Tx
Line to radio with only one control unit
Power unit BMJ 142 12/1 (EURO) BMJ 142 12/2 (UK)
Other 12V DC source
Outer connector +12V Inner connector –
Cable RPM 513 67
OPTIONAL Cable and slave unit when using 4 - 6 control units
Junction box KEY 101 02/1 when using more than one control unit
Master
Slave
NOTE! Do not connect 12V to slave unit
Junction box KEY 101 02/1
Power unit BMJ 142 12/1 (EURO) BMJ 142 12/2 (UK)
Outer connector +12V Inner connector –
Other 12V DC source
Handset RLG 405 05/801
Cable TRS 864 14/0
Control unit KEP 813 05/1
Control unit 1
APP.
RADIO
Tx Rx
Tx1 Rx1
Tx2 Rx2
Tx3 Rx3
Tx4 Rx4
Tx5 Rx5
Tx6 Rx6
Connection cable RPM 213 05/1
Lightning protector RR-192500
Maximum line attenuation 20 dB
bk w r g bl y
Line to radio Maximum attenuation 20 dB
To control unit 1
To control unit 4
To control unit 5
To control unit 6
Rx line
Tx line
Tape recorder
Ext. Alarm 1 ★★
Ext. Alarm 2
Max 48V/500mA
To telephone patching unit
V24 Interface
Ext Modem
Connector RNV 403 06/1
Control unit 2
Control unit 3
Maximum line attenuation 20 dB
Maximum line attenuation 20 dB

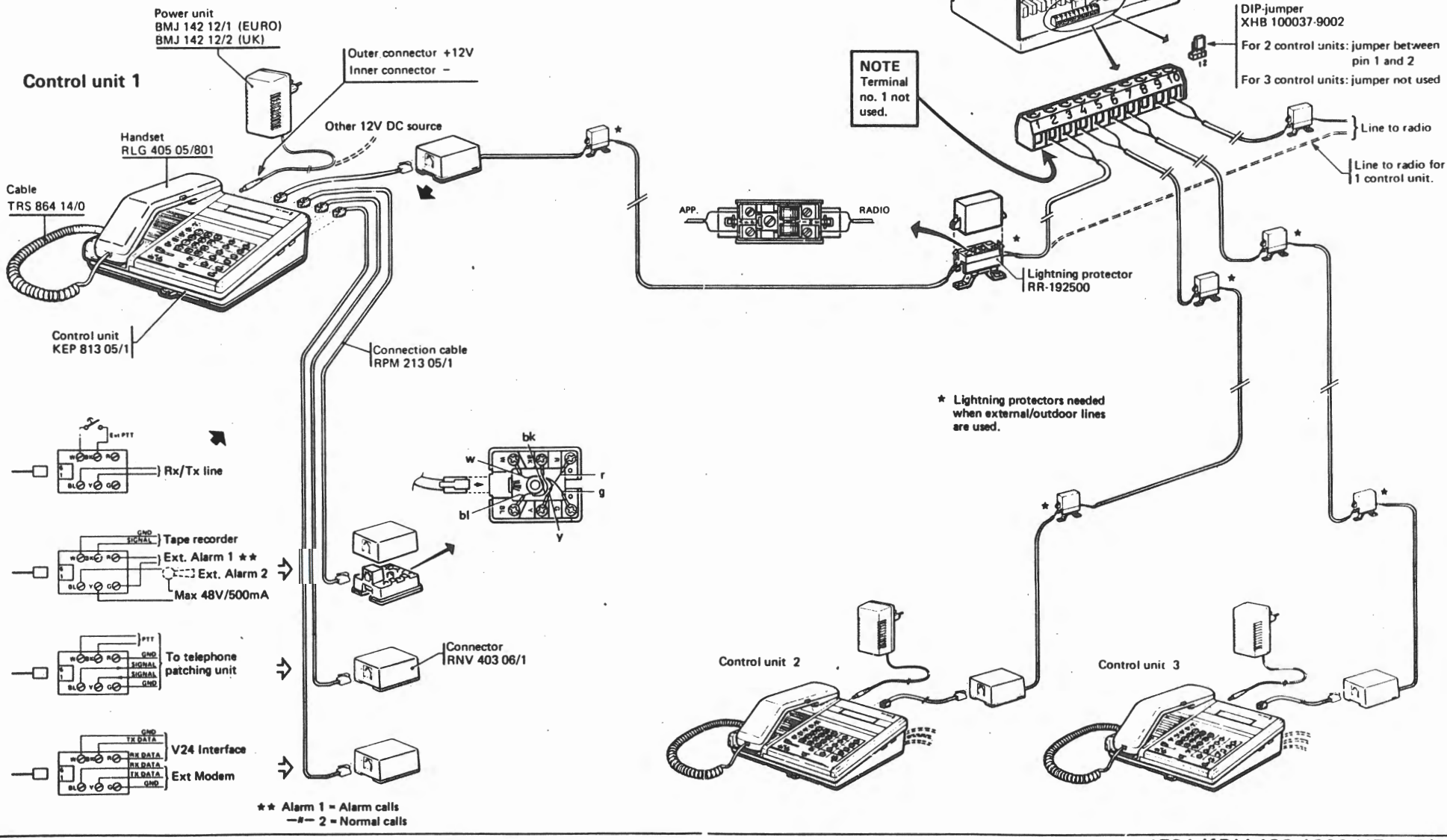
★★ Alarm 1 = Alarm calls
—#— 2 = Normal calls

★ Lightning protectors needed when external/outdoor lines are used.

Uppgjord · Prepared	Faktaansvarig · Subject responsible	Nr · No	
KI/ERA/XLB/IAn	F/TRK/AAD	1531-KDV 120 1002 UEn	
Dokansv/Godk · Doc respons/Approved		Datum · Date	Rev / File
R/FTC P Bjork		91-10-14	D
Benämning		Title	
MANÖVERAPPARATSATSER CU 200		CONTROL UNIT KITS CU 200	

INSTALLATION DRAWING FOR 2-WIRE SYSTEMS

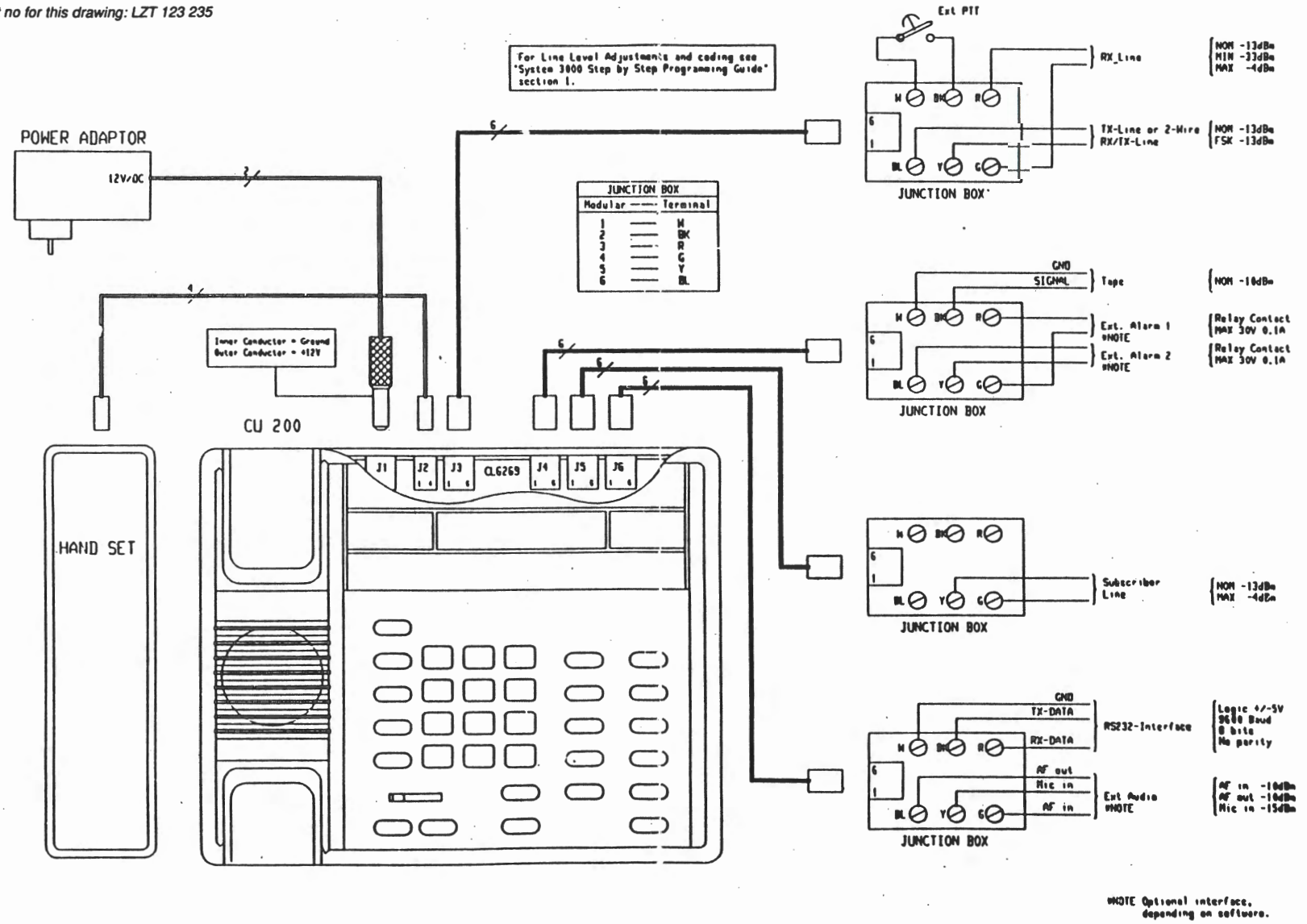
NOTE!
Maximum attenuation between control unit and radio: 20 dB.
Attenuation in junction box: 11 dB.
Att. in each lightning protector ≈ 1 dB.



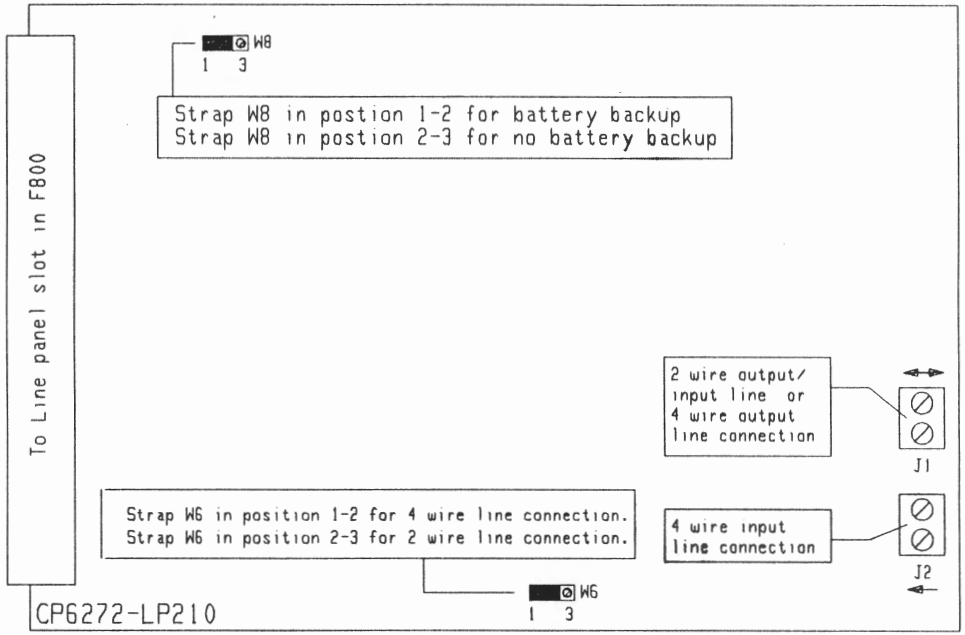
Uppgjord - Prepared	Faktaansvarig - Subject responsible	Nr - No	
KI/ERA/R/FT/CA	R/FTC	1531- KDV 120 1002 UEN	
Dokansv/Godk - Doc respons/Approved		Datum - Date	TRev / File
R/FTC PSpute		91-10-14	D
Benämning		Title	
MANÖVERAPPARATSATSER CU210		CONTROL UNIT KITS CU210	

INSTALLATIONS DRAWING
FOR 2 AND 4 WIRE SYSTEMS
AND TELEPHONE INTERCONNECTION

Part no for this drawing: LZT 123 235



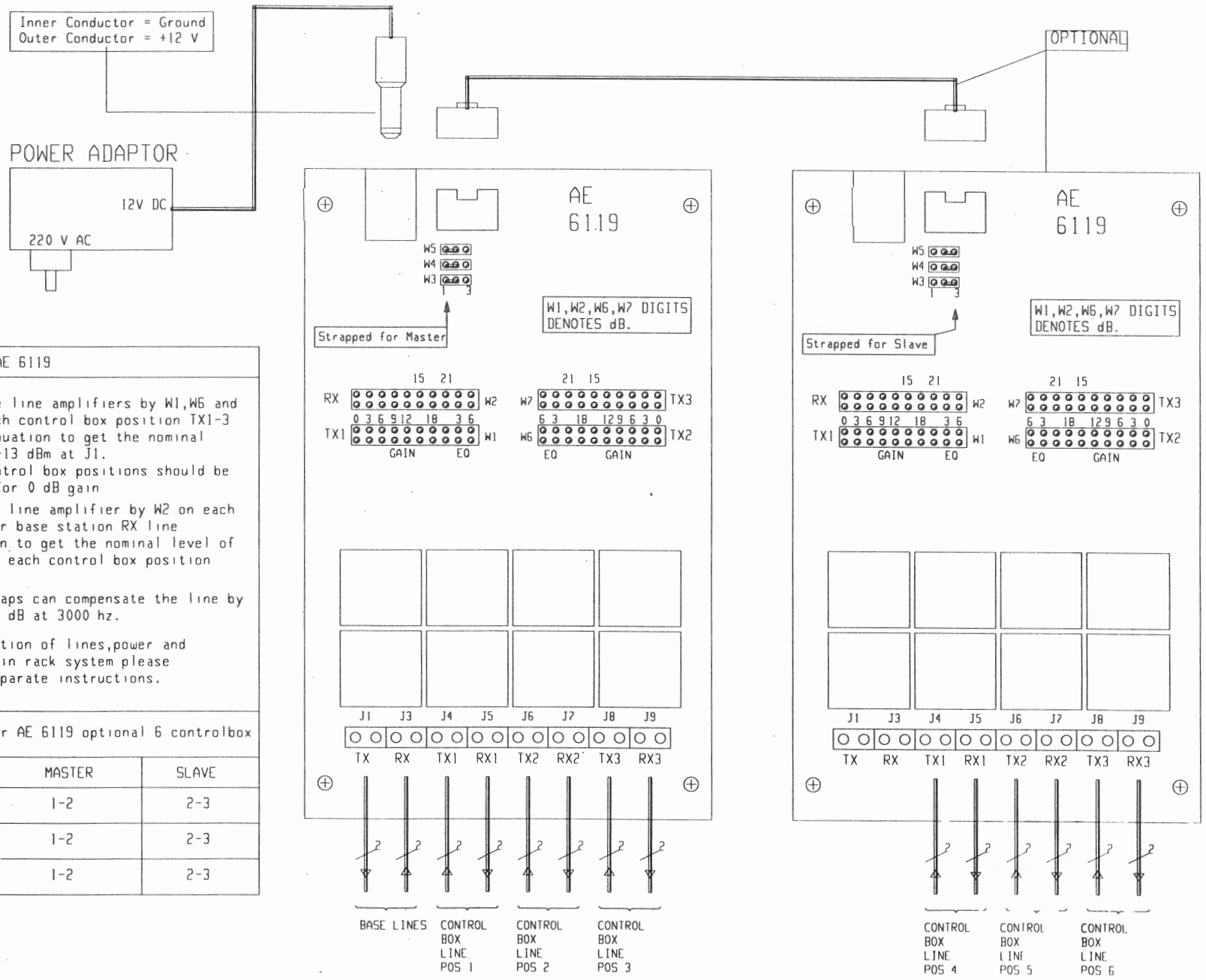
Installation notes	check
1. To use the line panel with F 800 check that internal wiring of F 800 lines to line panel slot is according to above diagram and modify if necessary.	
2. Measure the line attenuation and frequency response.	
3. Select 2 or 4 wire connection with strap W6.	
3. Connect a CU to the line and adjust line 2 / 4 wire , gain and equalizer in AREA 2.	
5. Set strap W8 in postion 1-2 for battery backup of realtime clock.	
6. Plugg in board in F800 line panel slot.	



Line panel slot		Chassi connector lines	F 800
J1B pin 2	L1A	J2 pin 5	2 wire/4 wire RX (to CU:s)
J1B pin 3	L1B	J2 pin 4	
J1A pin 2	L2A	J2 pin 3	4 wire TX (from CU:s)
J1A pin 3	L2B	J2 pin 2	

Line panel slot		Inputs and Outputs	F 800
J1A pin 25	G-IN1	Input 1 active low (internal pull up +5V)	
J1A pin 24	G-IN2	Input 2 active low (internal pull up +5V)	
J1A pin 27	G-OUT1	Output 1 active low max 50 mA	
J1A pin 26	G-OUT2	Output 2 active low max 50 mA	

SA3	Description:	Date: 93-06-21
SMS STYRSYSTEM	Installation in F800 Radio	Page: 1 of 1
	Title: LP210 Scale:	Dwg.nr:



Notes:

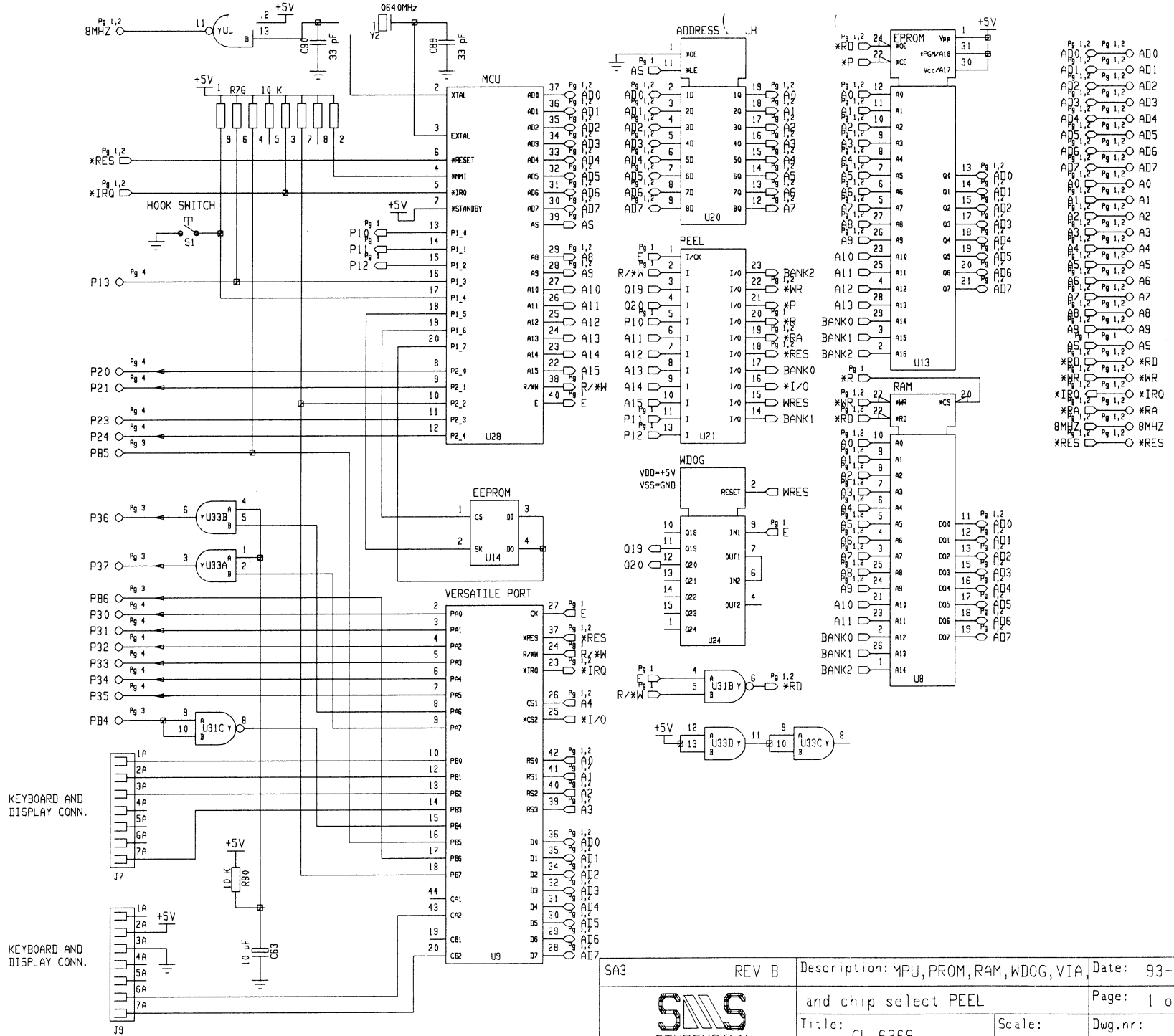
Adjustments AE 6119

1. Adjust the line amplifiers by W1,W6 and W7 for each control box position TX1-3 line attenuation to get the nominal level of -13 dBm at J1.
   Unused control box positions should be strapped for 0 dB gain
2. Adjust the line amplifier by W2 on each AE 6119 for base station RX line attenuation to get the nominal level of -13 dBm at each control box position RX1-3.
3. The EQ straps can compensate the line by 0,+3,+6,+9 dB at 3000 hz.
4. For connection of lines,power and expansion in rack system please consult separate instructions.

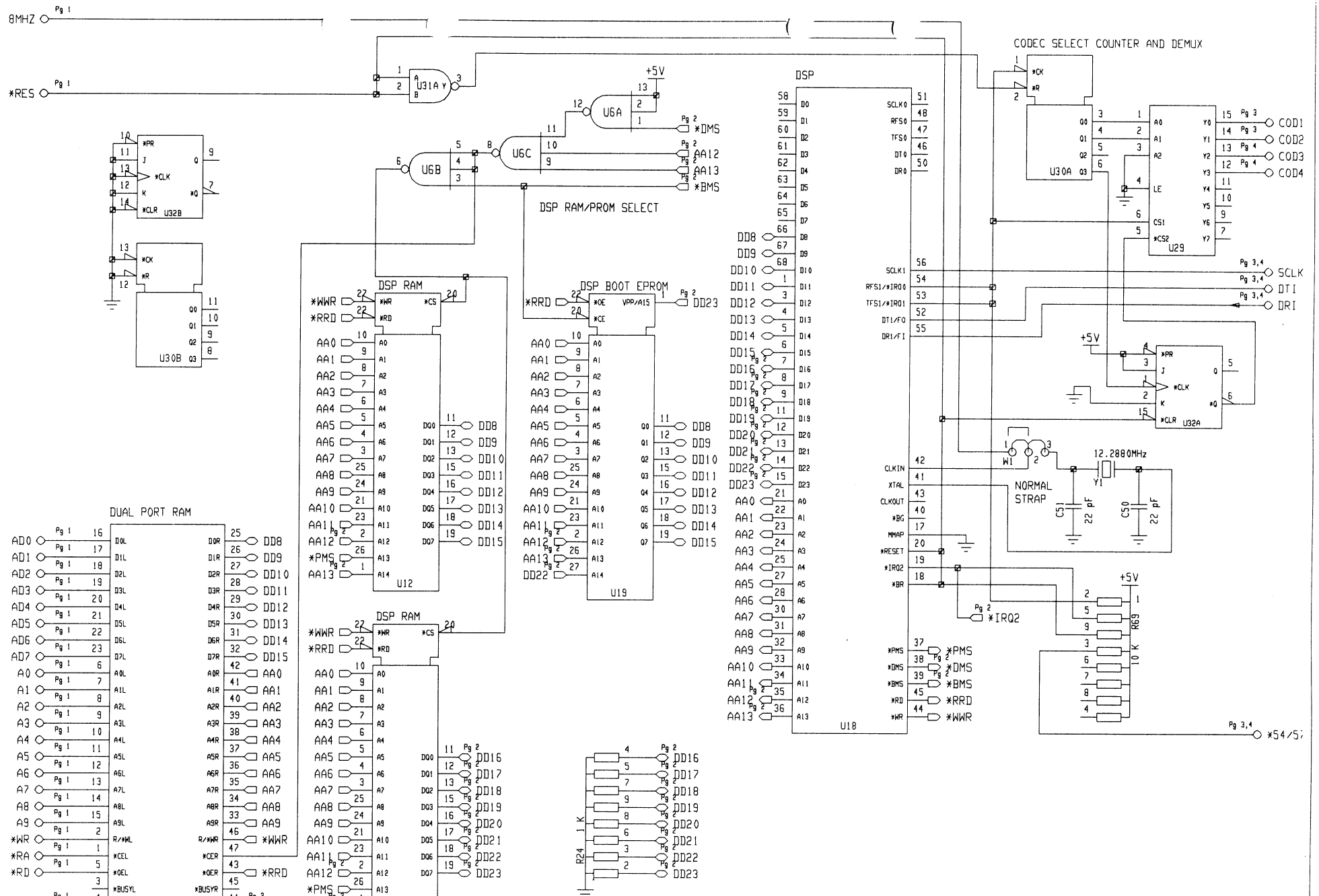
Strap Table for AE 6119 optional 6 controlbox

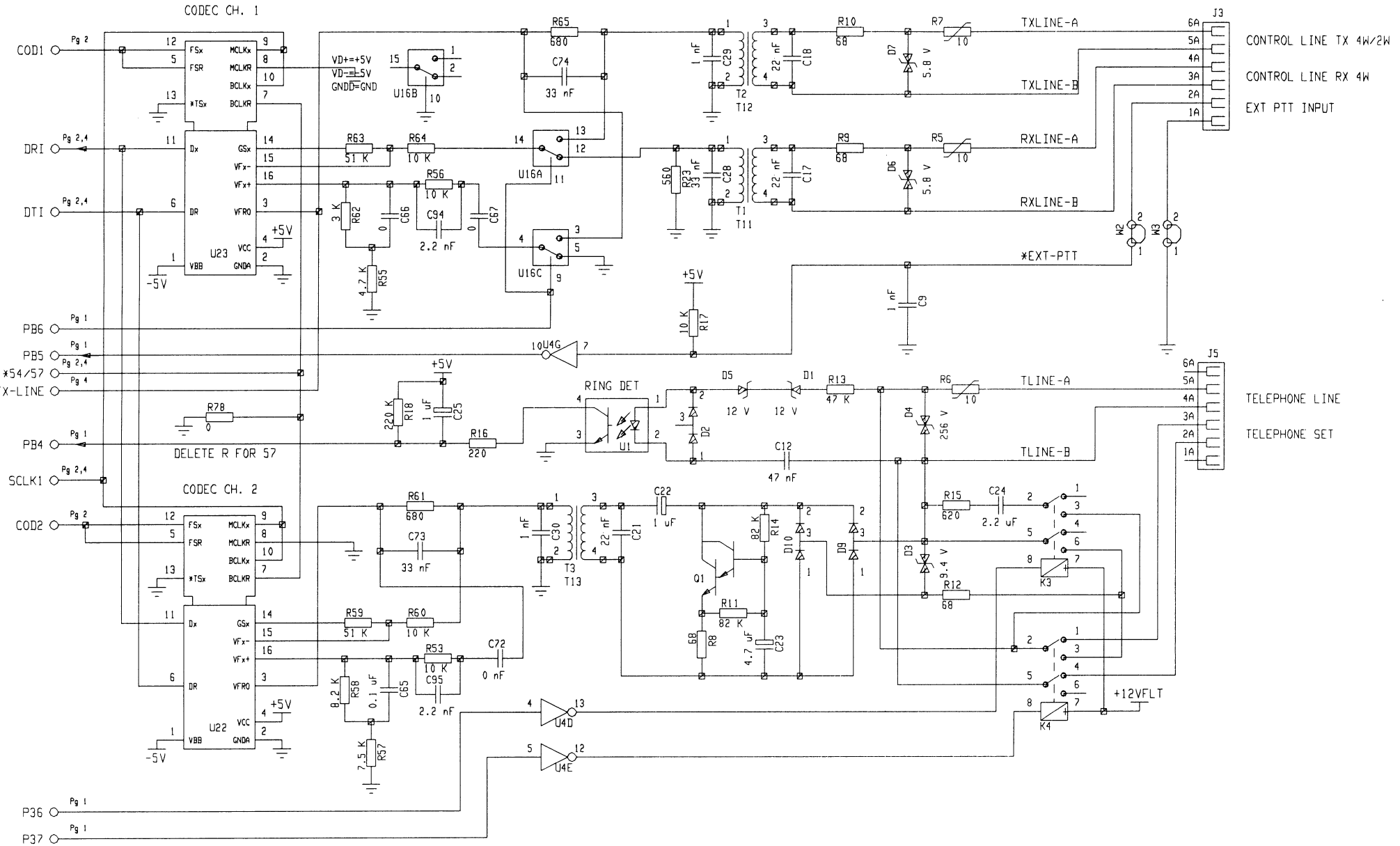
Strap	MASTER	SLAVE
W3	1-2	2-3
W4	1-2	2-3
W5	1-2	2-3

SA3 REV B	Description: Installation note		Date: 97 04 08
SMS TELECOM			Page: 1 of 1
	Title: AE 6119	Scale:	Dwg.nr:

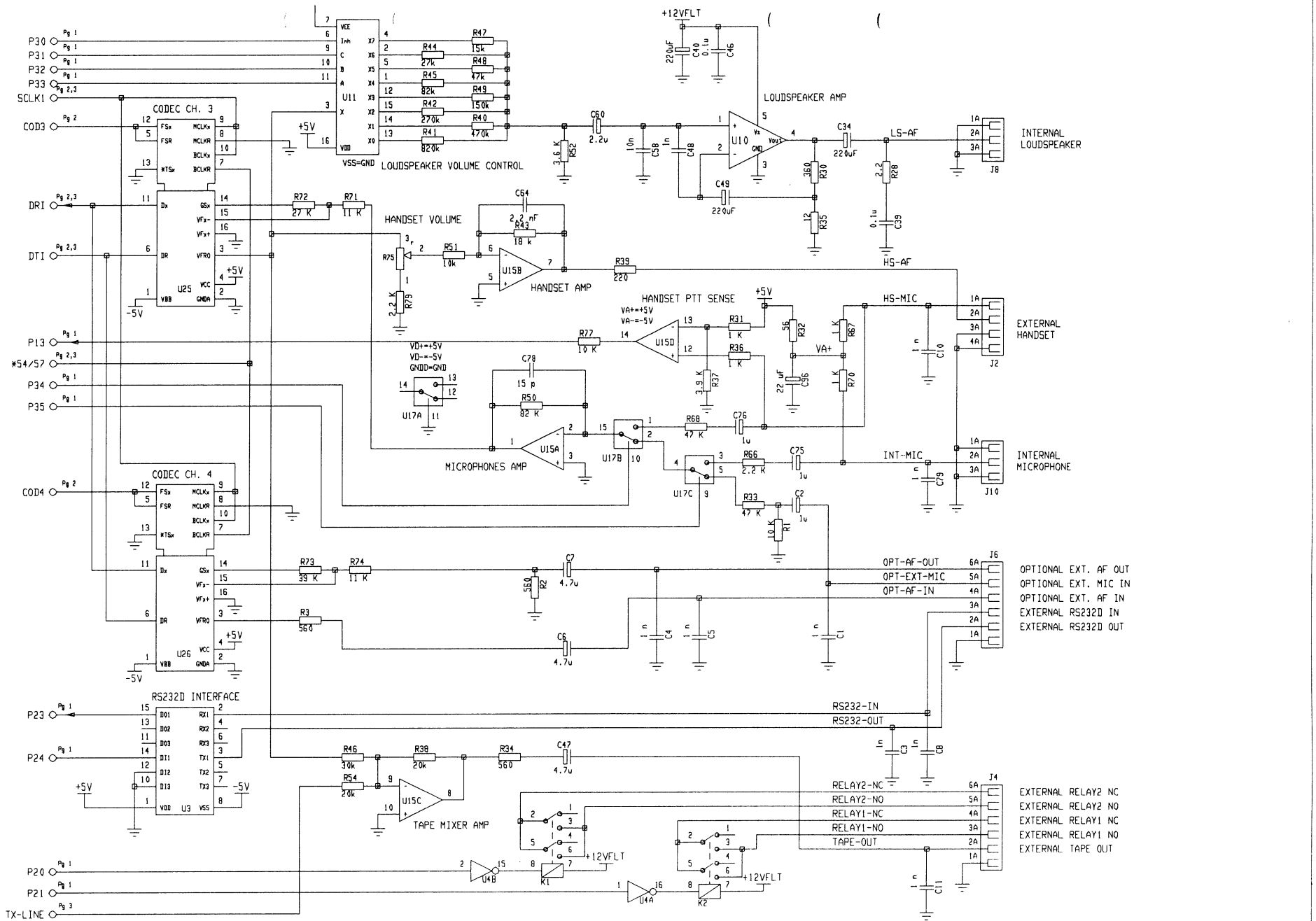


SA3 REV B	Description: MPU, PROM, RAM, WDOG, VIA, and chip select PEEL	Date: 93-05-10	
STYRSYSTEM		Page: 1 of 5	
	Title: CL 6269	Scale:	Dwg.nr:

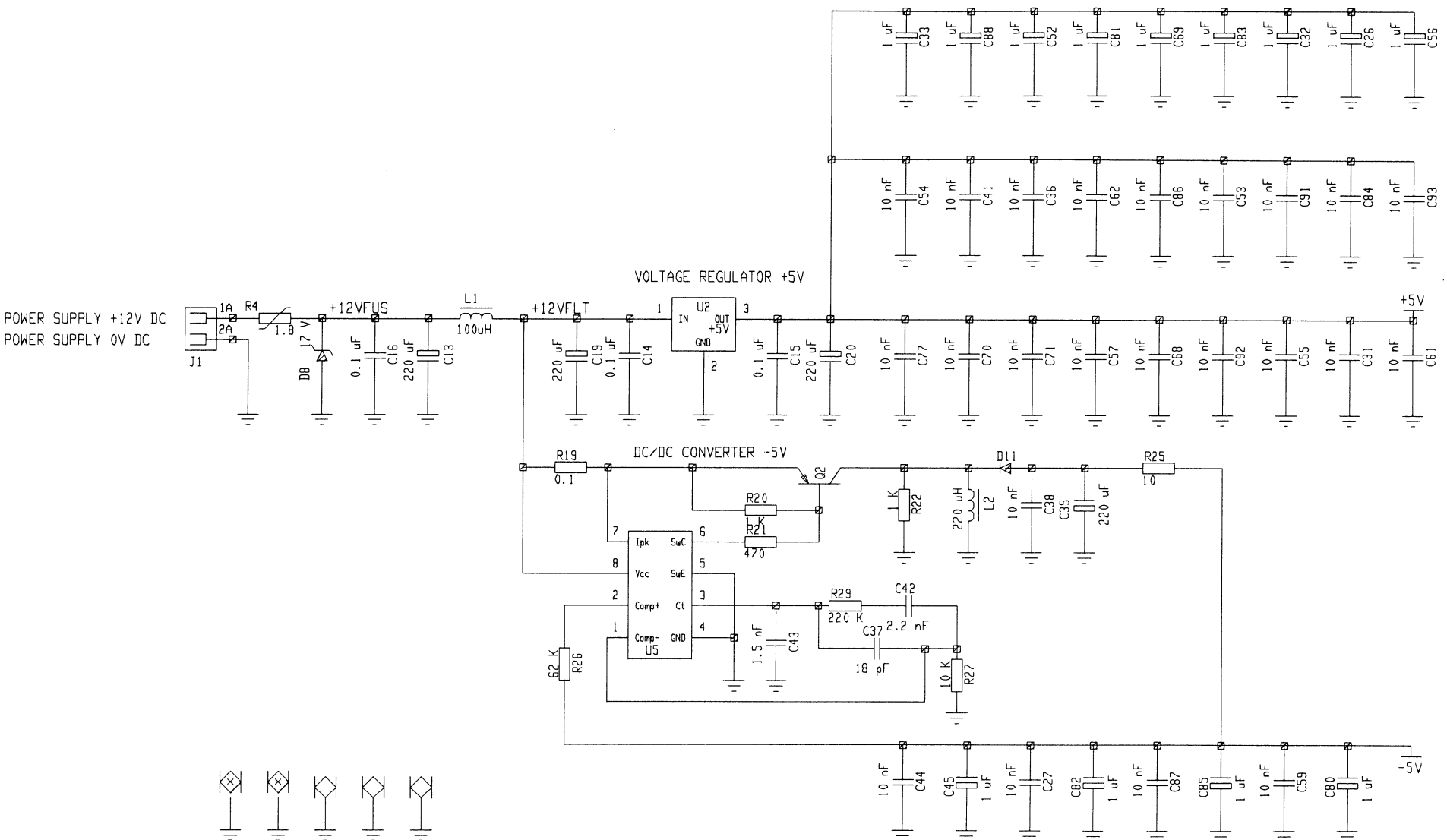

8MHZ
*RES
U31A
U6A
U6B
U6C
+5V
*DMS
AA12
AA13
*BMS
DSP RAM/PROM SELECT
DSP
CODEC SELECT COUNTER AND DEMUX
U30A
U29
COD1
COD2
COD3
COD4
SCLK
DTI
DRI
U32A
U32B
U30B
DSP RAM
DSP BOOT EPROM
U12
U19
U7
U18
DUAL PORT RAM
U27
*IRQ2
*RRD
*WWR
*PMS
*54/57
W1
NORMAL STRAP
12.2880MHz
Y1
C51
C50
22 pF
R69
10 K
R24
1 K
SA3
REV B
STYRSYSTEM
Description: Dual port RAM, DSP RAM, DSP, BOOT PROM and CODEC select.
Date: 93-05-10
Page: 2 of 5
Title: CL 6269
Scale:
Dwg.nr:



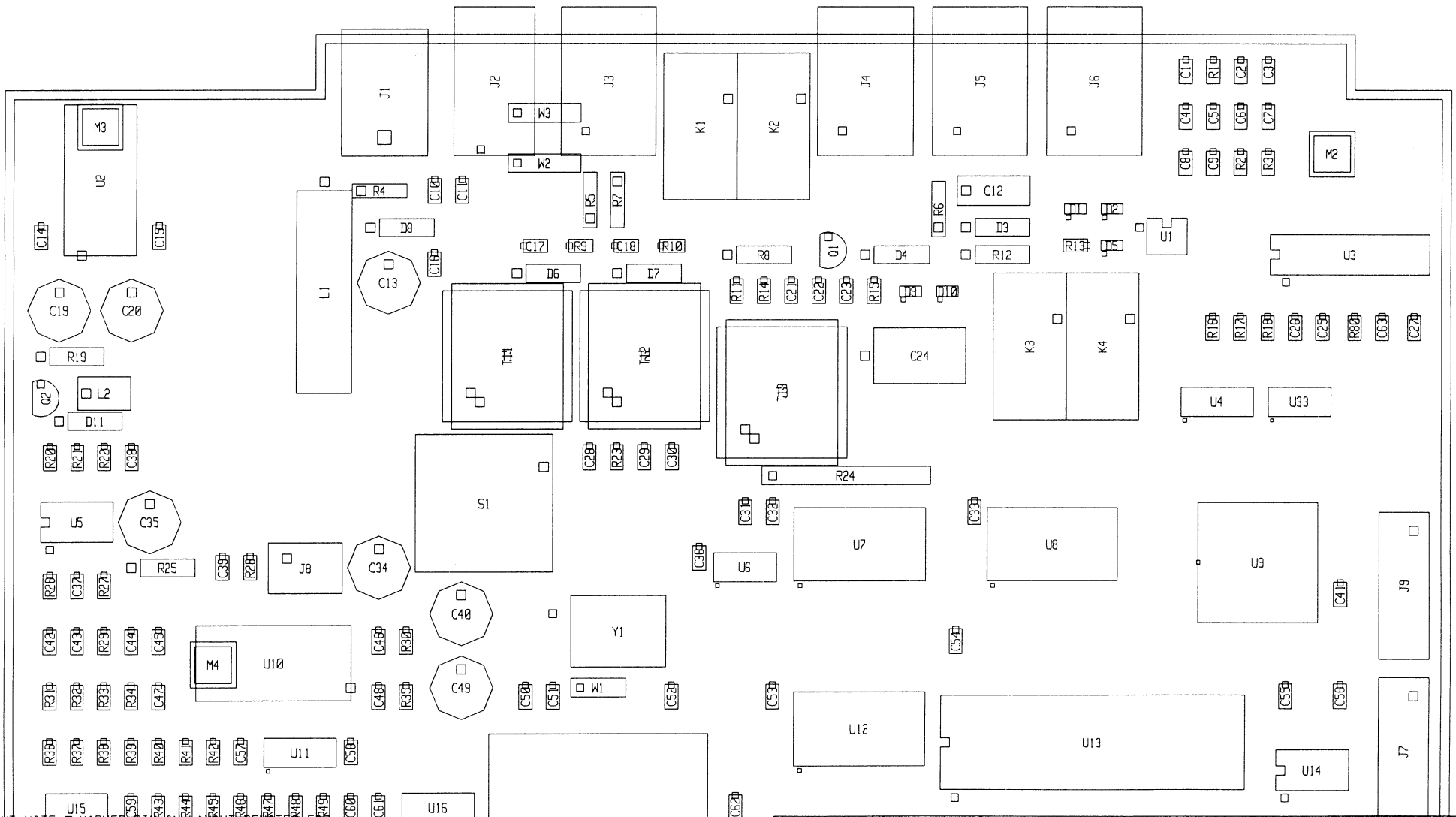
SA3 REV B	Description: CODECS with telephone and control line interface.		Date: 93-05-10
STYRSYSTEM			Page: 3 of 5
	Title: CL 6269	Scale:	Dwg.nr:



SA3 REV B	Description: LS, Handset, Mic, Tape,		Date: 93-05-10
STYRSYSTEM	RS232D, Relays interface.		Page: 4 of 5
	Title: CL 6269	Scale:	Dwg.nr:

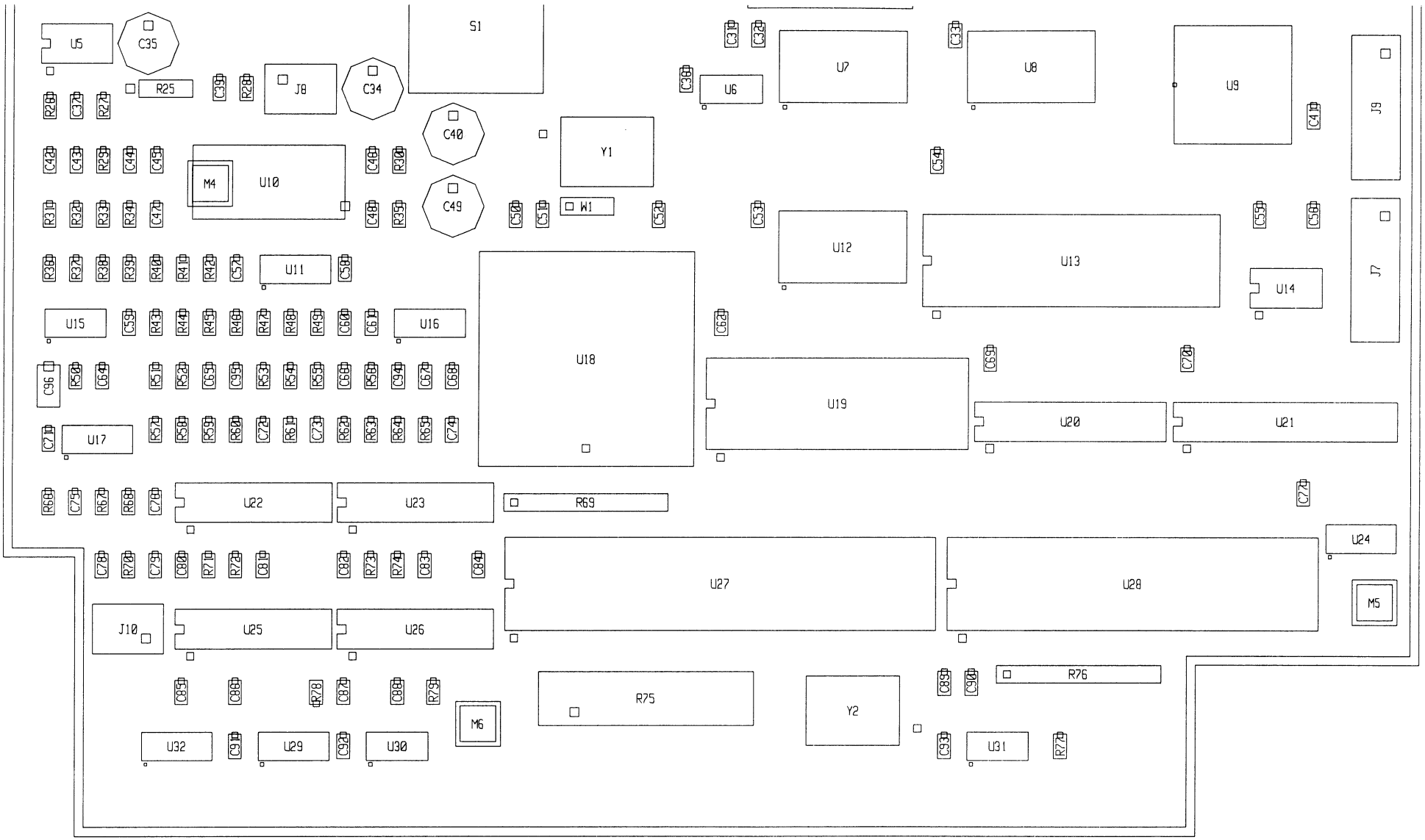


SA3 REV B	Description: Power supply voltage		Date: 93-05-10
STYRSYSTEM	regulator +5V and DC/DC -5V		Page: 5 of 5
	Title: CL 6269	Scale:	Dwg.nr:



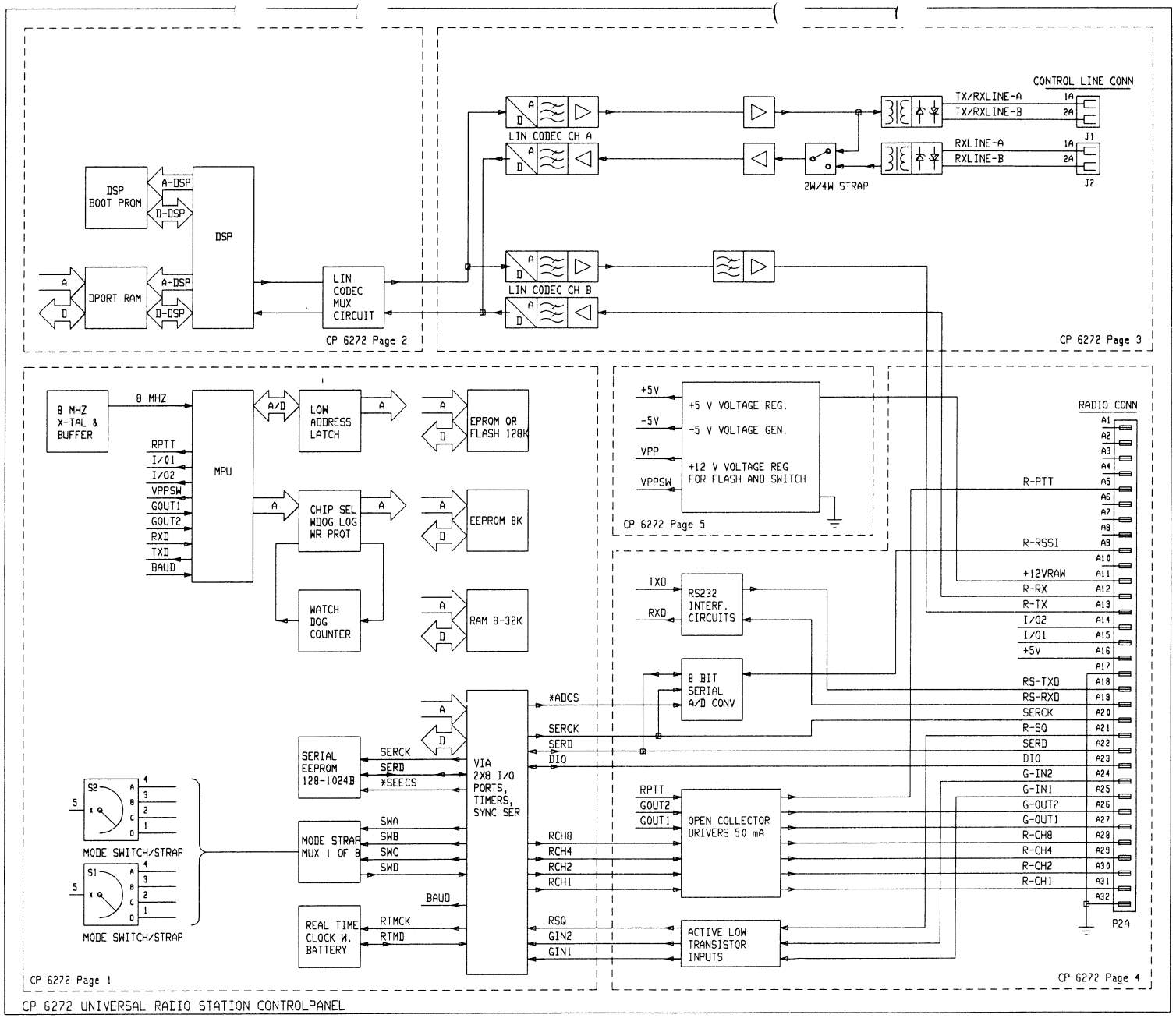
LAYOUT NOTE: MARKED PIN ON LAYOUT DENOTES FOR
LEDS: CATODE PIN ,SHORT PIN OR PHASED BODY SIDE
DIODES: CATODE PIN
TANTAL AND ELECTROLYT: POSITIVE PIN
CONNECTORS: 1A OR A1 PIN
SMD IC : PIN 1

SA3LAY REV B	Description: Component layout		Date: 93-05-17
STYRSYSTEM			Page: 1 of 2
	Title: CL 6269	Scale:	Dwg.nr:



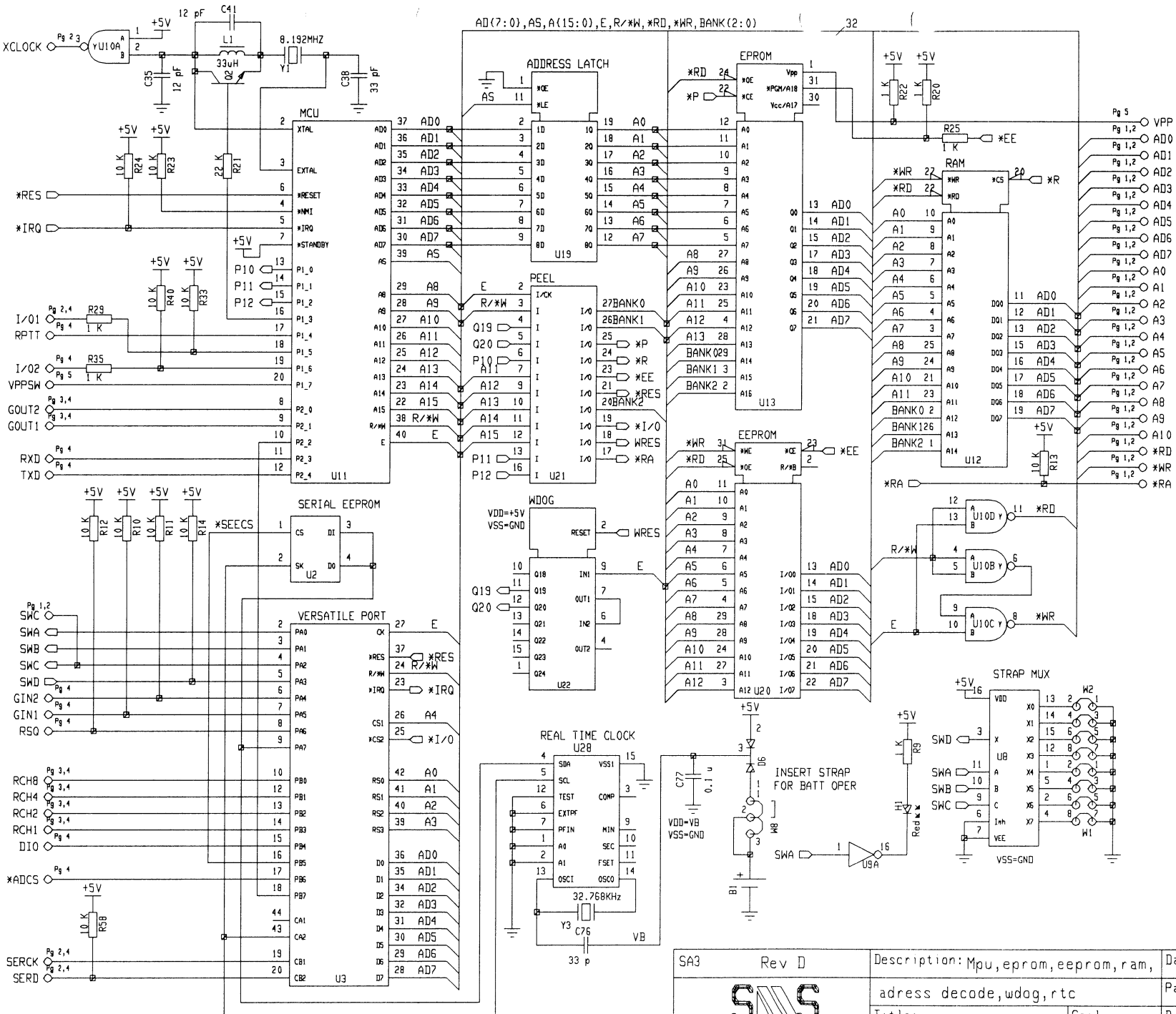
LAYOUT NOTE. □ MARKED PIN ON LAYOUT DENOTES FOR
LEDS: CATODE PIN ,SHORT PIN OR PHASED BODY SIDE
DIODES: CATODE PIN
TANTAL AND ELECTROLYT: POSITIVE PIN
CONNECTORS: 1A OR A1 PIN
SMD IC : PIN 1

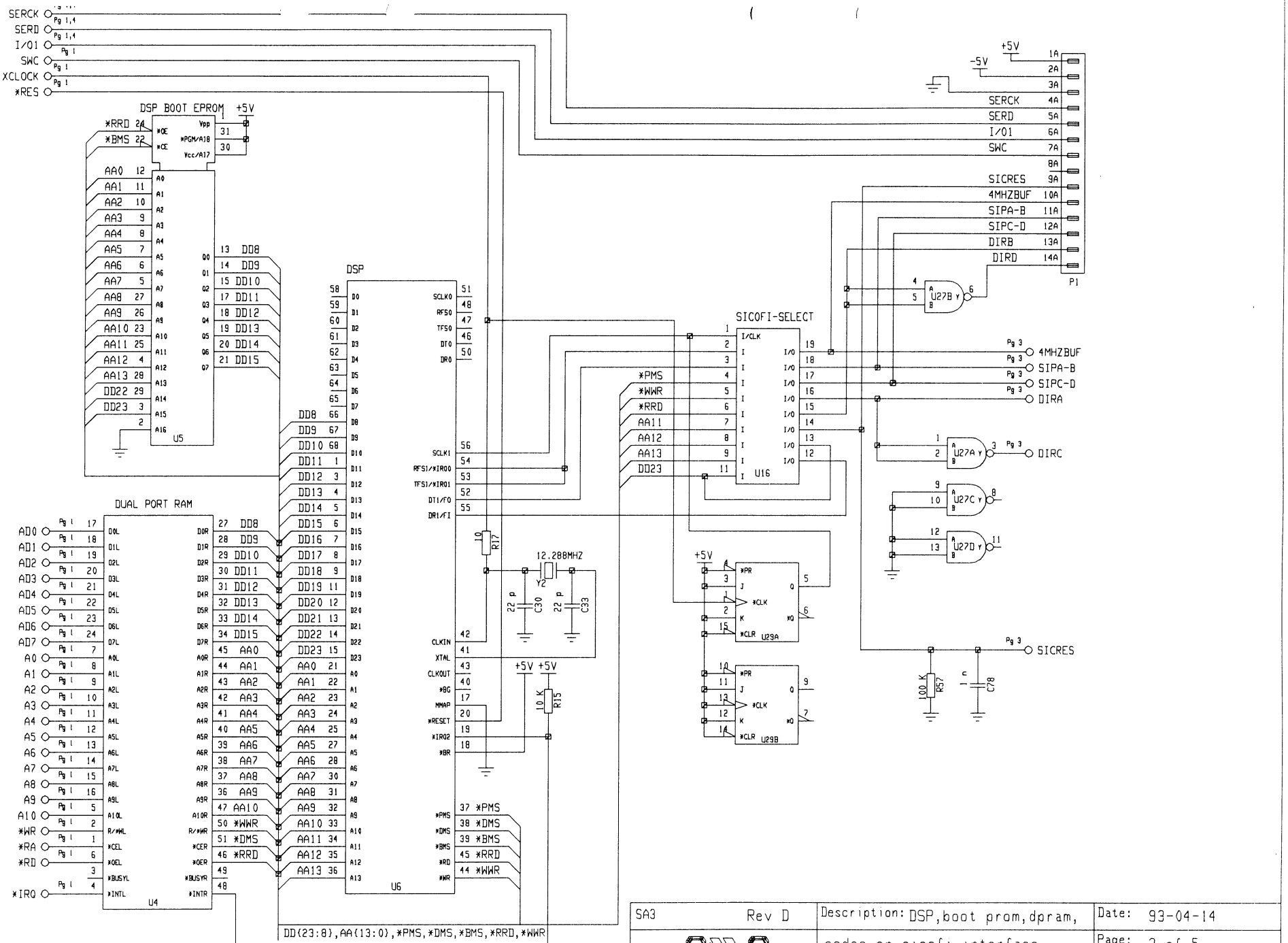
SA3LAY REV B	Description: Component layout		Date: 93-05-11
STYRSYSTEM			Page: 2 of 2
	Title: CL 6269	Scale:	Dwg.nr:

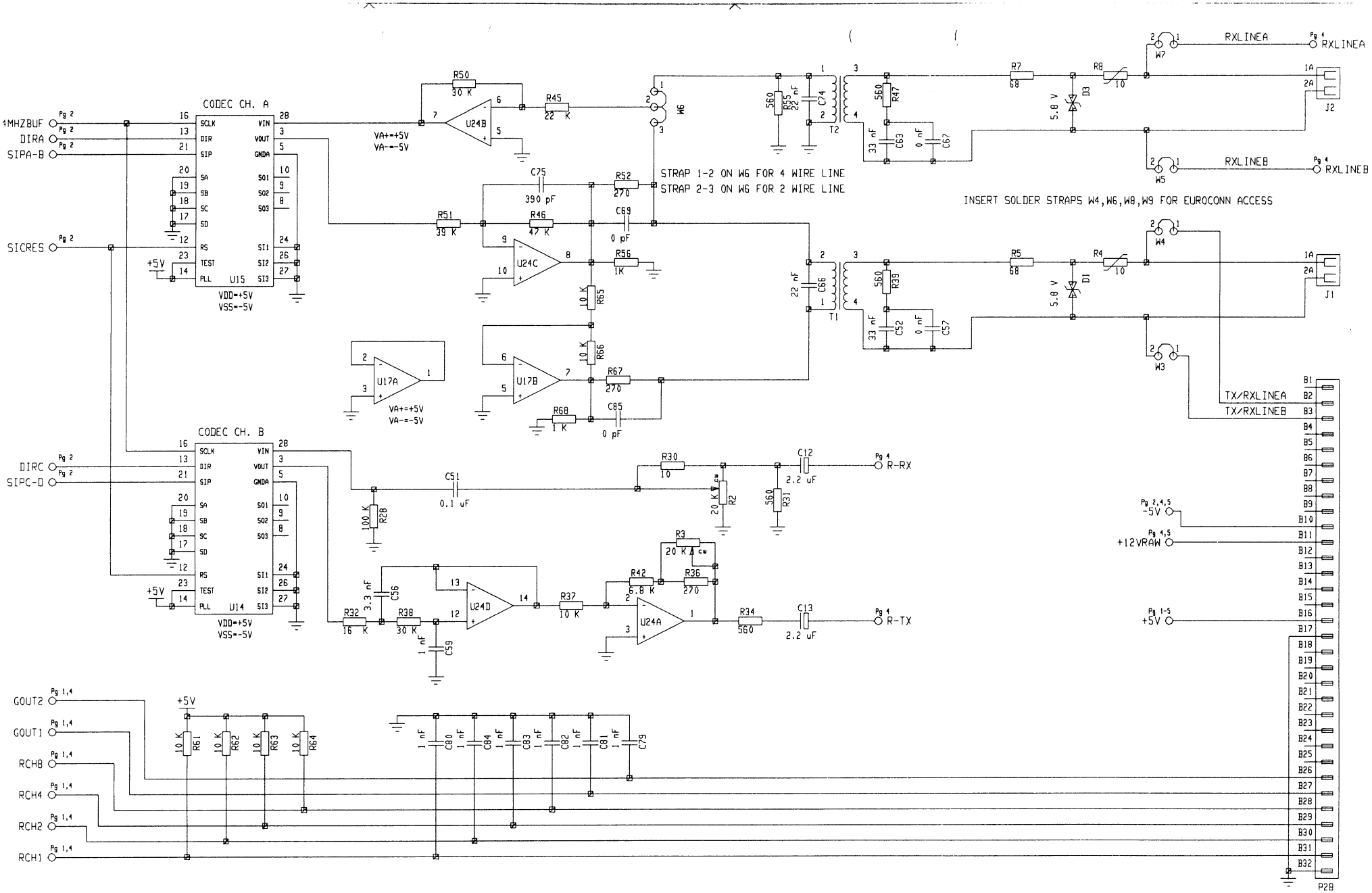


CP 6272 UNIVERSAL RADIO STATION CONTROLPANEL

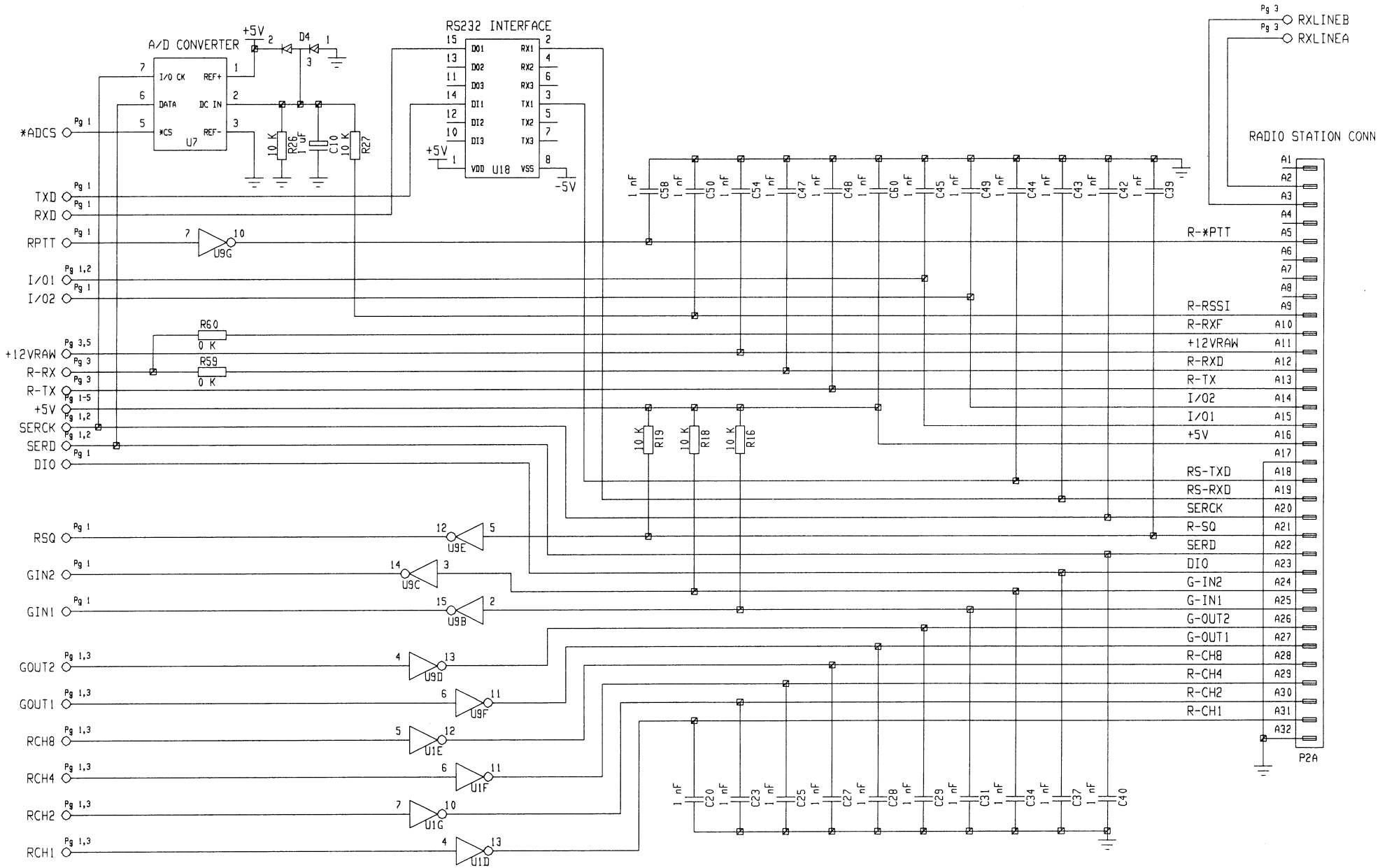
SA3 REV D	Description: Functional block-		Date: 93-01-05
STYRSYSTEM	diagram		Page: 1 of 1
	Title: CP 6272	Scale:	Dwg.nr:


AD(7:0),AS,A(15:0),E,R/*W,*RD,*WR,BANK(2:0)
32
MCU
ADDRESS LATCH
EPROM
RAM
PEEL
EEPROM
WDOG
SERIAL EEPROM
VERSATILE PORT
REAL TIME CLOCK
U28
32.768KHz
STRAP MUX
INSERT STRAP
FOR BATT OPER
VDD=VB
VSS=GND
STYRSYSTEM
SA3
Rev D
Description: Mpu, eprom, eeprom, ram,
adress decode, wdog, rtc
Date: 93-04-14
Page: 1 of 5
Title: CP 6272
Scale:
Dwg.nr:

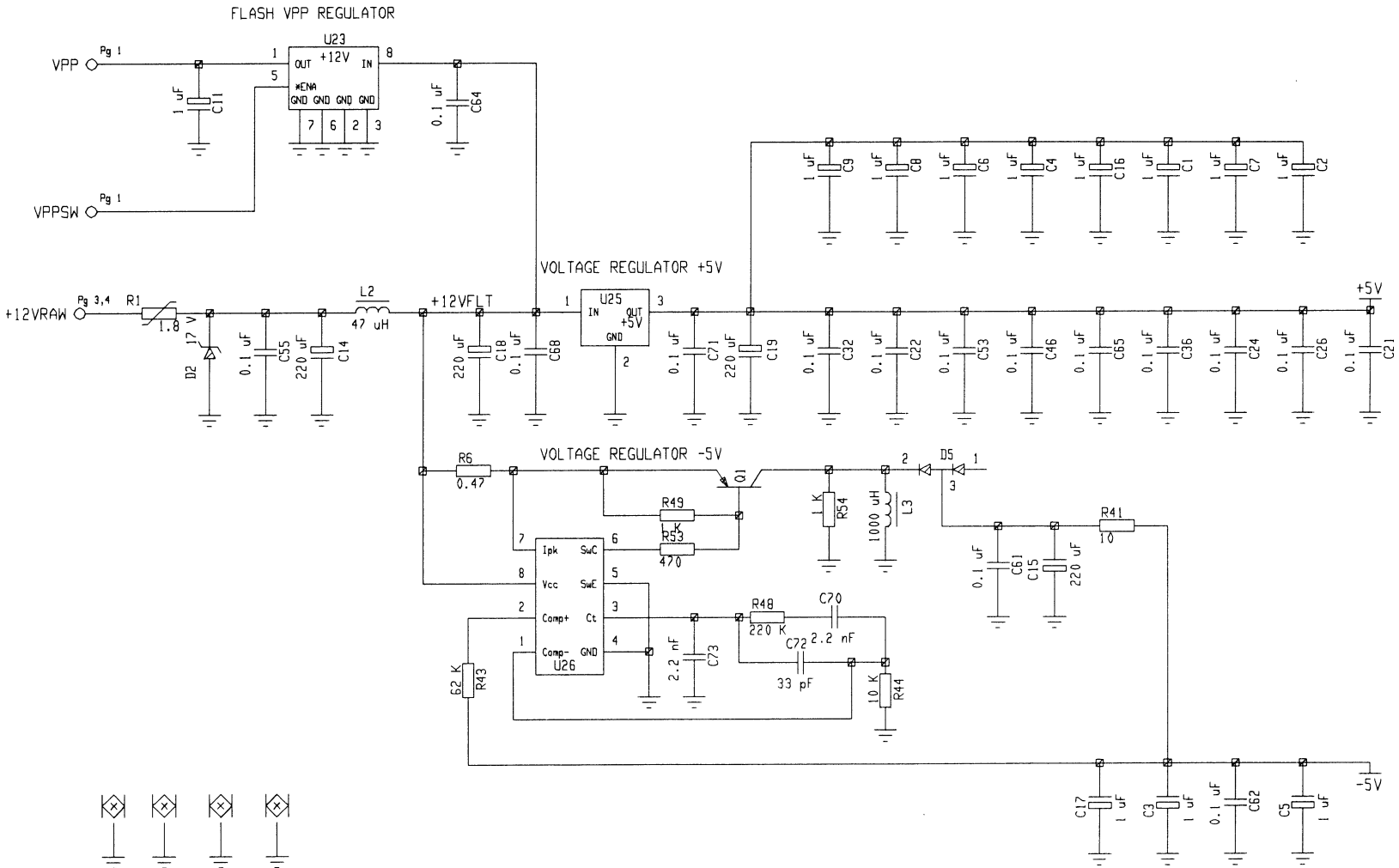

SERCK
SERD
I/O1
SWC
XCLOCK
*RES
DSP BOOT EPROM
+5V
-5V
P1
SICRES
4MHZBUF
SIPA-B
SIPC-D
DIRB
DIRD
DSP
SICOFI-SELECT
U16
U27B
U27A
U27C
U27D
DIRA
DIRC
DUAL PORT RAM
U4
U5
U6
U23A
U23B
12.288MHZ
Y2
C30
C33
C78
R17
R15
R57
10 K
100 K
DD(23:8),AA(13:0),*PMS,*DMS,*BMS,*RRD,*WWR
SA3
Rev D
STYRSYSTEM
Description: DSP, boot prom, dpram,
codec or sicofi interface
Date: 93-04-14
Page: 2 of 5
Title: CP 6272
Scale:
Dwg.nr:



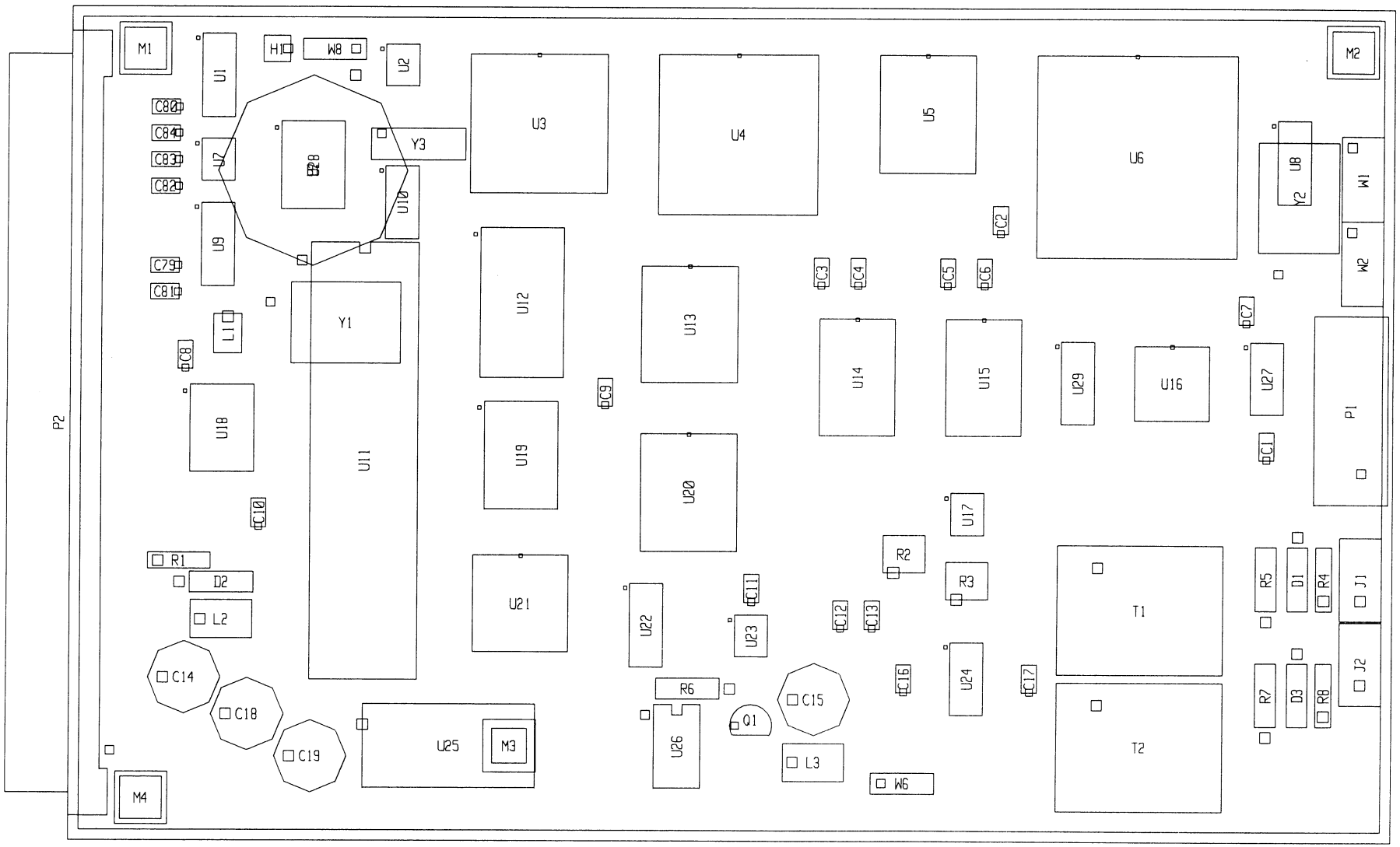
SA3 Rev D	Description: Codec or sicofi and radio and line af interface		Date: 93-04-14
STYRSYSTEM			Page: 3 of 5
	Title: CP 6272	Scale:	Dwg.nr:



SA3 Rev D	Description: RS 232 interface, a/d converter and radio interface	Date: 93-04-14	
STYRSYSTEM		Page: 4 of 5	
	Title: CP 6272	Scale:	Dwg.nr:

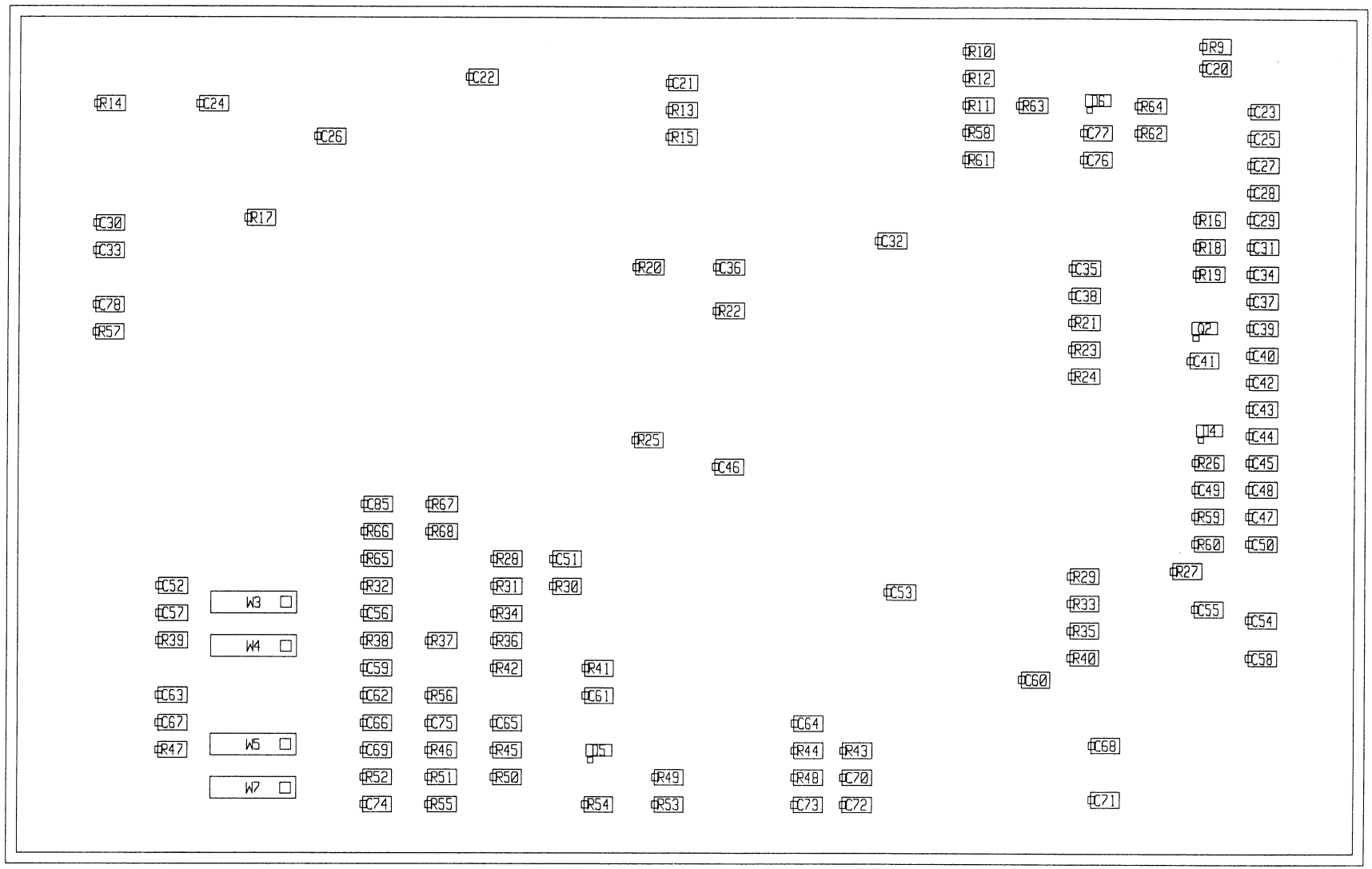


SA3 Rev D	Description: +5V/-5V regulator,		Date: 93-04-14
STYRSYSTEM	Vpp voltage switch och regulator		Page: 5 of 5
	Title: CP 6272	Scale:	Dwg.nr:



LAYOUT NOTE. □ MARKED PIN ON LAYOUT DENOTES FOR
LEDS: CATODE PIN ,SHORT PIN OR PHASED BODY SIDE
DIODES: CATODE PIN
TANTAL AND ELECTROLYT: POSITIVE PIN
CONNECTORS: 1A OR A1 PIN
SMD IC : PIN 1

SA3LAY REV D	Description: Component layout		Date: 93-01-05
STYRSYSTEM	Primary side		Page: 1 of 2
	Title: CP 6272	Scale:	Dwg.nr:



LAYOUT NOTE. □ MARKED PIN ON LAYOUT DENOTES FOR
LEDS: CATODE PIN ,SHORT PIN OR PHASED BODY SIDE
DIODES: CATODE PIN
TANTAL AND ELECTROLYT: POSITIVE PIN
CONNECTORS: 1A OR A1 PIN
SMD IC : PIN 1

SA3LAY REV D	Description: Component layout		Date: 93-01-05
STYRSYSTEM	Secondary side		Page: 2 of 2
	Title: CP 6272	Scale:	Dwg.nr:

Inställning av klocka till CU200

System 3000 har en gemensam klocka för alla manöverapparater, den är placerad på linjepanelen och innehåller datum, timma samt minut. Kontrollera aktuell tid genom att trycka (Klocka)-knappen en gång.

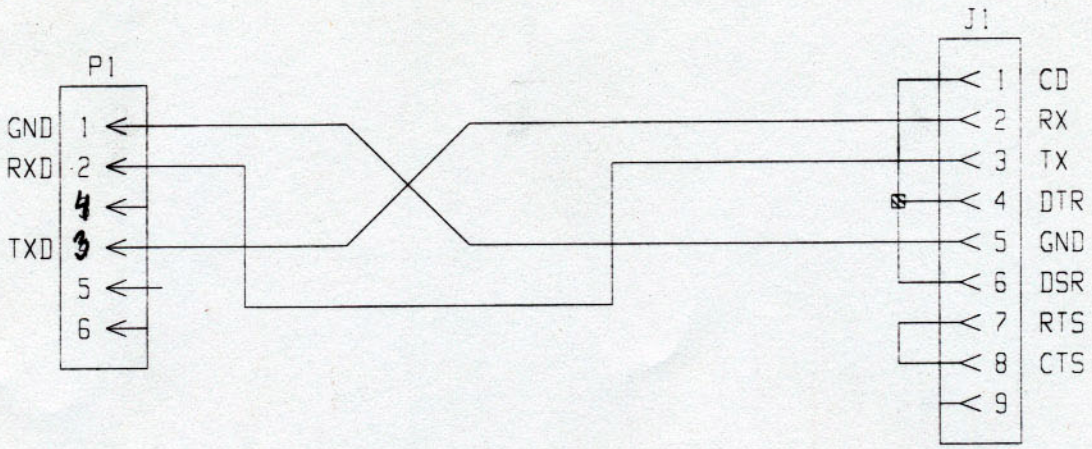
Justera tidsinställningen genom att trycka (Klocka)knappen två gånger (förbjudet om linjen är upptagen) och skriv password 55555.

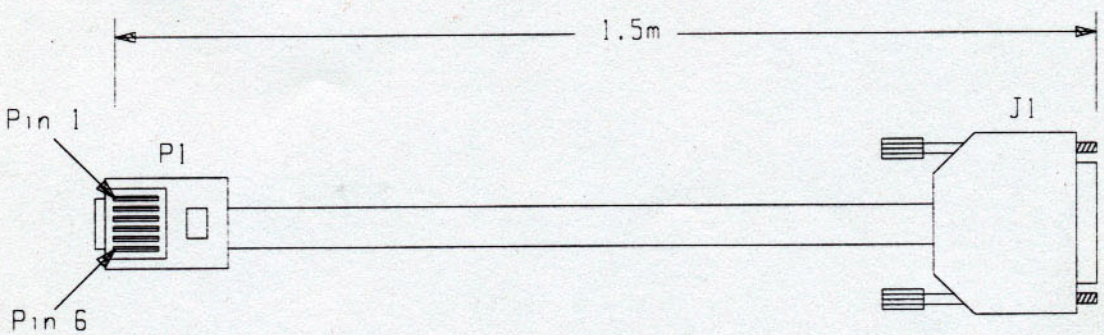
Byt position i teckenfönstret genom (+/-)-knapparna, korrigera tidsinställningen med knappsatsen och avsluta med att trycka (Sänd)-tangenten två gånger, om inga förändringar önskas lämna med (*).

Den utnyttjade manöverapparaten återställs automatiskt efter utförd operation. Detta påverkar inte linjepanelen eller övriga manöverappater.

Efter programmeringen bör tidsinställningen kontrolleras än en gång.

Omställning för nytt år 1 januari och en extra dag 29 februari sker automatiskt till år 2040. Denna förändring sker inte exakt klockan 00:00 utan strax efteråt.





Partlist			Q
P1	044.0506-90	CONN 6P CRIMP AMP MODULAR 641337	1
J1	040.4009-91	CONN FEM 9S D-SUB + HOUSING	1
		CABLE 6-WIRE FLAT-OVAL BLACK	

	Description: RS232 Cable		Date: 93-05-03
STYRSYSTEM	018.0214-00		Page: 1 of 1
	Title: CC6283	Scale:	Dwg.nr: