



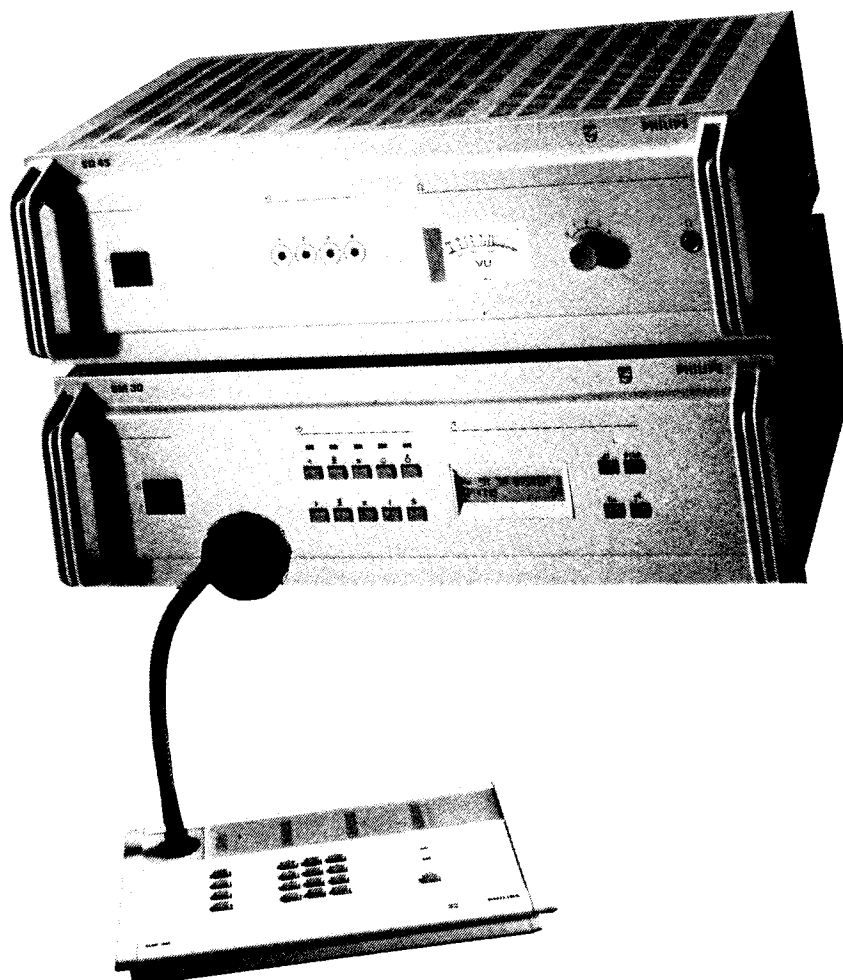
PHILIPS

SM30 Public Address

Sound Management Systems

Service Manual

INDUSTRIAL & ELECTRO - ACOUSTIC SYSTEMS DIVISION - PROFESSIONAL AUDIO



**CUSTOMER
SUPPORT**

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1. CHAPTER 1. INTRODUCTION

1.1. CHAPTER 1.1. GENERAL

The Sound Management System SM30 is a highly sophisticated professional public address system, integrated in a central housing, incorporating all the necessary interface circuitry for the comprehensive range of SM30 input and output modules. The system has been designed to fulfil all known public address requirements.

In following chapters besides specification, spare parts listing, diagrams and installing instructions more detailed information will be supplied about the several system parts.

Because of the systems modular setup and the ease of install and maintain, the aim of this Service Manual is mostly to provide in a First Line Service. At nearly all possible system breakdowns or failures interchanging of modules will be the quickest and cheapest repair-method.

1.2. CHAPTER 1.2. THE SM30 DISTRIBUTION SYSTEM

The total public address distribution system comprises:

A Control Centre (containing a microprocessor and plugin modules), Call Stations and Power Amplifiers. These, in turn, feed loudspeakers located in geographical and/or functional zones, where people must be reached with background music, announcements, prerecorded messages and alarm signals.

Controlled by a central microprocessor, the system is particularly flexible, specific functions being easily programmed and changed by non technical personnel.

The versatile construction allows the System to be mounted free-standing on a table-top or, with other equipment, in a 19" rack.

The system is designed of handling up to 6 Call Stations. Their functions are being programmed from a keyboard/display unit built into the Control Centre.

Capable of routing calls and music simultaneously, a call being made to a particular zone or combination of zones will not affect music playing in other zones.

Because the system is a two channel design (one channel for music and one for calls) only one call at the time can be handled. To cope with conflict situations a system of priorities has been developed. For example: When a person attempts to make a call when at the same time a call is being made by someone with a higher priority, the new call will not be switched through.

The flexible system setup makes it possible to fulfil a various kind of application needs. In order to meet with differing application needs besides a Control Centre and Call Station several plugin modules can be supplied, with type numbers:

- LBB1280 CONTROL CENTRE
- LBB1282 MICROPHONE INPUT MODULE
- LBB1283 CALL STATION INPUT MODULE
- LBB1284 CONTROL INPUT MODULE
- LBB1285 RECORDED MESSAGE MODULE
- LBB1286 MUSIC INPUT MODULE
- LBB1287 ZONE RELAY MODULE
- LBB1288 CONTROL RELAY MODULE
- LBB9068 CALL STATION

2. CHAPTER 2. SM30 SPECIFICATION

General

The following specification relates to an SM30 Control Centre with power supply, system processor, keyboard and corresponding modules.

Microprocessor Hardware:

- clock rate Z80B: 3,6864 MHz
- clock rate I²C: 21 KHz
- Eprom capacity: 64K (48K usable)
- RAN capacity: 8K
- Power up reset and watch dog reset.
- EEPROM: 8K

For back-up of pre-programmed settings,
guaranteed back-up time of memory:

>10 years

Audio Outputs

Music input to Music output:

- Gain .Control range: >60dB (2dB steps)
- .Mute: > 80dB
- input level: >150 mV
- output level symmetrical:
 - .nominal: 0 dBV
 - .maximal: +12 dBV
- amplifier output distortion:
 - .THD at nominal level: 0.1%
 - .THD at max. output: 0.3%
- amplifier S/N output:
 - .at nominal level: >80dB (flat)

Call station or Mic. input, to call output:

- output level symmetrical:
 - .nominal: 0 dBV
 - .maximal: +12 dBV
- input level (MIM): > 1.5mV
 - freq. response: 50Hz - 15KHz(2dB)
 - Signal-to-noise ratio: 68 dB (flat)
- input level (CST): > 84 dB (SPL)
 - freq. response: 440-12500Hz(3dB)
 - Signal-to-noise ratio: 58 dB (flat)

- amplifier output distortion:
 - .THD at nominal level: 0.1%
 - .THD at max. output: 0.3%

Recorded Message to Call Output:

- Output level symmetrical: 0 dBV
- Input level: 1.5 mV
- Signal to noise ratio: >40 dB (flat)

Test Signal 20 KHz sinus asymmetrical:

- Volume preset: at least 50mV-1V
- mute by on/off switch: > 80 dB

Music and Call Output Impedance at 1kHz: > 50 Ohms

Click suppression in combination for any module:

- for audio switching: > 60 dB
- for power on/off switching: > 30 dB
- mute by on/off switch: > 80 dB

Relay switch for Amplifier input:

- make/break contacts to chassis for controlling SQ45 relay input.
- Relay in non-active position during calls.
- Functions only in single amplifier mode.

Mains Supply:

- Adjustable: 110V, 127V, 220-230V or 240V.
- On delivery the frame is set to mains 220-230V
- max. voltage deviation: +/- 10%(230V +6%)
- mains frequency: 50 – 60Hz.
- power consumption at mains voltage: <90VA
- mains fuse T2.5A
- mains transformer: temperature switch at 125°C (self restoring type).

Emergency Supply:

SM30 can be supplied via an external DC voltage.

- Vdc (nominal)= 48V @ Current <1.2A
- Vdc (min.)= 42V @ Current <1.2A
- Vdc (max.)= 58V @ Current <1.2A
- fuse in 48 Vdc line on PCB located in housing
- polarity protection against reverse connection

Mechanical Data

- dimension housing: 440 x 310 x 132mm
- for table top use: removable cover and feet
- for 19-inch rack mounting: 2 removable mounting brackets
- weight unpacked (kg): LBB 1280/00: 8.8 kg

Environmental Requirements

Ambient temperature:

- rated range of use: -10 to +45°C.

Relative humidity:

- rated range of use: 15 - 90%

Climatic conditions during transporting handling and storage:

- According to UN-d 1639/01.
- temperature: -40 to +70°C
- rate of change of temperature: max. 5°C/min
- relative humidity: 5 to 95%(kg)

3 CHAPTER 3. INSTALLING INSTRUCTIONS

The SM30 Control Centre is delivered with only the Line Output Module and the Power Supply Module mounted in their slots. All other modules must be fitted into their respective slots.

– Designated slots.

All modules have predefined slots where they are to be positioned. For all adjustments to be made to the different modules we refer to their respective chapters.

Viewing the back of the Control Centre and counting from left to right following modules can be placed in the slots:

Slot A :	Recorded Message Module	LBB1285/00
Slot B :	Music Input Module	LBB1286/00
Slot C :	Microphone Input Module	LBB1282/00
	Call Station Input Module	LBB1283/00
Slot D :	Control Input Module	LBB1284/00
	Microphone Input Module	LBB1282/00
	Call Station Input Module	LBB1283/00
Slot E :	Control Input Module	LBB1284/00
	Microphone Input Module	LBB1282/00
	Call Station Input Module	LBB1283/00
Slot F :	Control Input Module	LBB1284/00
Slot G :	Zone Relay Module	LBB1287/00
Slot H :	Zone Relay Module	LBB1287/00
Slot I :	Zone Relay Module	LBB1287/00
Slot J :	Control Relay Module	LBB1288/00

– Opening the Housing:

Note: Before attempting to open the Housing, the MAINS POWER should be DISCONNECTED. It is not sufficient to merely switch off the ON/OFF switch on the front panel.

Access to the inside of the Control Centre is gained by removing the cover. This is done by removing the four 'cross-head'-screws located in the sides of the unit. The cover is then simply lifted off the housing.

When the cover is removed, a 'retaining bar' will be seen spanning the top of the housing. This bar should be removed first before any removing or placing of modules. Loosen (n.b. do not remove) the screws located in its ends. To access the screw heads, the screwdriver must be inserted through the holes in the sides of the housing. With the screws loosened a little, the bar can be slid vertically out of the screw slots.

– **Removing modules.**

Loosen the cross-headed screw on the modules' back panel a little and slide the module vertically out of the Control Centre.

– **Mounting the Modules**

Before inserting the modules please note:

- read their respective chapters to make sure that there are no jumpers that need to be set in order to carry out the desired function(s).
- Though placing of the modules in different places will not damage the module, all modules have specific places in where they may be positioned. In order to check the proper slot for the module which need to be mounted please refer to the specific chapter.

The modules are inserted, by aligning:

- the front plate screw with the keyhole slot;
- the metal strip at the bottom of the front plate with the slot in the bottom of the housing;
- The multi-connector with the socket mounted on the motherboard. The module is then gently pushed into place by putting pressure on the top of the circuit board.

If it does not slide in easily into place do not attempt to force it. Check that it is properly aligned and try again.

When the modules are inserted and properly seated in their connectors, tighten the modules' front plate screws at the rear of the system.

The retaining bar can now be replaced by sliding it down in its slots as far as possible, and tightening the screws in its ends.

– Voltage Setting

The system is delivered with the mains transformer wired for 220 Volts A.C.

Note: Before attempting to switch on the unit ensure that the voltage is set correctly for your mains supply.

To change the voltage, unplug the long, grey coloured, screw connector block, and rewire it for the appropriate voltage. Push the connector block firmly back into place.

The Control Centre's cover can now be replaced, and the screws reinserted in the side panels.

– 48 Volt Emergency Power Supply

In situations where the mains power supply is unreliable, and SM30 is used for security/evacuation purposes, an emergency power supply may be used. This can be switched in automatically whenever the mains power fails. As stated in chapter 3.1, a 'Mate-'N-Lock' socket is provided on the Power Supply Module on the back panel, to allow the 48V DC supply to be connected.

The terminations for the supply are clearly marked alongside the Mate-'N-Lock socket. The emergency supply plug should be wired accordingly.

– Earth (Ground) Terminal

An Earth Terminal is mounted on the Power Supply Module to allow an extra earth (ground) wire to be connected. This should be used when the Emergency Power Supply is used alone, or when the mains power earth is inadequate.

If audible interference is present in the system, caused by an inadequate, or contaminated earth (e.g. due to heavy equipment using the same common earth), a separate "clean" earth may be connected to the Earth Terminal.

4. CHAPTER 4. LBB1280/00 CONTROL CENTRE

4.1. CHAPTER 4.1. INTRODUCTION

At the heart of each SM30 Sound Management System is the Control Centre. This is a self contained unit, housing the micro-processor, which controls SM30. The unit includes 12 slots where, when supplemented with a variety of plug-in modules, a wide range of system configurations are possible and many different PA system monitoring needs are successfully met.

The Basic System LBB1280/00 comprises:

- SINGLE (19 INCH RACK) CABINET
- DISPLAY AND KEYBOARD
- (mounted on front panel)
- CENTRAL MICROPROCESSOR
- PILOT TONE GENERATOR
- CONTROL RELAY SWITCH
- INTERCONNECTION BOARD
- POWER SUPPLY NODULE AC/DC
- LINE OUTPUT MODULE FOR CALL & MUSIC
- USER MANUAL

On the front panel of the Control Centre you will find programming keys, associated LEDs, keys for controlling the functions of the music input source and an alpha-numeric LCD-display.

All of the interconnections between individual modules take place automatically when they are plugged into the Centres Mother-Board, so that no complex wiring is required.

Thanks to the housings unique construction, the modules slide in and out quickly and easily. These features make SM30 simple and inexpensive to install and maintain.

All switching and routing of the system is carried out by software, so that hard-wiring problems are kept to a minimum. This means that though SM30 comprises a great amount of features, making it a comprehensive Public Address Centre, the unit itself is uncluttered and simple to assemble and use.

4.2. CHAPTER 4.2. FRONT PANEL CONTROLS

– ON/OFF Power Switch

This rocker switch switches mains power to the Control Centre. NOTE: Note: When installing new modules or carrying out service work inside the SM30 housing, the mains power lead should be unplugged. It is not sufficient merely to switch off the ON/OFF switch.

– Programming keys

Ten programmer keys, situated on the front, marked with logical symbols, enable the installer to program SM30 to suit the overall system configuration and the users specific needs.

◀ and ▶ The single arrow keys are used to scroll through the main menu, in order to move to a different program, and also to move the cursor during the zone routing.

△ and ▽ The single up and down arrow keys are used to scroll through selections within an actual program and to select digits 1 to 9 during selection of an attention or alarm signal number.

⏮ and ⏭ The double up and down arrow keys are used to select tens during selection of an attention or alarm signal number.

O Deselects (turns off) a zone during Keypad, Function Key, Microphone, Control Input and Music Source Input.

| Selects (turns on) a zone during Keypad, Function Key, Microphone, Control Input and Music Source Input.

⏏ BREAK will always return to the next higher programming level.

⏏ ENTER will confirm your selection, storing the information in the systems memory

Illuminated LEDs indicate which keys can be used at the current stage of the programming.

– Alpha-Numeric LCD Display

In the systems normal Run-mode, the backlit LCD display indicates the name of the current music source (e.g. “TUNER” or “MUSIC OFF”), plus the current music volume level.

In the programming mode, the display will enable the installer/user to see:

- Program selections while scrolling through the programming menus.
- Function selections within a program.
- The number of the current Call Station; Function Key; Microphone; Control Inputs; etc., being programmed.
- Call priority status.
- Attention of Alarm signal number.
- Pre-recorded message number.
- Loudspeaker Zone call; Control Relay and music routing.
- Alternative Music Input text.
- Current program status: (e.g. Clearing memory, please wait)
- Error indications: advising if an SM30 module or Call Station is no longer communicating with the processor.

– Music Function Keys

Four keys are provided for use while the system is in its normal Run-mode. These the allows the operator to select the music source; alter the volume level and mute the music signal.

These keys are marked as follows:

-  Music Volume up
-  Music Volume down
- 0123 Music Source Select
-  Music Mute

When either ‘Music Volume up’ or ‘Music Volume down’ is pushed, the music volume changes in steps of ‘3’ over a range of ‘00’ to ‘99’ (Each step of 3 represents 2dB, with ‘99’ equalling 0dBV).

The current music source and the music volume level can be seen on the bottom line in the Display.

A single LED is illuminated in Run-mode, indicating that the Music Function keys can be used.

Any or all of the four music input control functions can also be activated via Call Stations Function Keys or Control Inputs.

4.3. CHAPTER 4.3. REAR PANEL

On delivery the SM30 Control Centres rear panel contains besides 10 removable blank output module panels, the connections for the Line Output Module and the Power Supply Module already mounted in the Control Centre. These two modules are essential system-parts, without which the SM30 will not function.

– Line Output Module

As its name implies, the Line Output Module terminates SM30's line level audio signals for:

- the 'Call' output and
- the 'Music' output.

These feed the inputs of their respective amplifiers. The outputs are connected to the terminals via 5 pole 180 DIN sockets.

On the Line output module a feature has been made for surveillance purposes. By setting a switch located at the module in the proper position the built-in pilot-tone generator will be activated.

On the back side of the module between the two DIN-plugs 2 potentiometers have been mounted:

- Alarm Volume Control (the top-potentio-meter);
- Attention Tone Volume Control (the lowest potentiometer).

These allows the installer to set the output volume of the internal signal controllers to the desired level for each of the two types of signal tones.

– Power Supply Module

This module contains the terminations for both the mains power and emergency 48V DC supply.

The mains power socket is of the standard "Europlug"-type and has a mains fuse holder built in.

To remove the mains fuse, first remove the mains power cable (cord) from the socket and carefully insert a medium sized screwdriver under the fuse cover's small lip (nearest the socket pins) and gently twist the screwdriver to lever the fuse holder out.

A 'Mate-N-Lok' emergency supply socket is provided to allow a 48V DG supply to be connected.

An Earth terminal is mounted on the Power Supply Module to allow an extra earth wire to be connected for use with the Emergency Power Supply, or when the mains power earth is inadequate.

4.4. CHAPTER 4.4. SERVICE-SOFTWARE

The SM30 control Centre is being controlled by software, programmed in an Eeprom, positioned on the Micro-processor Board.

In this Eeprom the following programs are included:

- Programming for factory system test purposes
- Programming for installer purposes programming for user purposes
- Programming for service purposes

Because factory system testing is not the aim for this manual we will not discuss them here. Programming information for user and installer are already included in the Operating Instructions, so for these we refer to the Operating Instructions.

In this paragraph we will give discuss the programming for service purposes.

In this service-test software following testings are done:

- RAM-test
- Keyboard test
- Display test
- Test of I²C-bus
- Test of Call Station Input Module
- Test of Microphone Input Module
- Test of Call Station
- Test of Control Input Module
- Test of Announcement Module
- Test of Zone Relay Nodule
- Test of Control Relay Module

SM30 TEST SOFTWARE

Test software is accessed via the password:

Tens down-function off-ENTER.

Use the '<' and '>' keys to scroll through the test software menu.

Pressing 'ENTER' will activate the displayed mode.

The display will show:

TEST SOFTWARE
CENTRAL PROC CRD

Display after pressing 'ENTER':

KEYBOARD TEST

Every depressed key except the MUTE and AUXILIARY select will be displayed on the bottom line of the display, but not all with the same symbols.

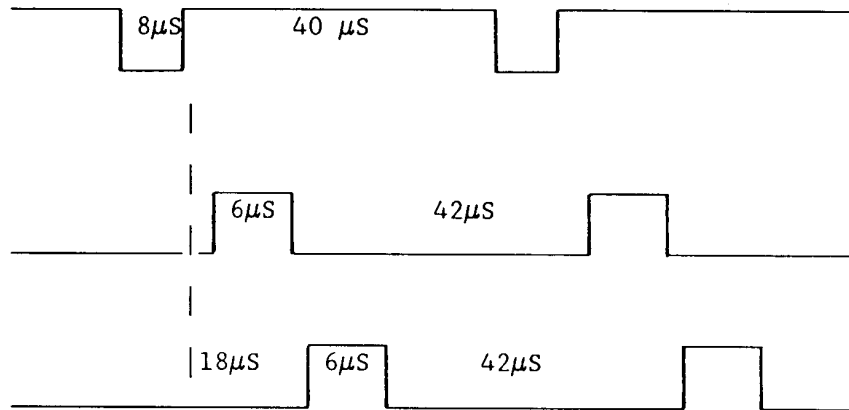
<	is displayed as	<	ENTER will proceed to next test
▲	is displayed as	U	U BREAK will return to main menu
▲	is displayed as	u	
O	is displayed as	O	
>	is displayed as	>	
▼	displayed as	D	
▼	is displayed as	d	
I	is displayed as	I	

Display after pressing 'ENTER':

TEST SDA & SCL

This test is meant for measuring the S(erial) DA(ta) and S(erial) CL(ock) lines on the mother board.

The signals must be according the pulse shapes below:



Tolerances of timing: $\pm 3/\mu\text{S}$.

This test can only be ended with the BREAK key.

Display after pressing 'BREAK':

EEPROM TEST
 CLEARS MEMORY !!

This test writes data to all addresses of the system EEPROM and reads back the data.

This test can be skipped with the '>' key.

BREAK will return to main menu

ENTER will activate this test

Display if no errors were detected:

EEPROM TEST O.K.
 Press ENTER

In case of a wrong reading the message * EEPROM ERROR * is displayed and the testing stops.
Duration of this test is approx. 2 minutes.
This test changes all program and system data. Therefore the test software will not return to the main menu, but perform a cold start with clearing all memory !!!

Display after this test:

RAM TEST
CLEARS MEMORY

This test writes data to all addresses of the system RAM and reads back the data.
Pressing '>' will skip this test and return to main menu.
BREAK will return to main menu
ENTER will activate this test.

Display if no errors were detected:

RAM TEST O.K.
PRESS ENTER

In case of a wrong reading the message * RAM ERROR ~ is displayed and the testing stops.
After pressing ENTER the system will perform a cold start and clear all memory.
The test software password has to be re-entered to proceed testing.
Display after correct password and pressing the '>' key:

TEST SOFTWARE
CONTROL INPUTS

Display after pressing 'ENTER':

CTL INPUT MOD 1

The cursor will blink below the current card number.
Cards 1, 2 and 3 can be selected via the up and down arrow keys.
Opposite to normal programming, there is no check if the card is really present in the system.

Display after pressing 'ENTER':

CTL INPUT MOD 1
IIIIIII

This is the idle state of the selected control input card. Activating one of the 8 inputs will change the corresponding 'I' into a '0'.

Pressing 'BREAK' will return to:

CTL INPUT MOD 1

Pressing 'BREAK' again will return to the main test software menu.

TEST SOFTWARE
CONTROL RELAYS

Pressing the '>' key will result in:

TEST SOFTWARE
CONTROL RELAYS

Display after pressing 'ENTER':

CONTROL RELAYS

All the keyboard LEDs will be lighted.
 Activating of the separate relays can be done now via the keyboard
 A relay will be active as long as the corresponding key is pressed, except K1.
 This is the error relay and will only stay activated if the key is pressed and released continuously.

K1	K2	K3	K4	K5		K6		-- EXIT
K7	K8	K9	K10	K11		K12		

Pressing 'EXIT' will return to main test software menu.

Display after pressing '>' (in main menu):

TEST SOFTWARE ZONE RELAYS

Display after pressing 'ENTER':

ZONE REL. MOD 1

The cursor will blink below the current card number.
 Cards 1, 2 and 3 can be selected via the up and down arrow keys.
 Opposite to normal programming, there is no check if the card is really present in the system.

Display after pressing 'ENTER':

ZONE REL. MOD 1

All the keyboard LEDs will be lighted.
 Activating of the separate relays can be done now via the keyboard

K1	K2	K3	K4	K5		K6		-- EXIT
K7	K8	K9	K10	K11		K12		

Pressing 'EXIT' will return to:

ZONE REL. MOD <u>1</u>

Pressing 'BREAK' will return to main menu.
Display after pressing '>' (in main menu):

TEST SOFTWARE REC. MESSAGE MOD

Display after pressing 'ENTER':

MESSAGE NR: <u>1</u>

Up to 4 Message numbers can be selected with the up and down arrow keys.

Display after pressing 'ENTER':

MESSAGE NR:X ABCDEFG

The characters on the second line can be either 'O' or 'I'

Legend of the second display line:

- A: Mode switch position;
- 'O': Sys position
- 'I': Not in sys position

B: Green led status;
 'O': Led on
 'I': Led off
 C: Message status;
 'O': Message busy
 'I': Message ready
 D: Mute status;
 'O': Message not muted
 'I': Message muted
 E: Start/stop bit
 F: Bit 1 of message number
 G: Bit 0 of message number

The green led status will be changing from "0" to "I" and reverse, during the time a message is produced.

The message number 1-4 is converted for the message card to 0-3. Pressing 'BREAK' will return to message number input. Pressing 'BREAK' again will return to main menu.

Display after pressing '>'

TEST SOFTWARE MIC INPUT MOD

Display after pressing 'ENTER':

MIC INPUT MOD <u>1</u>

The cursor will blink below the current card number.
 Cards 1, 2 and 3 can be selected via the up and down arrow keys.
 Opposite to normal programming, there is no check if the card is really present in the system.

Display after pressing 'ENTER':

MICR:X	MICR:X
OFF Pm	OFF Pm

The microphone numbers will correspond to the selected card number

Activating of the selected card can be done via the keyboard.

p1	M1	p2	M2	BRK		
P1	m1	P2	m2			

P1 & P2 switch the power to the first and second microphone on.

p1 & p2 switch the power off.

M1 & M2 switch muting of the first and second microphone on.

m1 & m2 switch muting off.

The position of the microphone switch is indicated in the display by 'on' and 'off'.

Pressing 'BREAK' will return to microphone input card number input.

Pressing 'BREAK' again will return to main menu.

Display after pressing '>' (in main menu):

TEST SOFTWARE CST INPUT MOD

Display after pressing 'ENTER'

CST INPUT MOD <u>1</u>

The cursor will blink below the current card number.

Cards 1, 2 and 3 can be selected via the up and down arrow keys. Opposite to normal programming, there is no check if the card is really present in the system.

Display after pressing 'ENTER':

CST:X SRM	CST:X srM
--------------	--------------

The call station numbers will correspond to the selected card number.

Card activation can be done via the keyboard.

SE1	RE1	M1	M2	BRK		
-----	-----	----	----	-----	--	--

SE2	RE2	ml	m2	DIS		
-----	-----	----	----	-----	--	--

SE stands for Send Enable
RE stands for Read Enable

SE1 & SE2 set the transmit switch on the card to the first or the second call station.
RE1 & RE2 set the receive switch on the card to the first or the second call station.
M1/ml set/clear the muting of the first call station.
M2/m2 set/clear the muting of the second call station.
DIS enables/disables the transmit/receive switches (toggle function).
Pressing 'BREAK' will return to cst input card number selection.
Pressing 'BREAK' again will return to main menu.

Display after pressing '>' (in main menu):

TEST SOFTWARE LINE OUTPUT MOD

Display after pressing 'ENTER':

LINE OUTPUT MOD III III rM

The first 6 characters indicate the current audio attenuation (NOT THE GAIN). The attenuation is set at maximum by default.
The first 3 bits indicate the position of the 16 dB/step attenuator.
The second 3 bits indicate the position of the 2 dB/step attenuator.

Activation of the card can be done via the keyboard:

+16	+2	R	m	BRK		
-16	-2	r	M			

The +16/-16 keys switch the attenuation in 16 dB steps.

The +2/-2 keys switch the attenuation in 2 dB steps

The R/r keys switch the card relay on/off.

The H/m keys switch the card mute on/off.

Pressing 'BREAK' will return to main menu.

After pressing '>' the display will show:

TEST SOFTWARE CALL STATION

Display after pressing 'ENTER':

CALL STATION: <u>1</u>

The cursor will blink below the current card number.

Cards 1, 2 and 3 can be selected via the up and down arrow keys.

Opposite to normal programming, there is no check if the call station is really present in the system.

Display after pressing 'ENTER':

CST:X	LGRA
ACT. KEY:--	IFFO

The active key will be displayed.

The characters in the right display are status indicators.

The upper right characters stand for:

- L(eds)
- G(reen)
- R(ed)
- A(udio)

The lower right characters indicate: I/O On/off
F/C Flash/continuous.

The call station can be activated via the keyboard:

L	GF	RF	A	BRK		

1	GC	RC	a			

L/1 switch all call station LEDs on/off.
GF/GC sets the green led flashing/continuous (only when all LEDs on).
RF/RC sets the red led flashing/continuous (only when all LEDs on).
A/a turns the audio amplifier on/off.

Pressing 'BREAK' returns to main menu.
Pressing 'BREAK' again exits the test software and returns to normal run mode.

4.5. CHAPTER 4.5. SM30 SOFTWARE VERSIONS

In the SM30 software, included in the system, several versions are possible, defined by the production date of the system. Below you will find a description of the various software versions and its differences to each other. Note must be taken that in an already installed SM30-system, not automatically the latest software versions should be inserted. However in the first delivered SM30-systems, with old software (lower than 1.21) changing to a new software version is advised. In case where the software version is 1.21 or higher and changing of software is desired, before changing the software we strongly advise feedback with the installer/deliverer of the system in order to prevent possible malfunctions.

- Software version 1.0

Checksum: 1547 Release-date: 28 Jun 1989

This is the first officially released software version.

- Software version 1.2

Checksum: FOEC Release-date: 05 Dec 1989

Differences compared to former versions:

- Call Station Zone-range now programmable
- Call zones via control inputs direct selectable
- Music zones via control inputs direct selectable
- adjusted software due to changes in the Message Module

Changes compared to former versions:

- Influence of function-selections by redial-button
- Priority-take over from Message Card
- Message after 1 minute Alarm signal
- Initialisation of bad Call Station

- Software version 1.21

Checksum: 67BD Release-date: 1990

Difference compared to former versions:

- Single Amplifier Mode again added to system.

- Software version 1.23

Not officially released

- Software version 1.3

Checksum: Release date: 1990

Differences compared to former versions:

- Signal numbers 81 thru 87 are the same Chime-signals as 1 thru 7, however they have become uninterruptable. The Chime-signals 1 thru 7 will stop at end of signal, unless the key is released earlier. Chime signal 81 thru 87 however will only stop at end of signal, even when the key has been released earlier.
- Signal numbers 20 thru 47 are Alarm signals which can be activated via a pulse-action. They can be stopped by another pulse-action.
- In order to meet the NATO-norm "STANAG 2047" a possibility has been created that alarm-signals - which are already activated - can be interrupted by a spoken message. Both a microphone or a Call station (with a higher priority and without a signal) will be able to interrupt the alarm. The alarm signals, which can be interrupted are signals which must be started by a contact from the Control Input Module, for this feature must be chosen by the Installer Menu. After ending the spoken message the alarm signal will return and continue as it has been defined in the software.
- When installing the SM30 a special feature have been added with the menu "Language Select". With this feature the Installer is able to chose the displayed User and Installation Menu text to be German or English.

4.6. CHAPTER 4.6. ATTENTION/ALARM SIGNALS THRU SOFTWARE VERSION 1.21

Built into the SM30 Control Centre is a signal generator, programmed with more than 20 attention tones and alarm signals. These can be programmed (via the User Menu):

- to precede a call or pre-recorded message, or
- to be activated independently.

As noted in the list below, some of these signals are terminated when the Call Station key, Control Input Relay, etc., is released. Other signals stop after a certain time, or when the Call Stations is pressed again.

- Attention Chime Tones (stop at end of signal, unless key is released earlier)

1)	1- tone chime;	frequency 554 Hz
2)	2-tone chime;	frequencies 554 & 440 Hz
3)	3-tone chime;	frequencies 392, 523 & 659 Hz
4)	3-tone chime;	frequencies 659, 523 & 392 Hz
5)	4-tone chime;	frequencies 554, 440, 493 & 330 Hz
6)	4-tone chime;	frequencies 659, 523, 392 & 330 Hz
7)	4-tone chime;	frequencies 196, 262, 330 & 392 Hz
8)	Fast Whoop;	Sweeping signal from 700 Hz up to 880 Hz in 400mS, followed by 400mS of Silence and repeating. Duration: 5 seconds.
9)	Police Alarm Tone;	Alternating frequencies; 650 Hz & 850 Hz; Duration: 5 seconds.
10)	Crash;	Sweeping from 500 Hz up to 600 Hz in 500 mS and sweeping down to 500 Hz in 500 mS and repeating. Duration: 5 seconds.
11)	Fire;	Single 1000 Hz tone; 300 mS on, 200mS off, repeating. Duration: 5 seconds.
- Alarm Tones either stop or continue, even though the key has been released:

a.	when the time noted below is exceeded;
b.	or – where marked “continual” - it can only be terminated by an operator.

All Alarm Tones can be terminated at any time by pressing the activating key again.

- | | | |
|-----|-----------------|---|
| 20) | DIN Alarm; | Sweeping signal from 1200 Hz down to 500 Hz in 1 second and repeating.
Duration: 60 seconds. |
| 21) | As signal 20. | Duration: Continuous. |
| 22) | Two tone alarm; | Alternating frequencies of 440 Hz & 554 Hz. Every frequency lasts 1 second. Duration: 60 seconds. |
| 23) | As signal 22. | Duration: Continuous. |

German Alarm Signals:

- | | | |
|-----|---------------|--|
| 24) | End of Alarm; | Start frequency 100 Hz, sweeping up to 420 Hz in 5 seconds, holding that frequency for 60 Seconds, sweeping down to 100 Hz in 5 seconds and ending. |
| 25) | Fire Alarm; | Start frequency 100 Hz, sweeping up to 420 Hz in 5 seconds, holding that frequency for 10 seconds, sweeping down to 300 Hz in 3 seconds, holding that frequency for 10 seconds and repeating the complete cycle until 60 seconds are passed. |

British Signals

- | | | |
|-----|--------------------|---|
| 26) | All Clear; | Sweeping from 1000 Hz down to 650 Hz in 3 seconds, followed by 2 seconds of silence and repeating. Duration: 60 seconds |
| 27) | As signal 26. | Duration: Continual |
| 28) | Fast Whoop; | Sweeping signal from 700 up to 880Hz in 400 mS, followed by 400 mS of silence and repeating. Duration: 60 seconds |
| 29) | As signal 28. | Duration: Continual |
| 30) | Police Alarm Tone; | Alternating frequencies; 650 & 850Hz. Duration: 60 seconds. |
| 31) | As signal 30. | Duration: Continual |

- | | | |
|-----|---------------|--|
| 32) | Crash; | Sweeping from 500 up to 600 Hz in 500 mS and sweeping down to 500 Hz in 500 mS and repeating. Duration: 60 seconds. |
| 33) | As signal 32. | Duration: Continual |
| 34) | Fire; | Single 1000 Hz tone; 300mS on, 200mS off, repeating. Duration: 60 seconds. |
| 35) | As signal 34. | Duration: Continual |
| 36) | Air Raid; | Sweeping from 900 up to 1000 Hz in 2.5 seconds and sweeping down to 900 Hz in 2.5 seconds, repeating. Duration: 60 seconds |
| 37) | As signal 36. | Duration: Continual |
| 38 | 1 kHz Tone; | Duration: 60 seconds |
| 39) | As signal 38. | Duration: Continual |
| 40) | Morse "F"; | 1000Hz frequency. Duration: 60 seconds. |
| 41) | As signal 40. | Duration: Continual |
| 42) | Slow Whoop; | Sweeping signal from 500 up to 1200 Hz in 3.5 seconds, followed by 0.5 seconds of silence and repeating.(30 seconds) |
| 43) | As signal 42 | Duration: Continual |

4.7. CHAPTER 4.7. ATTENTION/ALARM SIGNALS SOFTWARE VERSION 1.3

The signals in software version 1.3 and further are built up from the former software versions. Thus all signals listed in the former paragraph are also included in the software version 1.3 and further. However following signals are added to the system:

- Alarm Tones either stop or continue, even though the key has been released:
 - a. when the time noted below is exceeded;
 - b. or – where marked “continual” - it can only be terminated by an operator.

All Alarm Tones can be terminated at any time by pressing the activating key again.

- | | |
|--|---|
| 44) | Sweeping signal from 900 Hz up to 1000 Hz in 2.5 Seconds, sweeping down to 900 Hz in 2.5 seconds. This complete 12 sec on + 12 sec off and repeating Duration: 60 seconds |
| 45) As signal 44 | Duration: Continual |
| 46) | Sweeping signal from 2000 Hz down to 1700 Hz in .3 Seconds and repeating. Duration: 60 seconds |
| 47) As signal 46 | Duration: continual |
| 48) Musteralarm (ship alarm, go to lifeboat) | Square wave signal from 650 Hz. 7 times: 1 second on/1 second off and then 650 Hz square wave continuing. Duration: 60 seconds |

– Attention Chime Tones

Note: These signals are the same as attention signal 1 thru 7, however they will stop only then, when the signal has ended, even when the key has been released earlier.

- | | | |
|-----|---------------|-------------------------------------|
| 81) | 1-tone chime; | frequency 554 Hz |
| 82) | 2-tone chime; | frequencies 554 & 440 Hz |
| 83) | 3-tone chime; | frequencies 392, 523 & 659 Hz |
| 84) | 3-tone chime; | frequencies 659, 523 & 392 Hz |
| 85) | 4-tone chime; | frequencies 554, 440, 493 & 330 Hz |
| 86) | 4-tone chime; | frequencies 659, 523, 392 & 330 Hz |
| 87) | 4-tone chime; | frequencies 196, 262, 330 & 392 Hz. |

5. CHAPTER 5. LBB1282/00 MICROPHONE INPUT MODULE

5.1. CHAPTER 5.1. INTRODUCTION

Each Microphone Input Module allows two Philips BPE or two dynamic microphones to be connected to the SM30 Control Centre.

SM30 will accept up to a maximum of 3 Microphone Input Modules and/or Call Station Input Modules.

– Remote Switching Function

SM30 makes use of the remote switching facility of certain Philips BPE and dynamic microphones.

This switch is used to activate calls originating from the microphone, including all of the programmed functions available (priority, routing, attention signals, etc.)

– Line Input Facility

By changing a switch, mounted on the module's circuit board (one double switch block for each channel), it is possible to connect a line level input, instead of a microphone.

In its up position, switch 1 on the switch block is set for Microphone (the default). In its down position, it is set for Line Input.

– Bass Cut Facility

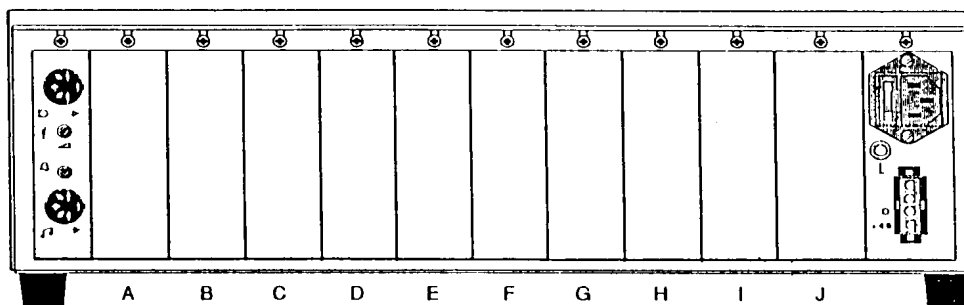
In noisy environments the operator often has to speak very close to the microphone, which exaggerates the microphone's bass frequencies. A bass-cut facility is available to reduce the bass, helping the call to be clearly heard.

On delivery, the bass-cut is active. By changing switch 2, located on the same switch block as the Line Input switch (see previous paragraph), the Bass Cut can be de-activated.

In its up position, switch 2 on the switch block is set for Bass Cut (the default). In its down position, it is set for Flat response.

5.2. CHAPTER 5.2. INSTALLATION

The Microphone Input Modules must be located in the Control Centre slots E, D, and/or C (see drawing below).



BACKSIDE OF THE SM30 CONTROL CENTRE

The number designated to a Microphone by the microprocessor is dependent on the slot in which the module is located.

If, for instance, only one Microphone Input Module is used in a system, and that module is located in slot E, then the two Microphones plugged into the module would be numbered 1 and 2.

If the same module were plugged into slot D, instead of C, then the Microphones would be numbered 3 and 4, regardless of the fact that they are the only Microphones in the system.

Two DIN input sockets numbered 1 and 2, are mounted on the module, plus two corresponding potentiometers.

– Gain Control Potentiometers

The potentiometers are input gain controls, used for “lining up” the microphone’s volume level with the rest of the SM30 signal sources (Call Stations, attention signals, pre-recorded messages, background music players, etc.)

Because the strength of each person’s voice differs, set each gain control “by ear” so that a clear, comfortable listening level is attained, which is in balance with the other amplified signals.

– Connection of Microphones

The design of SM30 allows a single cable to be used to connect a Microphone to one of the Input Module's sockets. This cable has two screened, plus two unscreened wires. The screened wires carry the audio signal and phantom powering, and the unscreened wires are connected to the microphone's remote switch. Terminate the cable at the Microphone with a lockable 5 pole 180° female DIN socket and at the Control Centre with a lockable 5 pole 180° male DIN socket.

6. CHAPTER 6 LBB1283/00 CALL STATION INPUT MODULE

6.1. CHAPTER 6.1. INTRODUCTION

Each Call Station Input Module allows two SM30 Call Stations to be connected to the Control Centre.
SM30 will accept up to 3 Call Station Input Modules and/or Microphone Input Modules in total.

Because the strength of each person's voice differs, each volume level must be set "by ear" so that a clear, comfortable listening level, which is in balance with the other amplified signals, is attained.

Besides two 5-pole 180°DIN-type sockets mounted on the rear of the module, two corresponding potentiometers are placed for Volume Level Control.

– Volume Level Controls

The potentiometers are input volume level controls, used for "lining up" the Call Station microphone's volume level with the rest of the SM30 signal sources (microphones, attention signals, background music players, etc.)

Because the strength of each person's voice differs, set each volume level "be ear" so that a clear, comfortable listening level, which is in balance with the other amplified signals, is attained.

– Connection of Call Stations

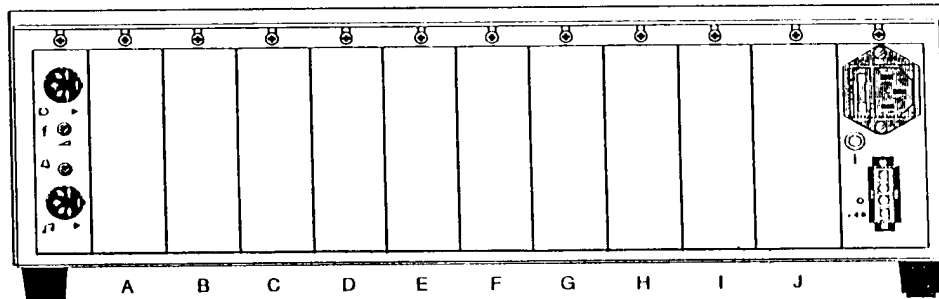
The design of SM30 allows a single cable, up to 1000 metres long, to be used to connect a Call Station to one of the Input Module's sockets.

This cable has two screened, plus two unscreened wires. The screened wires carry the audio signal and Call Station phantom powering, and the unscreened wires carry the control signal.

Terminate the cable at the Call Station with a lockable 5 pole 180° female DIN socket, and at the Control Centre with a lockable 5 pole 180° male DIN plug.

6.2. CHAPTER 6.2. INSTALLATION

The Call Station Input Modules must be located in the Control Centre slots E, D, and/or C. (see drawing below)



BACKSIDE OF THE SM30 CONTROL CENTRE

The number designated to a Call Station by the microprocessor is dependent on the slot in which the module is located.

If, for instance, only one Call Station Input Module is used in a system, and that module is located in slot E, then the two Call Stations plugged into the module would be numbered 1 and 2. If the same module were plugged into slot D, instead of C, then the Call Stations would be numbered 3 and 4, regardless of the fact that they are the only Call Stations in the system.

Two DIN input sockets, numbered 1 and 2, are mounted on the module, plus two corresponding potentiometers.

7. CHAPTER 7. LBB1284/00 CONTROL INPUT MODULE

7.1. CHAPTER 7.1. INTRODUCTION

Each Control Input Module allows eight remote switches to be connected to the Control Centre.

Up to 3 Control Input Modules can be located in the SM30 Control Centre allowing a total of 24 remote switches to be used.

When a remote switch closes the normally open circuit, the Control Input circuit senses this and SM30's microprocessor carries out a series of actions.

- All Control Inputs

Each Control Input can be programmed to carry out SM30 switching functions, including:

- Activation of one of SM30's attention or alarm signals.
- Activation of a pre-recorded message.
- Routing of the above listed signals to loudspeaker zones,
- after giving the call a priority status.

- Inputs 1 to 8 of first CIM (F).

Apart from the above listed functions, Inputs 1-8 may be given an alternative function:

INPUT 1: Music volume up activation.

INPUT 2: Music volume down activation.

INPUT 3: Music mute on/off

INPUT 4: Music source selection.

This allows all of the 4 Music Function Keys, located on the SM30 Control Centre's front panel, to be activated at a remote location.

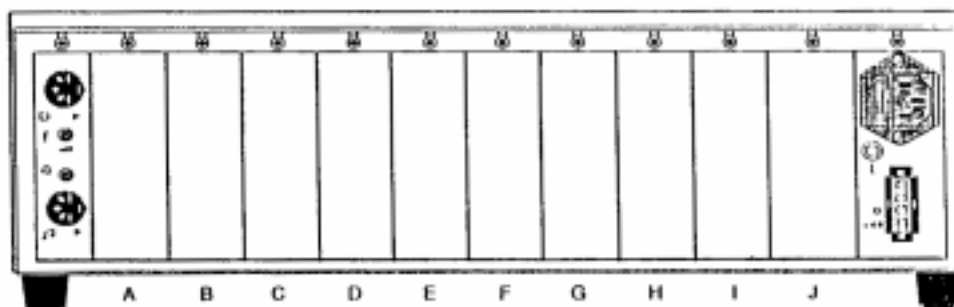
INPUT 5-8: Relay switches. Apart from the normal switching functions, Inputs 5-8 may be programmed to activate Control Relays, which can be used to start remote equipment, activate signalling/ warning lamps, etc. (see chapter 11: Control Relay Module for further details)

Control inputs 1 - 6, 1 - 12 or 1 - 18 can be programmed to route a call or music directly to loudspeaker zones 1 - 6, 1 - 12 or 1 - 18.

7.2. CHAPTER 7.2. INSTALLATION

– Mounting in the Control Centre

The Control Input Modules must be located in the Control Centre slots F, E, and/or D (see drawing below).



BACKSIDE OF THE SM30 CONTROL CENTRE

The numbers designated to Control Inputs by the microprocessor are dependent on the slot in which their module is located.

If only one Control Input Module is used in the system, that module should be located in slot F, then the eight Control Inputs are numbered 1 to 8.

If another module were plugged into slot E instead of F, then the Control Inputs are numbered 9 to 16. Accordingly, slot D will carry inputs numbered 17 to 24.

Note should be taken of the paragraphs referring to Inputs 1 to 4 and 5 to 8 when planning the location of the Control Input Module(s) in the Control Centre.

– Wiring Control Inputs

Each Control Input Module is supplied with a plug-in, 16 terminal, screw connector block.

The remote switch wires are connected to the screw terminals, which are marked in pairs 1 to 8.

The great advantage of the connector block is that if, for some reason, the SM30 Control Centre has to be removed, the block has simply to be unplugged and the wires remain intact. This avoids the tedious and risky business of rewiring the blocks in their original configurations.

8. CHAPTER 8 LBB1285/00 RECORDED MESSAGE MODULE

8.1. CHAPTER 8.1. INTRODUCTION

A unique feature of SM30 is its Recorded Message Module, which allows up to 4 individual messages to be recorded, and played back as desired.

The recording is digitally stored in memory chips, ensuring that the quality will not deteriorate for as long as the message is in memory.

Messages will remain in memory as long as the power is turned on. If SM30 is switched off, a backup battery will enable the message to remain intact for up to 30 days.

The maximum total recording time is 29.5 seconds, and up to 4 messages of varying duration may be recorded, so long as the sum of the durations does not exceed the maximum recording time.

SM30 can be programmed so that a message is played back either alone or preceding a call(following an attention signal, if desired).

Playback can be activated by a Control Input, a microphone remote switch or a Call Station Keypad or Function Key.

– Microphone Input

The microphone input, terminated with a 5 pole, 180°DIN socket, provides phantom powering, so that either a Philips BPE or a dynamic microphone may be used to record the messages.

– Automatic Gain Control

A limiter ensures that, even though the microphone signal fluctuates severely, the message is recorded at a fairly constant level.

This, however, is not an overload protection device. The operator should speak at about 30 cm from the microphone, with a normal speaking voice, to ensure that the input is not overloaded.

- **Headphone Monitoring**

A headphone socket allows the recorded messages to be monitored, both during and after recording, without them having to be amplified via the system. This is especially useful, during a recording session, for checking that a recording is being, or has been, successfully made.

- **Output Volume Control**

A volume control potentiometer is mounted on the module to allow the output volume level to be “lined up” with other SM30 signal sources (attention signals, microphones, music sources, etc.). Turning the control clockwise increases the volume level; anti-clockwise decreases the level.

- **Safety Features**

With the Function switch in its lowest (system) position, the Message Select switch and the (start/stop) and (erase) buttons will be inoperative. The (erase) button will only become operative when the Message Select switch is in position ‘1’ and the Function switch is in the top (record) position. The Function switch must be in its lowest (system) position for messages to be replayed through the system.

When the Function switch is in its top (record) or middle (monitor) position, SM30 will not be able to use the Recorded Message function and the messages already recorded will not be accessible to the user. An ERROR warning will be seen on the Control Centre’s display, indicating that the Message Module is not in its ‘system’ mode.

If the Function switch is in the top (record) position and the Message Selection switch is moved to a position where a message is already recorded, the green Message Present LED illuminates to warn that a message is present at that position.

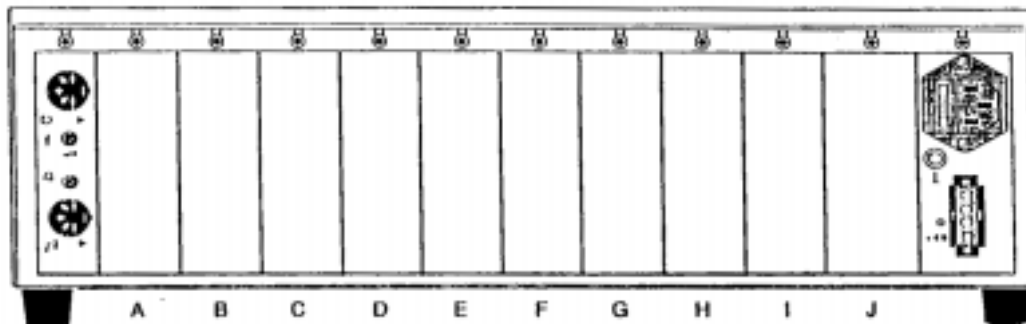
- **Remote Location Recording**

Because the Record and Monitor functions are independent of SM30’s microprocessor, the unit may be taken out of the Control Centre and transported to a remote location. There, the module may be used to record the messages in a more suitable/convenient recording environment.

8.2. CHAPTER 8.2. INSTALLATION

– Mounting in the Contro. Centre

The SM30 Control Centre provides room for one Recorded Message Module, which must be located in slot A (see drawing below).



BACKSIDE OF THE SM30 CONTROL CENTRE

– Clearing Memory

On delivery of the unit, the module's memory must be cleared before any messages can be recorded.

This is done by moving the Message Selection slide switch to the '1' position; moving the Function switch to the top (record) position and pushing the (erase) button.

Both the green Message Present LED and the red Record LED will illuminate for as long as the button is pushed.

When recording for the first time, or when the module's memory has been cleared, it is important to record messages in numerical order, commencing with message 1.

– To Record a Message

To record the first message, move the Message Selection slide switch to number '1'. Next move the Function switch to the top (record) position.

To commence recording, press the (start/stop) button (the red Record LED will now illuminate) and begin to speak into the microphone. Immediately after the message has been spoken, push the (start/stop) button once more to stop the recording.

The green Message Present LED will now illuminate to advise that a message is present at that position.

The message can now be checked by moving the Function switch to its middle (monitor) position and listening through a set of headphones. When the message is being replayed, either through headphones or through the system, the green Message Present LED will flash.

If the recording is satisfactory, either move the Message Selection slide switch to number '2', and follow the above steps to record the second message or move the Function switch to the (system) position. With the Function switch in its lowest (system) position, the recording is ready to be played back via the system when desired.

– Recording over an Existing Message

When a message is recorded, its time duration is stored in memory. When a new message is recorded over an existing one, the new message will automatically be the same length as the original.

The red Recording LED will illuminate for the original message's duration and extinguish at the end of that time, indicating that the recording is finished.

The recording cannot be terminated by the (start/stop) switch when recording over an existing message.

If the new message is too long, it will be cut off before it is finished. If it is too short, there will be a silence at the end of the message, for the remaining time, before the system can continue with its next function. If this is unworkable, the messages which are currently in memory should be erased and all of the messages should be re-recorded. (See 'Clearing Memory', earlier in this chapter).

9. CHAPTER 9 LBB1286/00 MUSIC INPUT MODULE

9.1. CHAPTER 9.1. INTRODUCTION

SM30's ability to play music, which is uninterrupted, even though the system is handling a call routed to other loud-speaker zones, is an important feature of this system.

To make best use of this feature, Philips has developed the Music Input Module. This module provides 3 sets of double cinch sockets (1, 2 & 3) for connection of the music sources. The double sockets allow stereo signal sources to be connected, using standard double cinch/cinch Hi-Fi cables.

The stereo signal is mixed to mono in the module. A mono signal (e.g. from a radio tuner) should simply be plugged into either one of the two sockets.

– Phono Input

Socket number '1' has RIAA equalisation, to allow a phono (record player) signal to be connected. A normal line level input should not be connected to this input.

– Individual Input Volume Controls

Three potentiometers (1, 2, & 3) corresponding to the three inputs, give the user/installer the capability of setting the input volume levels of each source independently.

Adjust the source signal levels so that when the operator selects a different source, no great change in music volume level occurs.

– Treble and Bass Tone Controls

Treble and Bass potentiometers provide tone control facilities for the module's output. In the vertical (12 o'clock) position, the signal is unaffected. Turning the control clockwise increases the level of the relevant treble or bass frequency range by up to 10 dB.

Turning it anticlockwise decreases the frequency range volume level by max. 10 dB.

- Front Panel Control

To allow the operator to control the music sources, four Music Function Keys are provided on the front panel of the SM30 Control Centre. These keys allow the operator to select the music source, alter the music volume level up or down and mute the music signal. When either the 'Music Volume up' or 'Music Volume down' key on the Control Centre is pushed, the output volume of the Music Input Module changes in steps of '3' over a range of '00' to '99' (Each step of 3 represents 2 dB, with '99' equalling 0 dBV).

- Remote Control

Any, or all of these four functions can also be activated via Call Station Function Keys, or Control Inputs 1 to 4.

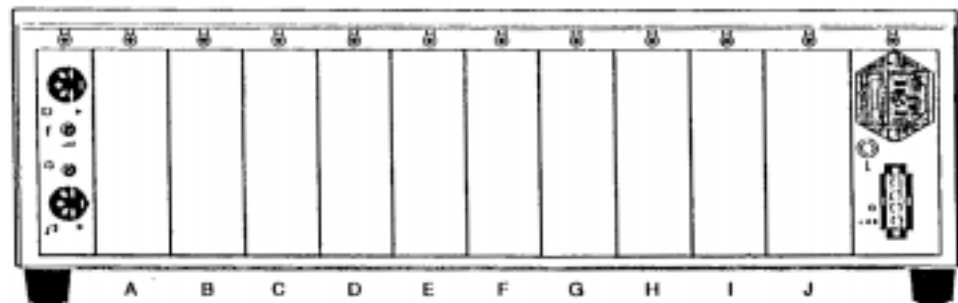
- Music Source Status Display

The current music source and the output volume level can be seen on the bottom line in the Control Centre's LCD Display when SM30 is in its normal 'Run' mode.

The Installer program allows alternative names for sources 2 and 3 to be selected for showing on the Display.

9.2. CHAPTER 9.2. INSTALLATION

One Music Input Module may be installed in the Control Centre. This module must be located in slot B.



BACKSIDE OF THE SM30 CONTROL CENTRE

10. CHAPTER 10 LBB1287/00 ZONE RELAY MODULE

10.1. CHAPTER 10.1. INTRODUCTION

The SM30 system is intended for use with two separate amplifiers or with two separate channels of a multi channel amplifier.

One channel will handle SM30's 'Call' channel signal, and the other channel will amplify the 'Music' channel signal.

This allows the music signal to continue, uninterrupted, when a call is made to other loudspeaker zones.

Both the Call and Music signals are processed via SM30, and output via the Line Output Module. The signals are then amplified by their separate power amplifiers and the amplified signals return to SM30, via the inputs of the Zone Relay Module.

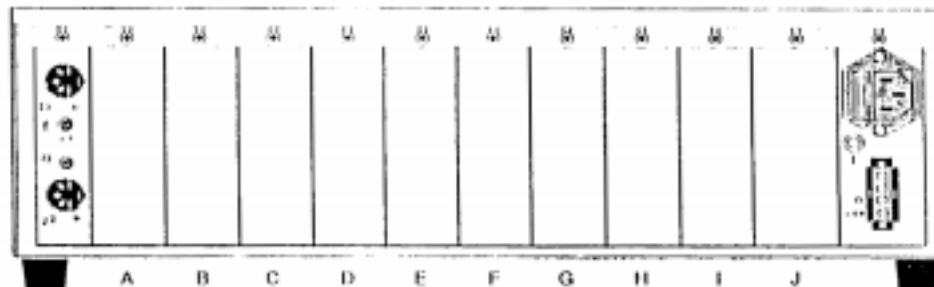
SM30's software uses the module's switching relays to route the separate signals, through the module's output terminations, to their relevant loudspeaker zones.

Each Zone Relay Module is capable of routing the amplified Call and Music signals to six separate loudspeaker zones.

Up to three units may be installed in the Control Centre, giving SM30 the capacity to route the signals to eighteen loudspeaker zones.

10.2. CHAPTER 10.2. INSTALLATION

Up to three Zone Relay Modules can be installed in the Control Centre, in slots G, H, & I.



BACKSIDE OF SM30 CONTROL CENTRE

The numbers designated to Loudspeaker Zones by the microprocessor are dependent on the slot in which the Zone Relay Nodule is located. If, for instance, only one Zone Relay Nodule is used in a system and that module is located in slot I, the six loudspeaker zones will be numbered 1 to 6.

If the same module were plugged into slot H, instead of I, then the loudspeaker zones would be numbered 7 to 12, regardless of the fact that they are the only loudspeaker zone outputs in the system.

This should be taken into consideration when planning the location of the Zone Relay Module(s) in the Control Centre.

– Terminations

The module is fitted with two Mate-N-Lok connectors. All wiring is done in the plugs provided with the module, which means that the wiring itself remains intact if SM30 is ever removed for servicing, etc. The top connector in the Zone Relay Module, marked (▶) is the module's Input connector. The outputs of the amplifiers are plugged into the connector's right row of sockets. The centre row of four sockets are used for linking the module to the next Zone Relay Module.

The bottom connector, marked (◀) feeds the routed outputs to the six loudspeaker zones.

– **Coupling Zone Relay Modules**

When more than one Zone Relay Module is used in a system, the inputs of the modules may be linked together, so that the same amplifier(s) can feed up to 18 loudspeaker zones.

This is done by making short linking wires, fitted with Mate-N-Lok connector pins at each end. One end is pushed into one of the centre row of termination sockets in the first 'Input' Mate-N-Lok connector plug (I). The other end is pushed into the corresponding right row of termination sockets in the second 'Input' Mate-N-Lok connector plug (H), and if applicable also connected to the third 'input' Mate-'N-Lok connector plug (G).

– **Multiple Amplifier Configurations**

In large systems, comprising many loudspeakers, it may be necessary, because the large amount of amplifier power required exceeds the power available, to use extra power amplifiers. This can be done in one of several different ways:

– **Unlinked Multiple Modules**

Separate amplifiers may be used to feed each Zone Relay Module. This enables each amplifier to be dedicated to six specific zones.

– **Module Input Splitting**

The Zone Relay Module provides the possibility of connecting more amplifiers to a single module, so that each amplifier feeds fewer loudspeaker zones, indicated by (')

Three miniature fuses, link the centre and left rows of sockets of each of the Call, Music, and (common) Ground sockets of the amplifier (▶) Input connector.

If one of the fuses is removed, the amplifier connected to the corresponding (right) socket will only feed sockets 1 to 4 of the LS (◀) Output connector.

Another amplifier, connected to the corresponding left socket, will then feed only sockets 5 and 6 of the LS Output connector.

- Connecting Amplifiers

Though the system will work with any P.A. power amplifier, Philips SQ45 amplifiers have been specifically designed to take the greatest advantage of SM30's functions.

- Two Channel System

SM30 will normally be connected to two amplifiers, or two channels on a Philips SQ45 amplifier:

After connecting both the () (Call) and () (Music) outputs of the SM30 Line Output Module, to separate (Call) inputs on the SQ45 amplifier(s).

1. Connect the outputs of both the 'Call' and 'Music' amplifiers (with two core loudspeaker cable) to their respective 'Call', 'Music', and 'Ground' termination sockets on the 'Input' Mate-N-Lok connector plug. Take care to connect them to the row of sockets on the right of the plug (when looking from the rear). Now push the plug into the amplifier connector of the Zone Relay Module.
2. Connect the wires which feed the individual loudspeaker zones, to their corresponding terminations on the 'Output' Mate-N-Lok connector plug(s), and plug it (them) into the LS connector(s) () of the module.

- One Channel System

It is possible to use only 1 amplifier channel for both calls and music. This has the disadvantage however that any music playing will be interrupted whenever a call is made, regardless of the zone(s) to which the call is routed.

When using a single amplifier system, the following steps must be taken:

- After connecting both the 'Call' and 'Music' outputs of the SM30 Line Output Module, to their respective 'Call' and 'Music' inputs on the SQ45 amplifier:
 1. Connect the output of the amplifier to the 'Call' and 'Ground' termination sockets on the 'Input' Mate-N-Lok connector plug. Take care to connect them to the row of sockets on the right of the plug (when looking from the rear). Now push the plug into the connector of the Zone Relay Module.
 2. Connect the wires which feed the individual loudspeaker zones, to their corresponding termination sockets on the 'Output' Mate-N-Lok connector plug(s) and plug it (them) into the connector(s) of the module.

If both calls and music signals are normally routed to a large amount of zones, then extra amplifiers should be used for both calls and music, and both the Call and Music amplifier inputs should be split.

If however, music (for instance) is routed to a smaller amount of zones, an extra amplifier for music may not be necessary, so that only the Call input has to be split.

It is possible, (as in the above example for instance) to link the Call inputs of the module to the Call inputs of a second and/or third module.

This would give the possibility of routing 4 'Call' amplifiers to the 18 zones, while a single 'Music' amplifier is routable to all 18 but only used for a few of the 18.

11. CHAPTER 11 LBB1288/00 CONTROL RELAY MODULE

11.1. CHAPTER 11.1. INTRODUCTION

The Control Relay module provides SM30 with a set of switching contacts, which can be opened or closed (dependent on the contact, and its terminations) as programmed by the installer or operator.

Relays 1 to 8 have both make and break contacts. Relays 9 to 11 are make contacts.

These contacts can be used to start remote equipment, such as cassette players, message loggers, etc.; to activate signalling/warning lamps; to release fire door relays; etc.

Relay 1: Reserved for the indication of microprocessor errors, and cannot be used for any other function.

Relay 2: Reserved for indication of all other internal errors (modules and Call Stations), and cannot be used for any other function.

Relay 3: Dedicated to the 'Delayed Power On' function, but may be used for other functions if Power On Delay is not required.

The Delayed Power On function is intended for battery operated systems where, in order to conserve battery power, the SQ45 amplifier(s) is/are switched on only when a call is made. The function is controlled by a program in the Installer Programming Menu. It causes a time delay (selectable from 1-9 seconds) between pressing the Call Station Push-to-talk key; Microphone 'ON' switch; or switching on of a Control Input, and actual activation of the call.

Both sides of Relay 3's normally 'Open' contact are wired to the switch terminations on the SQ45 'DC Power' Mate-N-Lok connector(s). (see the SQ45 Instructions for Use for further details)

The software causes the relay contacts to close ('make'), switching on SQ45's DC power.

Relays 3 – 12:

Relay 3 (or 4, if power delay is used) can be activated by different sources, and may be used for a number of functions:

– Remote Volume Control Overrides.

The ‘make’ contacts of Relays 3 to 12 may be used to activate up to 10 loudspeaker volume control override relays.

These relays, mounted in the loudspeaker enclosures, override the volume control setting of the actual loudspeaker itself. This means that regardless of the individual “music” volume setting of each loudspeaker, all the loudspeakers in a particular zone will work at full volume when a Call is routed to it.

Each Control Relay is programmable, ‘linked’ or ‘locked’, to a specific Zone Relay, so that when a call is routed to a loud- speaker zone, the Control Relay linked to it will activate automatically.

– Activation by Call Station and Function Keys.

Relays 3 (or 4, if power on delay is used) to 12 may be programmed to be activated by Call Stations, and Call Station Function Keys.

Activation by a Call Station happens whenever a call is made using the Call Station’s Keypad.

Activation by a Function Key happens whenever a pre-programmed Function Key (followed by the ‘Press-To-Talk’) key is pressed.

– Activation by Control Inputs

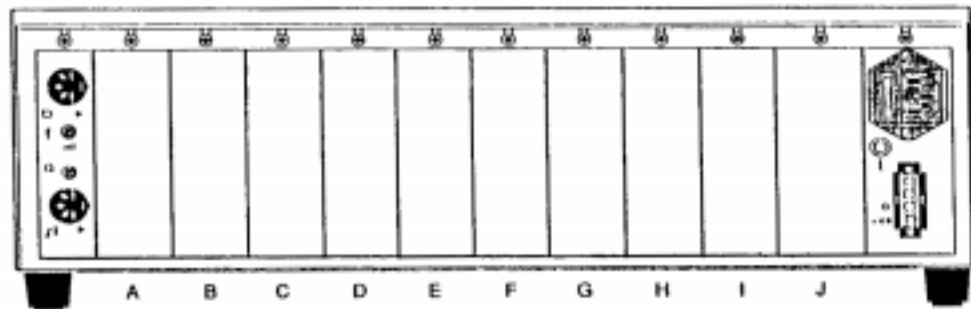
Relays 3 (or 4, if power on delay is used) to 12 may also be programmed to be activated by Control Input Relays.

Control Input Relays 5 to 8 can be programmed to activate one or a group of Control Relay(s).

This means that when the Control Input’s remote switch is closed, the programmed Control Relays become activated.

11.2. CHAPTER 11.2 INSTALLATION

One Control Relay Module is used in SM30. This must be located in Control Centre slot J (see drawing below).



BACKSIDE OF THE SM30 CONTROL CENTRE

Wiring Control Relays

Each Control Relay Module is supplied with two plug-in, 16 terminal, screw connector blocks.

The wires to remote equipment are connected to the screw terminals, which are marked in threes:- 1 to 8, and in pairs:- 9 to 11.

Relays 1 to 8 have both make and break contacts. Relays 9 to 11 are make contacts.

The great advantage of the connector block is that if, for some reason, the SM30 Control Centre has to be removed, the blocks have simply to be unplugged and the wires remain intact. This avoids the tedious and risky business of rewiring the blocks in their original configurations.

12. CHAPTER 12. LBB9068/00 CALL STATION

12.1. CHAPTER 12.1. INTRODUCTION

The SM30 Call Station presents the operator with a logical, comprehensive, and easy to use method of routing and broad-casting calls, announcements, and music.

The wide range of features include:

- **BPE condenser microphone**

High quality phantom powered microphone with inbuilt bass rolloff filter gives clear voice reproduction, even in difficult acoustic environments.

- **Numeric Keypad**

Allowing individual selection of up to 18 loudspeaker zones by typing in the zone number.

Each Call Station can be programmed with a priority status, attention tone and pre-recorded message. These become operational whenever the keypad is used to route a call.

Recall function, repeats the last keypad selection. Each zone has its own Zone Selection Indicator, an LED which is illuminated when the zone is selected. When the call is completed the LED's will be extinguished.

- **4 Function Keys**

Programmable with: priority; alarm and attention tones; pre-recorded messages; routing to loudspeaker zones; and Control Relay activation.

Alternative functions include: music volume up/down; music source selection; music mute; and independent Control Relay switching or toggling.

Using the Function Keys to make a call is done in the same way as using the Keypad. The main difference being that instead of the operator selecting the zones using the Numeric Keypad, the Function Keys route the call to a pre-programmed selection of zones.

This of course saves a great amount of time when an operator has to frequently call the same selection of zones, or when an "ALL CALL" must be made in emergencies.

Each Function Key may be programmed to carry out a totally different task.

Key 1, for instance, can be programmed to route a low priority call, preceded by an attention tone, to several, frequently used, loudspeaker zones.

Key 2 could be programmed to route an alarm tone, followed by a pre-recorded evacuation message, to all loudspeaker zones (an All Call).

Key 3 could be used to mute the music signal.

Key 4 could be used to toggle a Control Relay on and off, switching a warning lamp, illuminated notice, etc.

Whenever the function key is pressed a Function Key LED illuminates, along with any Zone Selection Indicators activated by the routing of the Function Key. When the call is completed the LED's will be extinguished.

Note: If a Function Key and the Keypad are both selected to activate a call, the last selection will always have precedence, cancelling any other selection.

During Installer programming a program is available to prevent the call station user, addressing specific zones selected via the keypad.

– Press-To-Talk Key

Activates a call after the zones have been preselected using the Key Pad or Function Key.

The way in which a call is executed, and how the Press-To-Talk Key is used, is dependent upon the type of signal and/or message with which the Key Pad, Function Key, Microphone, or Control Input, is programmed:

- 1: Call without signal or message:
Will stop when the Press-To-Talk Key is released.
- 2: Call with attention signal and/or non-repeating message:
Will stop when the Press-To-Talk Key is released.

- 3: Call with attention signal and repeating pre-recorded message:
The message and/or signal cycle will continue after the Press-To-Talk Key is released.
The cycle can be stopped by pressing the Press-To-Talk Key a second time. If this is done during the attention signal, the call stops immediately. If the message is playing, the call will stop at the end of the message.
- 4: Call with alarm signal:
The alarm signal will continue after release of the Press-To-Talk Key. It can be stopped by pressing the Press-To-Talk Key a second time.

– **BUSY and WAIT/TALK LED's**

Advise the operator whether a call may be activated, the status of the call, and whether any other calls are active. The red 'BUSY' LED flashing means that another call is in progress.
The red 'BUSY' LED illuminated constantly indicates that the call has been blocked by another call with a higher priority.
In its 'WAIT' state, the green LED flashes, indicating that the call is accepted, and the attention tone or pre-recorded message is being broadcast.
The green LED illuminates constantly ('TALK') when the tone or message finishes and the processor switches on the microphone for the call to proceed.

– **Built in Compressor**

Helps to keep the Call Station's audio output level constant, even in situations where the operator's speech volume level changes radically. The amount of compression is dependent on the Microphone preamplifier gain setting (the higher the gain setting - the greater the amount of compression, and therefore - the greater the effect on the microphone signal).
(see Microphone Preamplifier Gain Preset later in this chapter 12.2.; INSTALLATION).

– **Balanced Line Level output**

Allows Call Stations to be located up to 1000 metres from the Control Centre.

12.2. CHAPTER 12.2. INSTALLATION

– Loudspeaker Zone Template

A paper template is provided, on which the names of the loud- speaker zones can be written.

The template has a detachable blank section at the bottom, allowing it to be used in a typewriter.

To mount the template in the Call Station, first remove the right end cheek, (by unscrewing the two screws in its side, and the one screw located in the bottom. The plastic template cover can now be slid out. Place the (type) written template in position over the zone LED's (having first torn off its blank perforated panel), and carefully slide the plastic template cover back in place.

With the right end cheek removed, it is possible to gain access to both the microphone volume and LED intensity presets (see 'Microphone Preamplifier Gain Preset' and 'LED Intensity Preset' later in this chapter).

With the template and its cover in position, and the microphone volume and LED intensity adjusted, replace the end cheek.

– Microphone Preamplifier Gain Preset

With the Call Station's right end cheek removed, as described, the microphone preamplifier's gain can be preset.

Turning the potentiometer to the right increases the amount of gain. The gain can be preset from 84 to 114 dB S.P.L., a range of 30 dB .

Note: The Call Station Input Modules also have input gain presets. The Microphone Preamplifier Gain Preset should only be used for setting the amount of compression, not for lining up the Call Station output with the rest of the SM30 System. (See 'Built in Compressor' earlier in chapter 12.1.;
INTRODUCTION

- LED Intensity Preset

To compensate for various local lighting conditions, the illumination intensity of the LED's can be adjusted. Remove the Call Station's right end cheek as described. Turning the potentiometer to the right increases the intensity.

- Connection to SM30 Control Centre

The design of SM30 allows a single cable to be used to connect a Call Station to one of the Control Centre's Call Station Input Modules. This cable has two screened, plus two unscreened wires. The cable is terminated at the Call Station with a 5 pole 180° male DIN socket, and at the Control Centre with a 5 pole 180° female DIN socket. Each Call Station Input Module will accept two Call Stations. SM30 will accept up to 6 Call Stations in total.

13. CHAPTER 13. SERVICING SM30

13.1. CHAPTER 13.1. GENERAL

The total SM30 system, built up around the Control Centre LBB1280 and dedicated to ones personal specifications by inserting several plug-in modules, is a complex system though modular built. As mentioned before servicing of the SM30 is done only by first line servicing. In the next paragraph we will briefly describe a possible fault location method. In the last of all serviced spare parts paragraphs of this chapter a list will be provided per module.

13.2. CHAPTER 13.2. FAULT FINDING

The SM30 is a micro-processor controlled system. Due to the first line service philosophy only a check on module-level is to be done.

The modules in the SM30 Control-Centre are communicating with each other by means of an I²C-bus. Also all modules and system parts are being fed by a power supply unit, generating +42V and +5V.

Power Supply test

First at system failures please check the +42V and +5V. If they are not available, check fuses, power-connector and main-switch. When interconnections are being found to be all right, interchange power supply.

When the supply-voltages are present the I²C-communications needs to be checked.

Software test of I²C-bus-communication

In order to have a possible check a test software is included, as subscribed in chapter 4.4. Running through this software test the logical steering of all modules and units will be verified.

When this test produces a failure check flat-cable and inter- connection board.

After finding interconnections all right, check I²C driver (collector of transistor TS201 thru TS204, drawing 14.17, circuit diagram of micro-processor board, sheet 3) on micro-processor board. After unplugging flat cable, we can enter the software test again and measure the logical signal by an oscilloscope.

When the I²C-signal is not there, interchange micro-processor board.

If they are found to be all right, replace specific module.

I²C-bus and power supply are functioning properly:

When in this test no failure is found and still a function can not be realized interchanging of the module is necessarily.

13.3. CHAPTER 13.3. SPARE PARTS CONTROL CENTRE LBB1280

– SPARE PARTS CONTROL CENTRE

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
	FIXING EAR	5322 498 50312
	FRONT PANEL	5322 447 50116
	COVER	5322 462 50458
	MAINS TRANSFORMER	5322 142 50165
	KNOB	5322 414 10059
	FUSE (2.5A)	4822 070 32502
	INTERCONNECTION BOARD	5322 214 11128
	KEYBOARD ASSEMBLY	5322 214 11129
	MICRO-PROCESSOR BOARD ASSEMBLY	5322 214 11131
	LINE OUTPUT BOARD ASSEMBLY	5322 214 11132
	POWER SUPPLY BOARD ASSEMBLY	5322 214 11133
	MATE-N-LOK ASSEMBLY	5322 310 10415

– SPARE PARTS KEY BOARD ASSEMBLY

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
	SWITCH PUSHBUTTON	5322 276 50347
	SWITCH, TUMBLER	5322 277 11238

– SPARE PARTS LINE OUTPUT BOARD ASSEMBLY

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
K 1	RELAIS	5322 280 80719
R 19	POTENTIOMETER 10K, LIN, 0.25W	5322 101 11122
R 27	POTENTIOMETER 10K, LIN, 0.25W	5322 101 11122
S 1	SLIDE SWITCH	5322 277 20993

– SPARE PARTS POWER-SUPPLY BOARD ASSEMBLY

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
F 101	FUSE	4822 253 30028
F 102	FUSE	4822 253 30025

13.4. CHAPTER 13.4. SPARE PARTS MICROPHONE INPUT
MODULE LBB1282

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
	MICROPHONE INPUT MODULE ASSEMBLY	5322 214 11134
R 38	POTENTIOMETER 10K, LIN, 0.25W	5322 101 11121

13.5. CHAPTER 13.5. SPARE PARTS CALL STATION INPUT
MODULE LBB1283

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
	CALL STATION INPUT MODULE ASSEMBLY	5322 214 11153
R 13	POTENTIOMETER 10K, LIN, 0.25W	5322 101 11119
R 27	POTENTIOMETER 10K,LIN, 0.25W	5322 101 11119

13.6. CHAPTER 13.6. SPARE PARTS CONTROL INPUT MODULE
LBB1284

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
	CONTROL INPUT MODULE ASSEMBLY	5322 214 11135

13.7. CHAPTER 13.7. SPARE PARTS RECORDED MESSAGE MODULE LBB1285

<u>POS.NR.:</u>	<u>DESCRIPTION</u>	<u>SERVICE CODE NR.:</u>
	RECORDED MESSAGE MODULE ASSEMBLY	5322 214 11136
15	KNOB	5322 414 10059
R 135	POTENTIOMETER 10K, LIN, 0.25W	5322 101 11118
S	SWITCH PUSHBUTTON	5322 276 20487
S 2	SLIDE SWITCH, 2P	5322 277 21406
S 3	SLIDE SWITCH, 2P	5322 277 21407
S 4	SWITCH PUSHBUTTON	5322 276 20487

13.8. CHAPTER 13.8. SPARE PARTS MUSIC INPUT MODULE LBB1286

<u>POS.NR.:</u>	<u>DESCRIPTION</u>	<u>SERVICE CODE NR.:</u>
	MUSIC INPUT MODULE ASSEMBLY	5322 214 11137
R 9	POTENTIOMETER 100K, LIN, 0.25W	5322 101 11123
R 20	POTENTIOMETER 100K, LIN, 0.25W	5322 101 11123
R 32	POTENTIOMETER 100K, LIN, 0.25W	5322 101 11123
R 36	POTENTIOMETER 100K, LIN, 0.25W	5322 101 11123
R 45	POTENTIOMETER 100K, LIN, 0.25W	5322 101 11123

13.9. CHAPTER 13.9. SPARE PARTS ZONE RELAY MODULE LBB1287

<u>POS.NR.:</u>	<u>DESCRIPTION</u>	<u>SERVICE CODE NR.:</u>
	ZONE RELAY MODULE ASSEMBLY	5322 214 11138
13	EJECTOR	5322 395 94064
F1 thru F3	FUSE 5A	4822 070 35002
K1 thru K12	RELAIS	5322 280 80719

13.10. CHAPTER 13.10. SPARE PARTS CONTROL RELAY MODULE LBB1288

<u>POS.NR.:</u>	<u>DESCRIPTION</u>	<u>SERVICE CODE NR.:</u>
	CONTROL RELAY MODULE ASSEMBLY	5322 214 11139
K1 thru K12	RELAIS	5322 280 80719

13.11. CHAPTER 13.11. SPARE PARTS CALL STATION LBB9068

– CALL STATION LBB9068

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
2	FRONT PLATE	5322 454 40126
	SCREENED, 4 CORE CABLE	5322 322 40107
	MICROPHONE ASSEMBLY	5322 242 10202
	CALL STATION BOARD ASSEMBLY	5322 214 11141

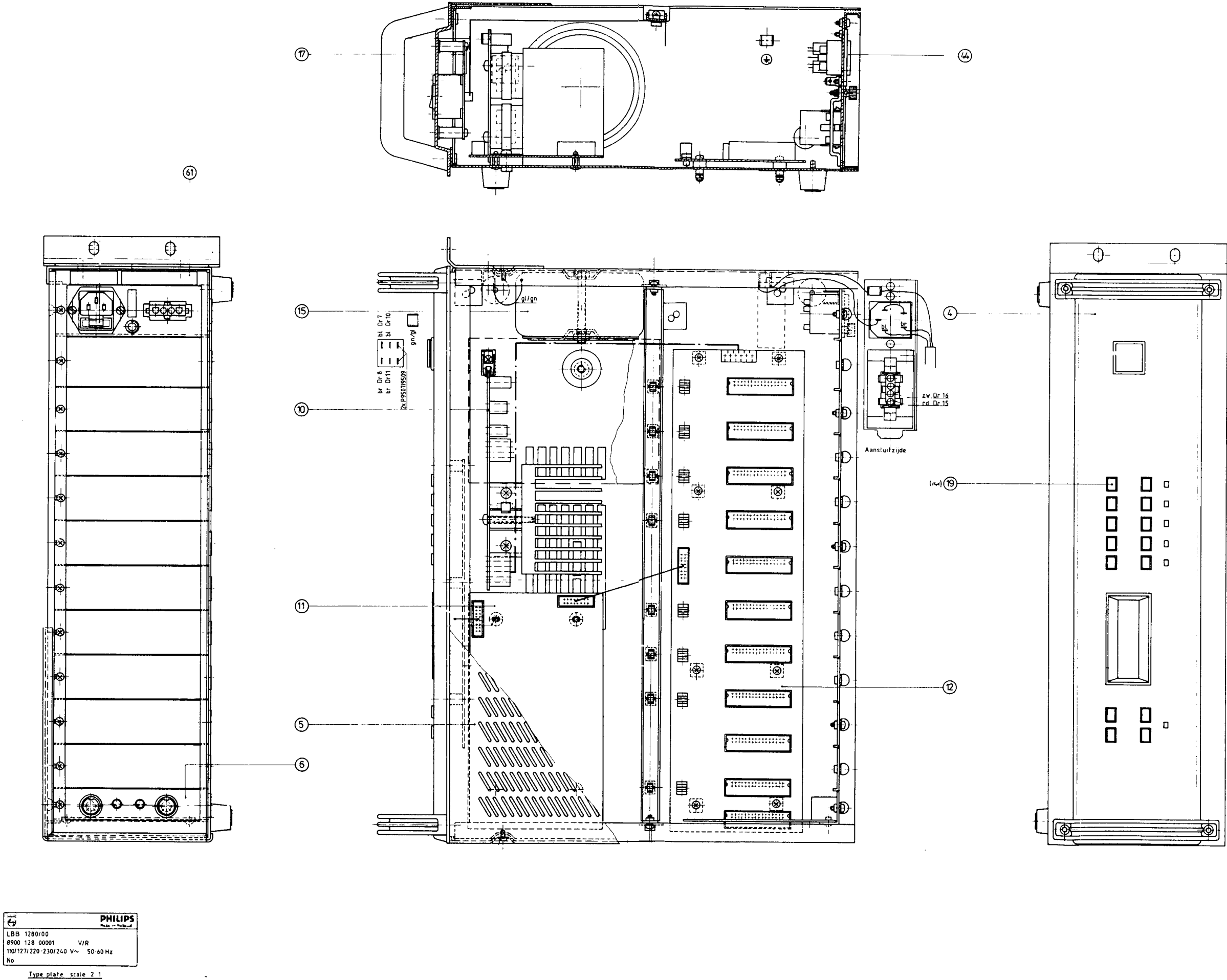
– CALL STATION BOARD ASSEMBLY

POS.NR.:	DESCRIPTION	SERVICE CODE NR.:
6	PUSHBUTTON SWITCH	5322 276 12931
7	PUSHBUTTON SWITCH	5322 276 12931
8	PUSHBUTTON SWITCH	5322 276 12931
9	PUSHBUTTON SWITCH	5322 276 12931
10	PUSHBUTTON SWITCH	5322 276 20487
11	KNOB	5322 414 10059
12	LED MOUNTING BLOCK	5322 255 41151
13	LED MOUNTING BLOCK	5322 255 41149
R 136	POTENTIOMETER 10K, LIN, 0.25W	5322 101 11124
R 216	POTENTIOMETER 220K, LIN, 0.25W	5322 101 11125
T 201	COIL	5322 157 52833

14. CHAPTER 14 DRAWINGS

In this chapter the drawings of the Control Centre LBB11280/00 and the different modules are given.

The drawings include the mechanical drawings, component layout of the different boards and the circuit diagrams of the modules. Tracks-layouts have not been included because of the first-line service-philosophy.



MECHANICAL DRAWING OF LBB1280/00

FIGURE 1
-14.1-

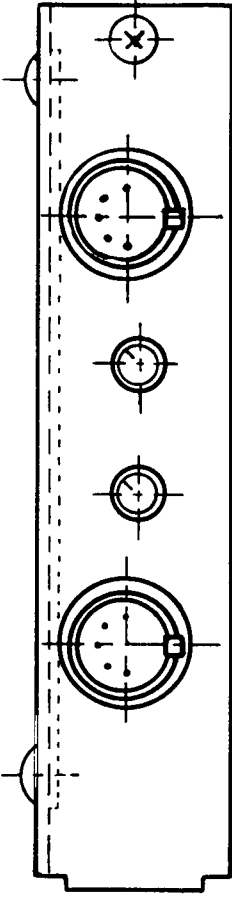
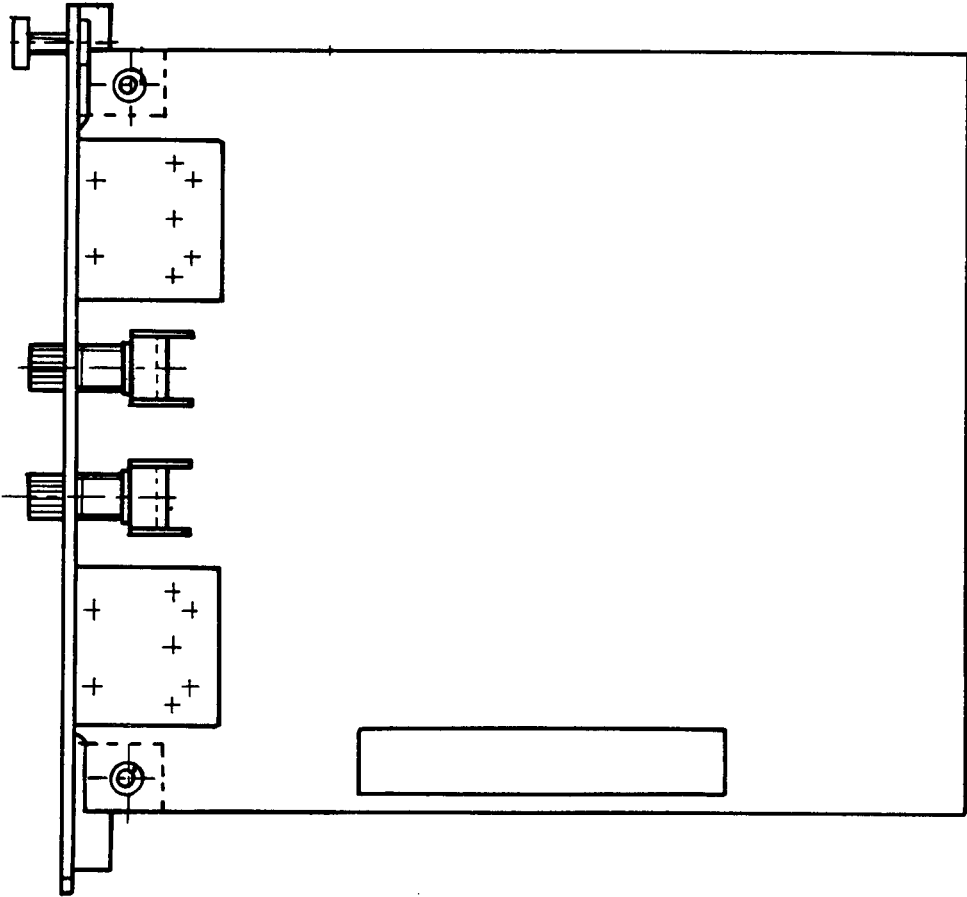
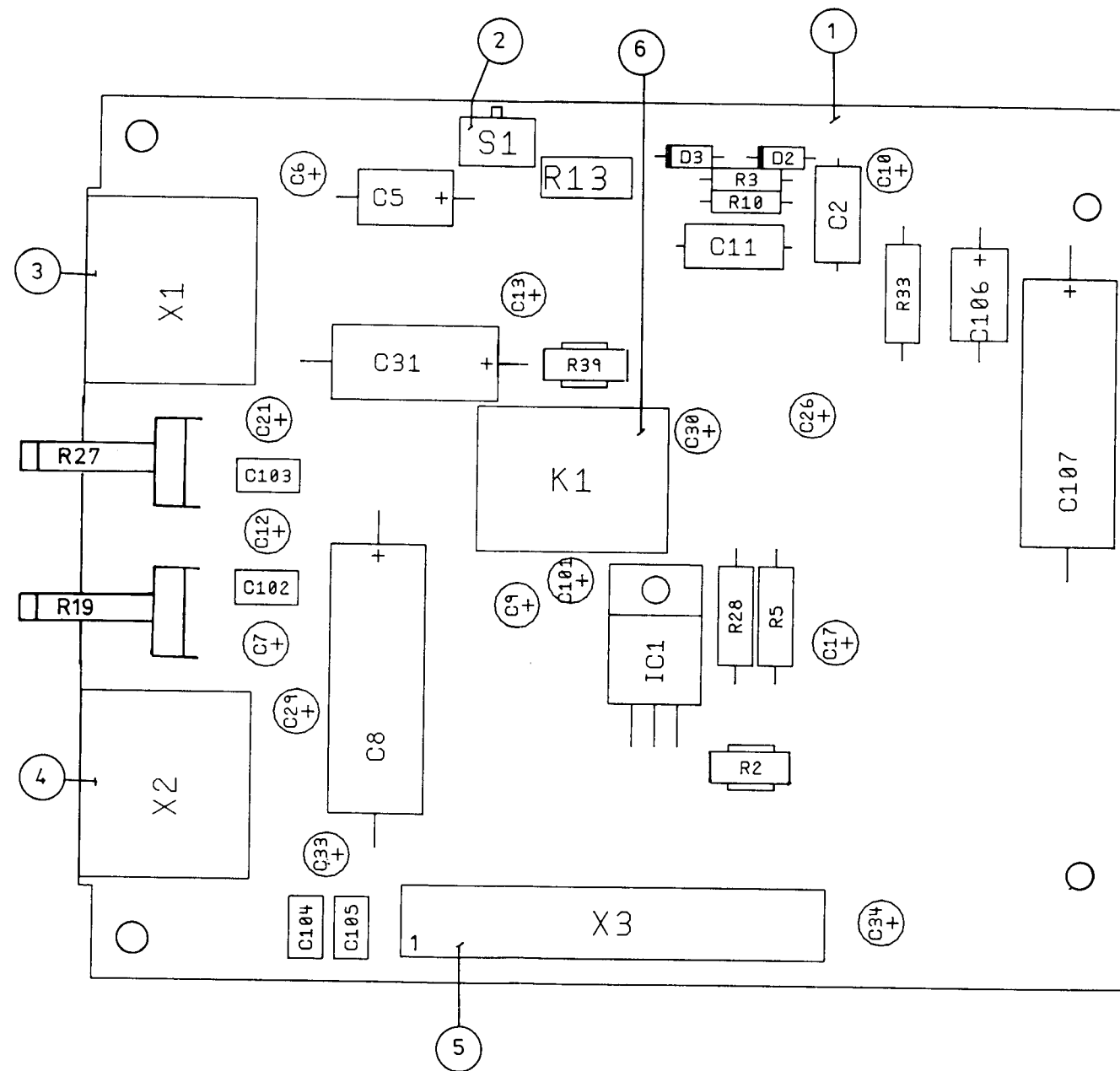
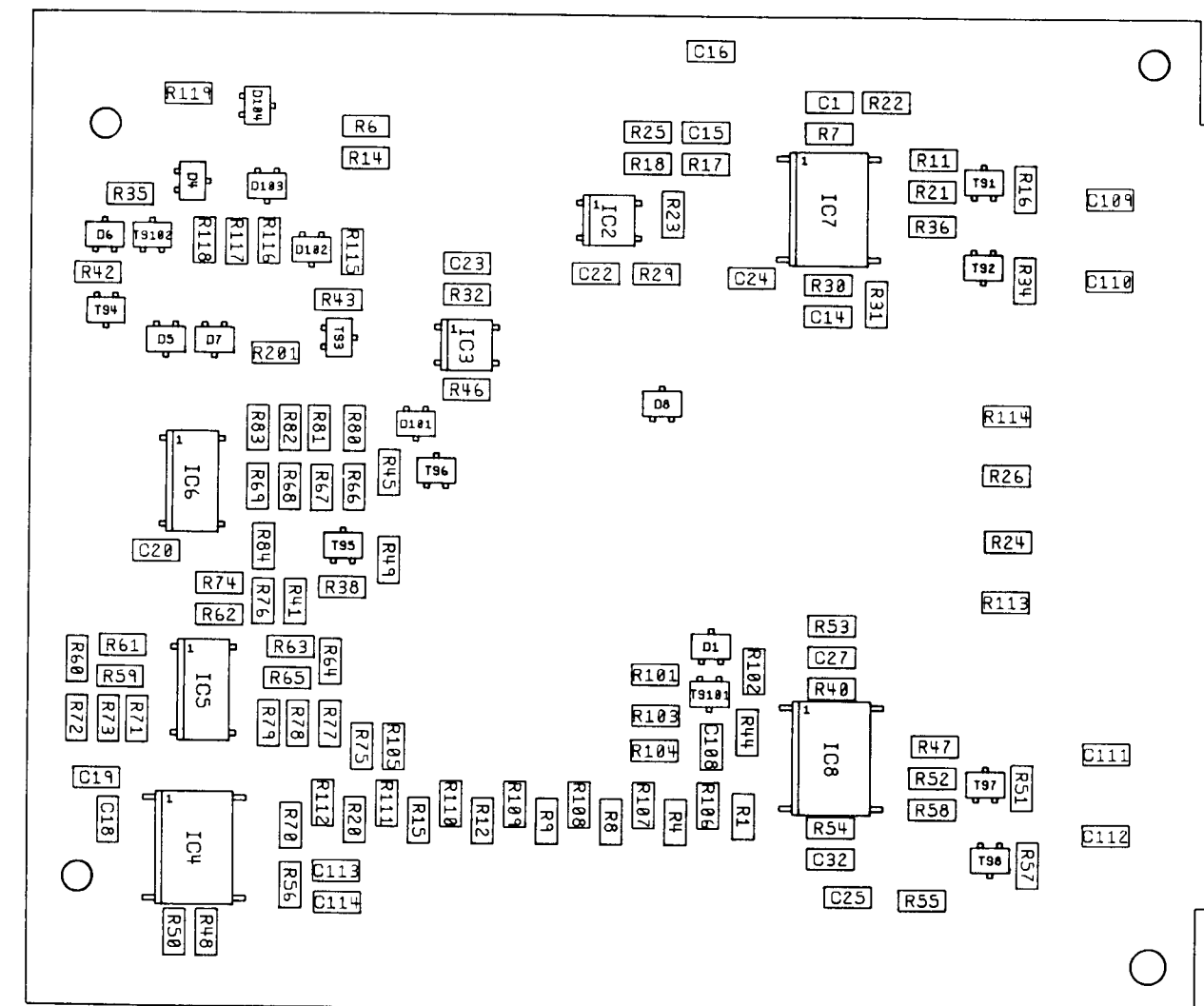


FIGURE 2
-14.2-

MECHANICAL DRAWING OF LINE OUTPUT MODULE

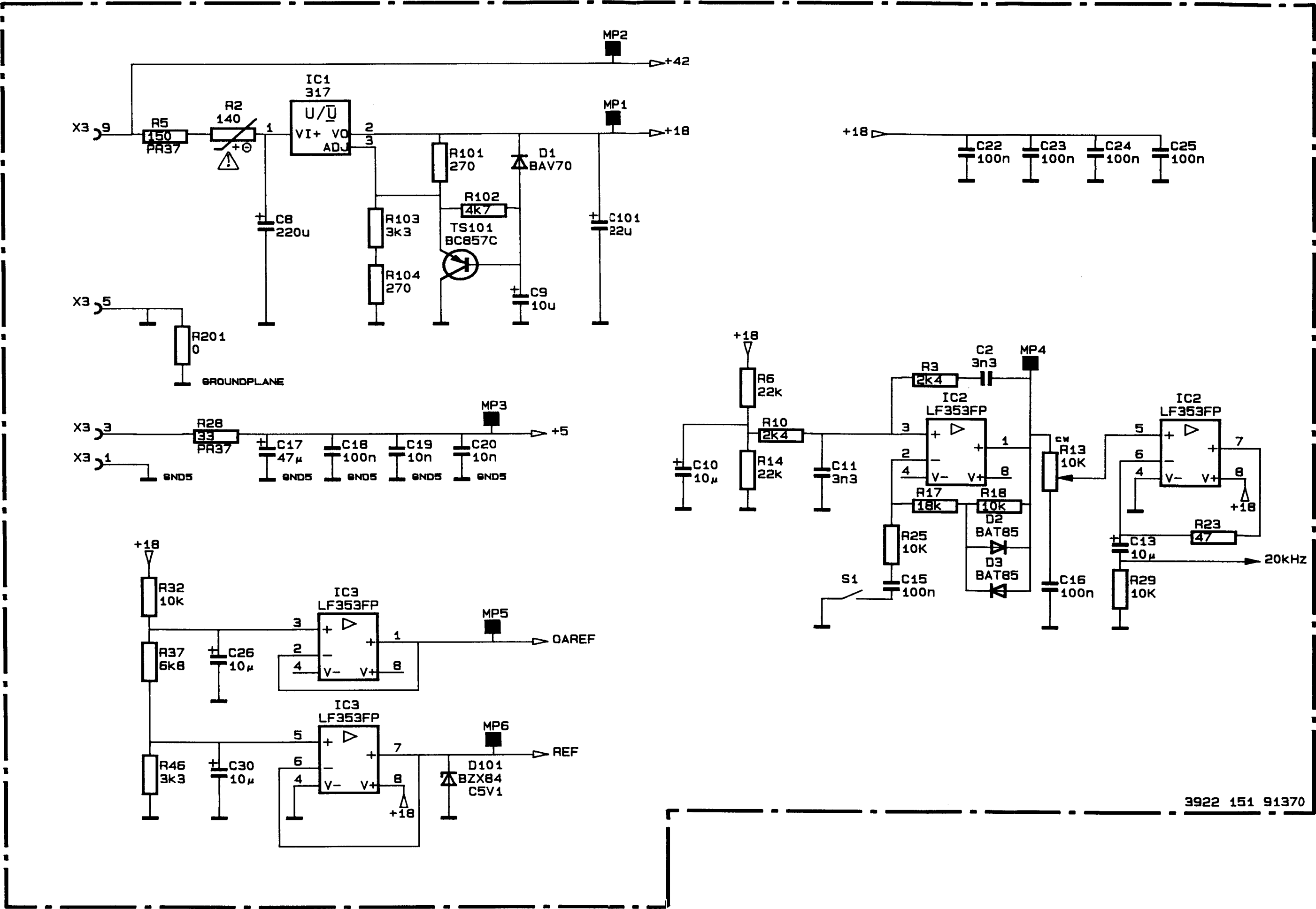


PC BOARD
PRENTPANEEL 3922 151 91370



PCB COMPONENT LAYOUT OF LINE OUTPUT MODULE

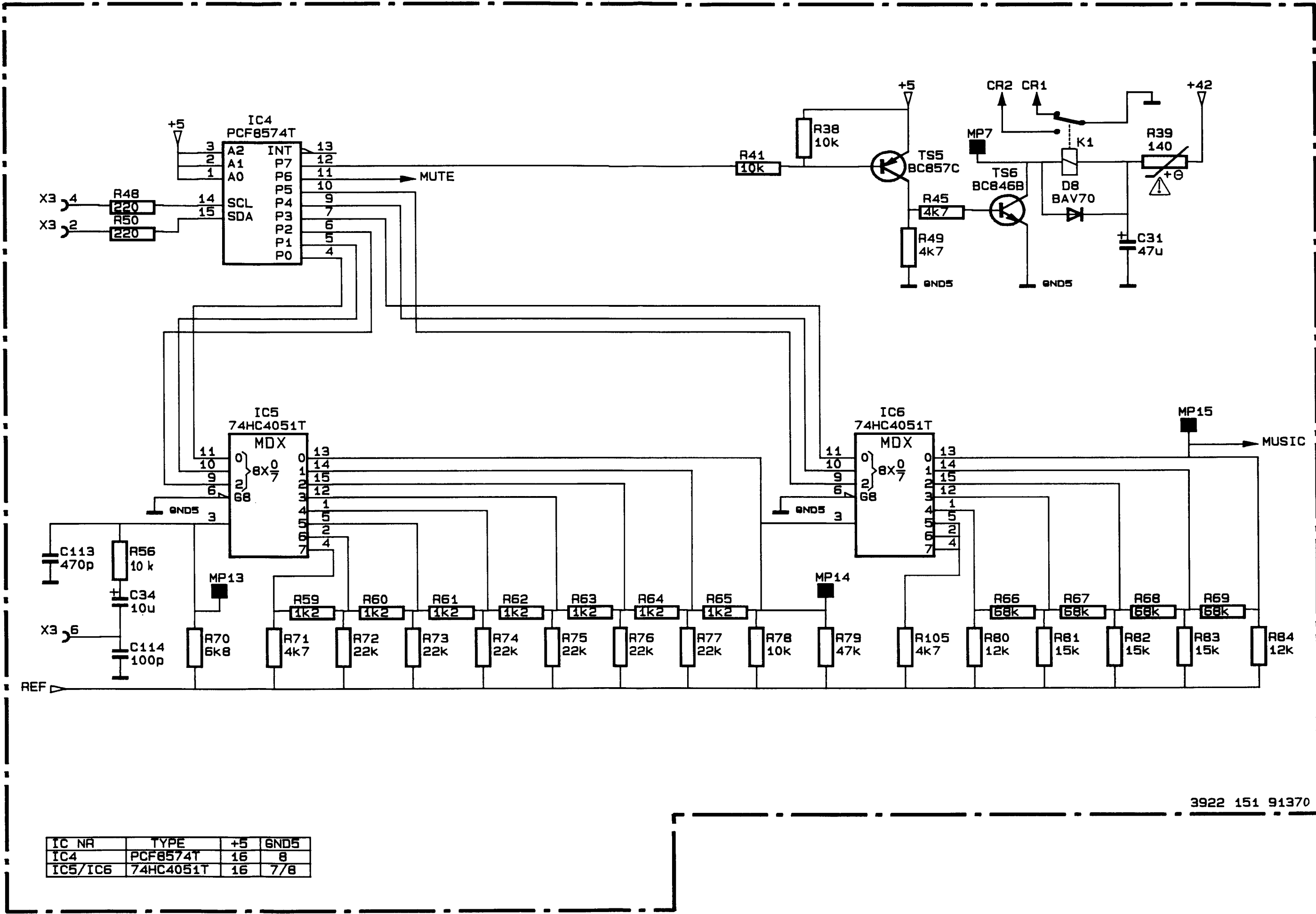
FIGURE 3



3922 151 91370

FIGURE 4
-14.4-

CIRCUIT DIAGRAM OF LINE OUTPUT MODULE, SHEET 1



CIRCUIT DIAGRAM OF LINE OUTPUT MODULE, SHEET 2

FIGURE 5
-14.5-

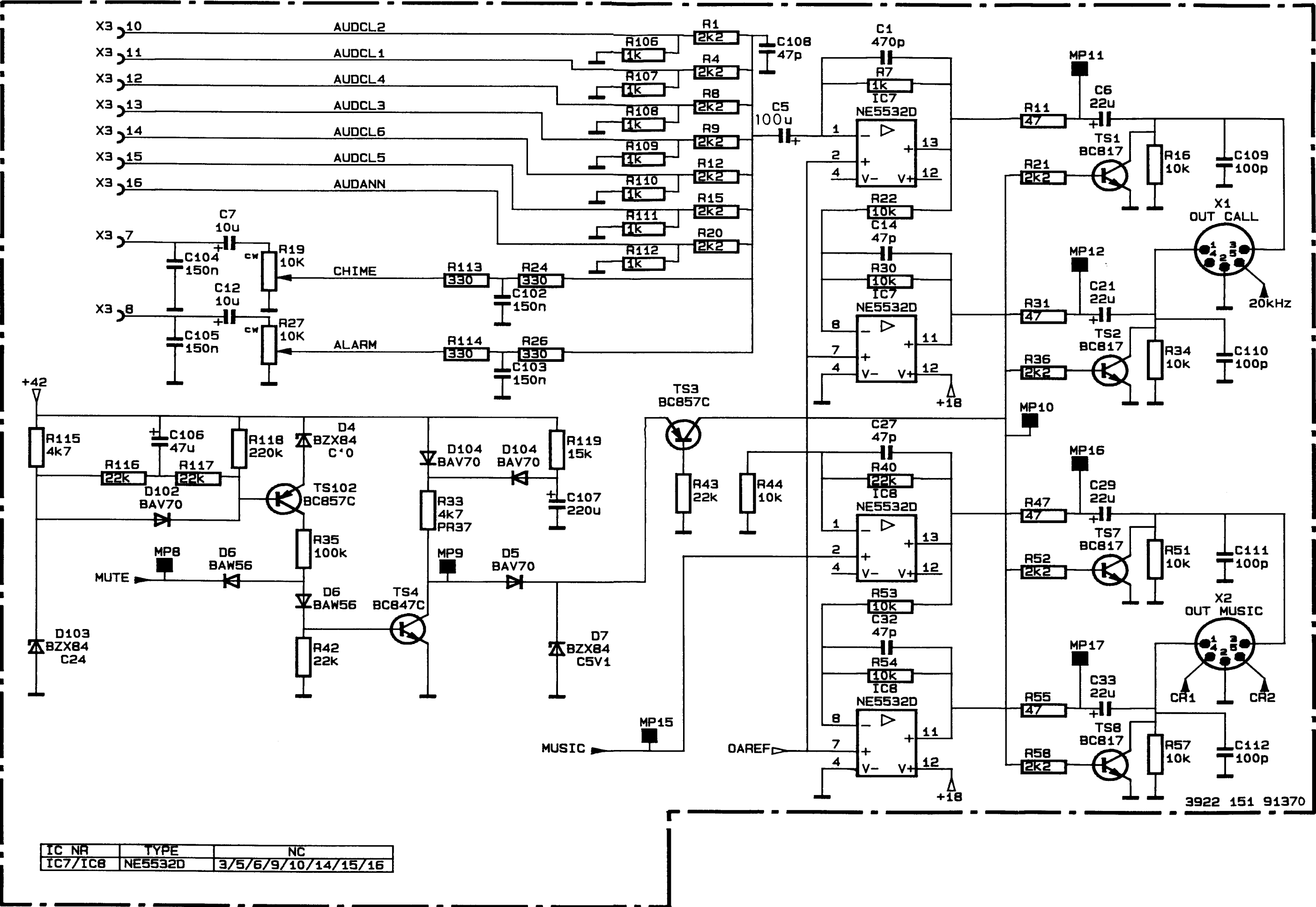
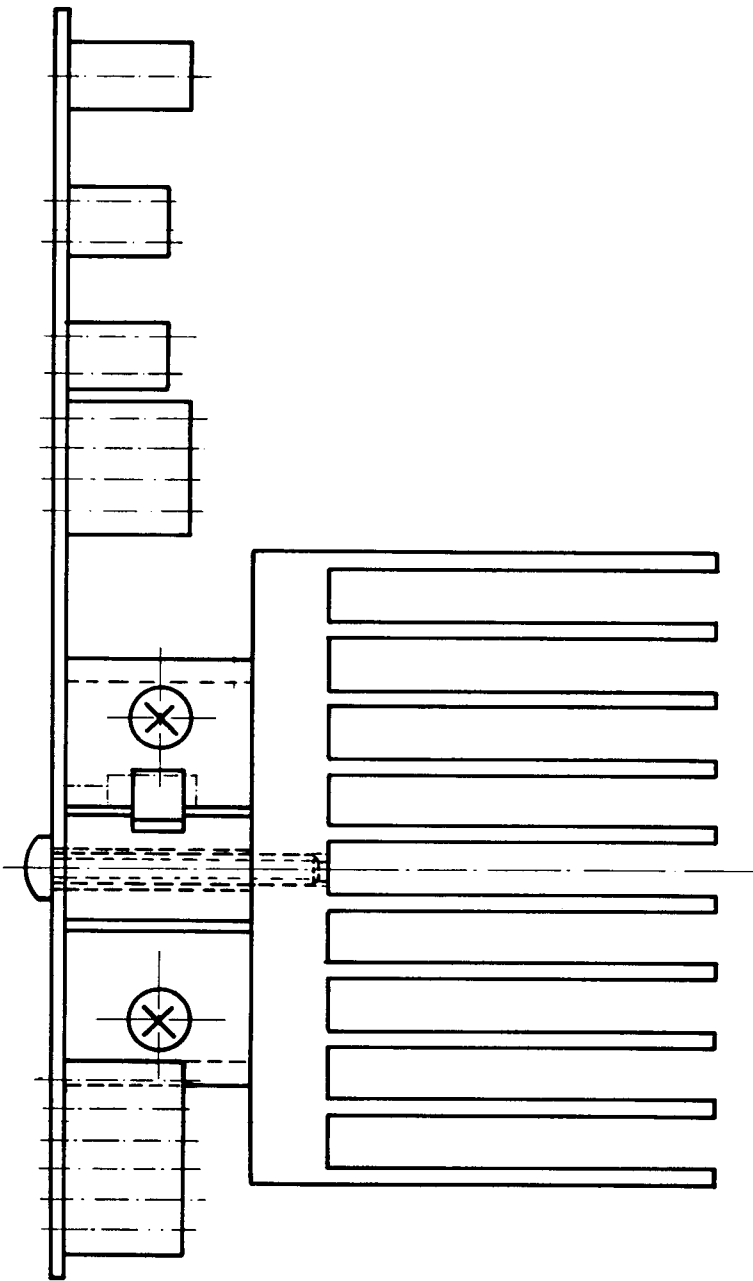
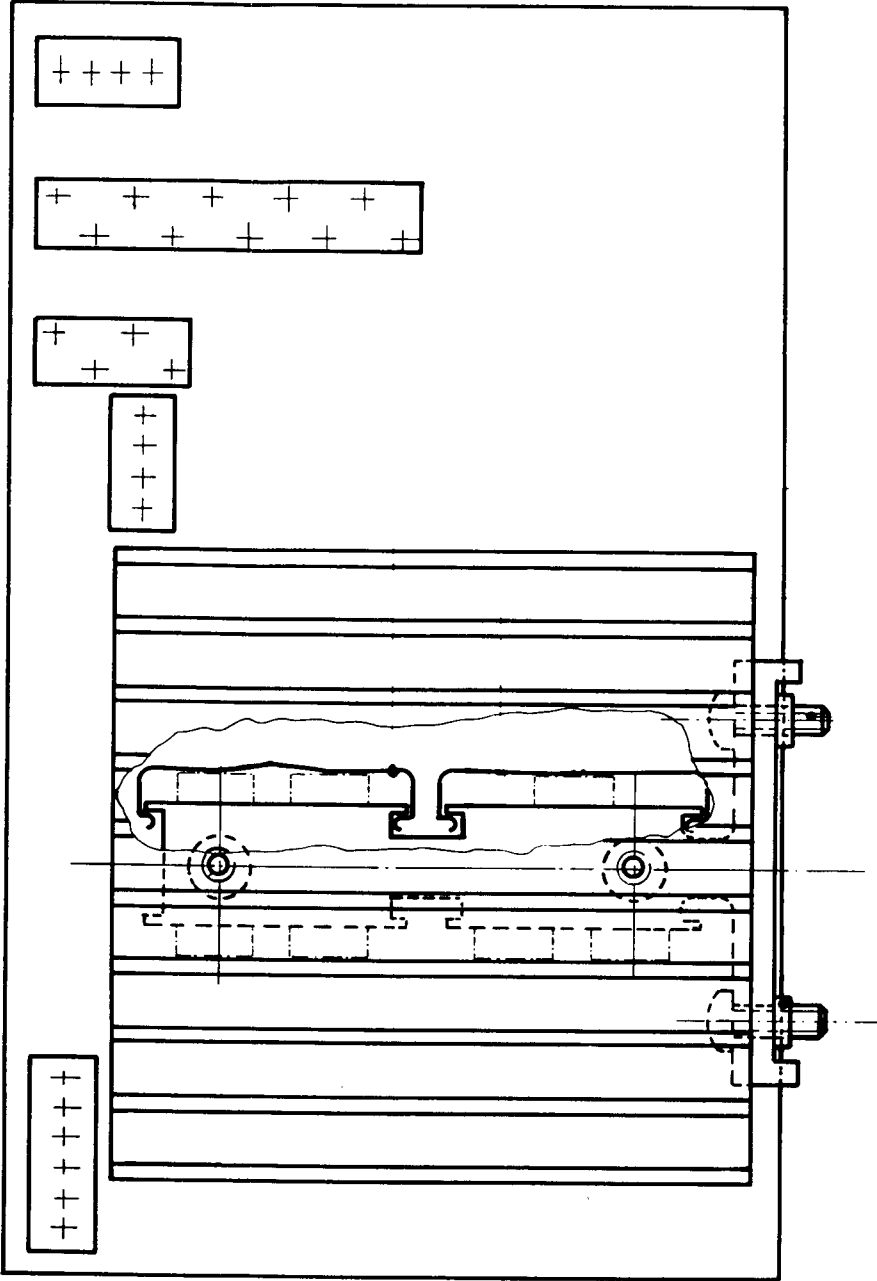


FIGURE 6
-14.6-

CIRCUIT DIAGRAM OF LINE OUTPUT MODULE, SHEET 3



MECHANICAL DRAWING OF POWER SUPPLY

FIGURE 7
-14.7-

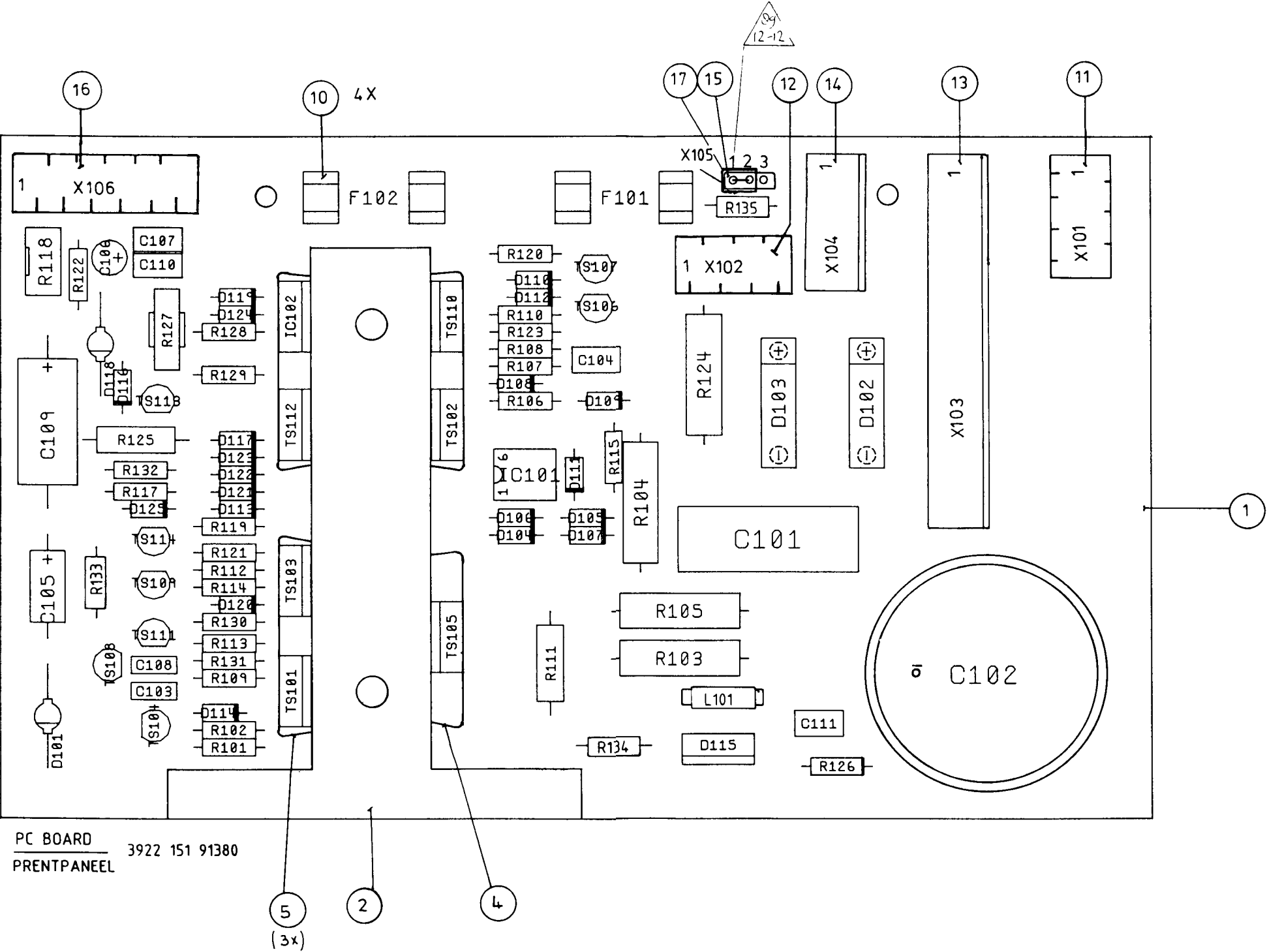
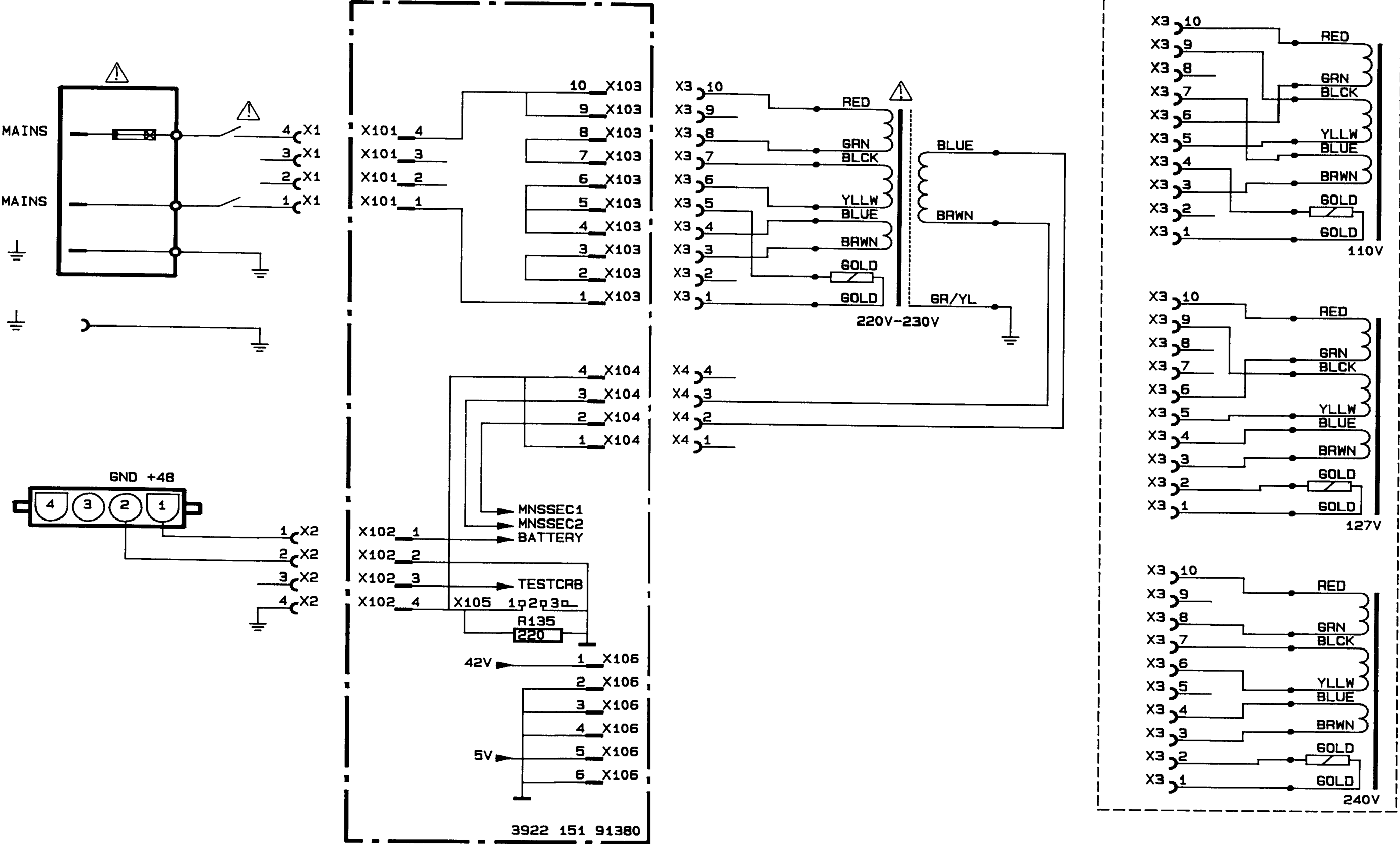


FIGURE 8
-14.8-

PCB COMPONENT LAYOUT OF POWER SUPPLY UNIT



CIRCUIT DIAGRAM OF POWER SUPPLY UNIT, SHEET 1

FIGURE 9

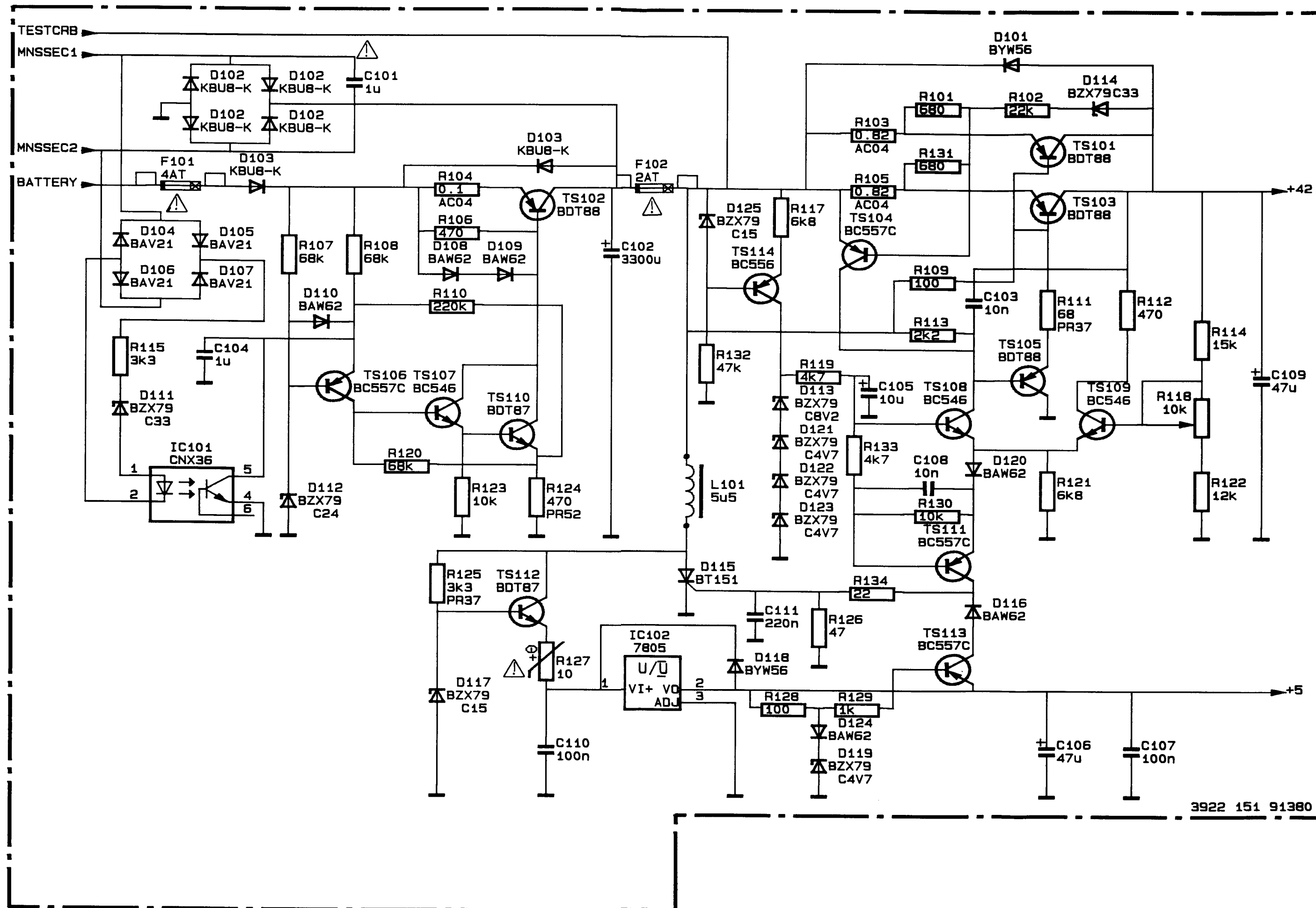
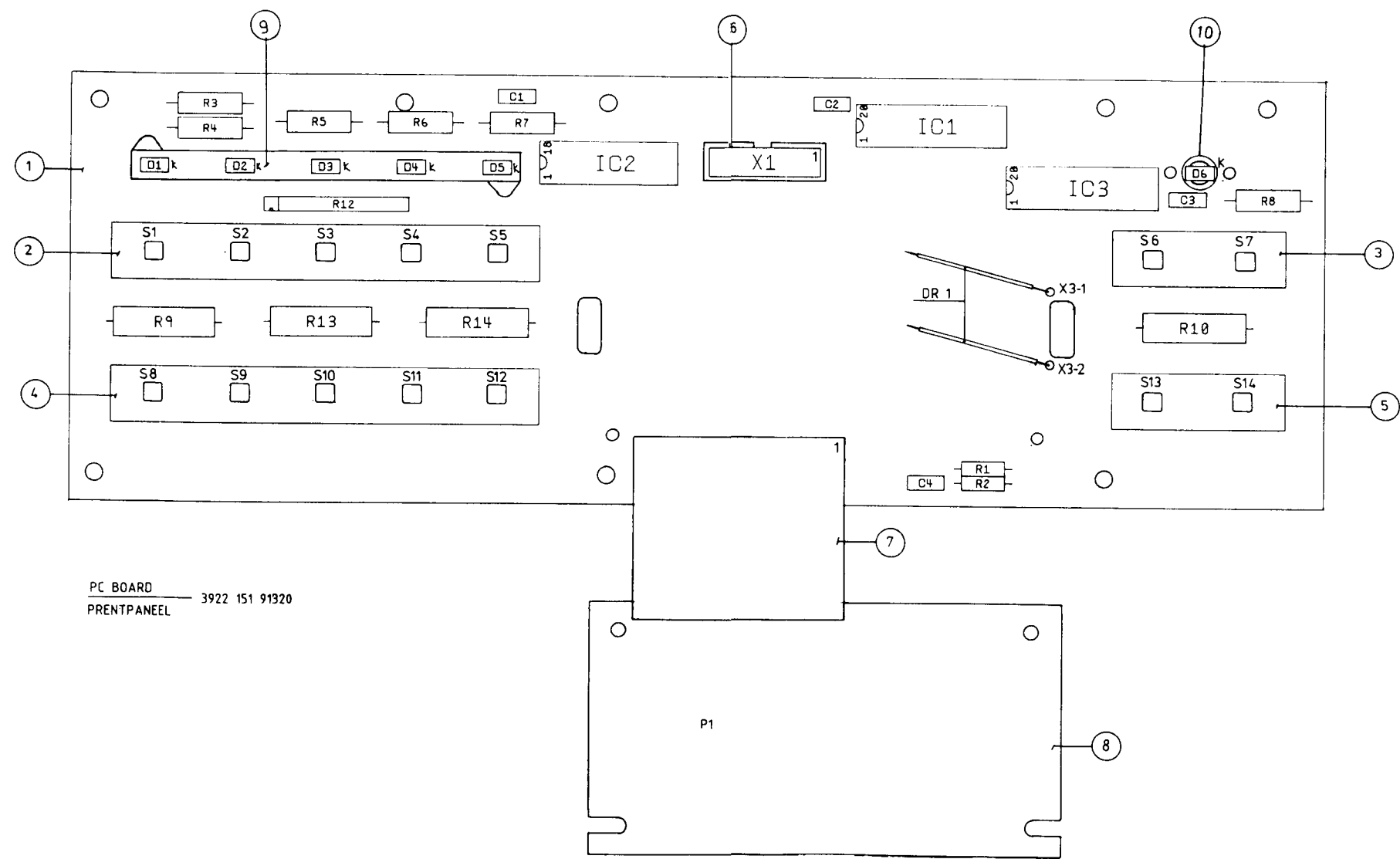


FIGURE 10
-14.10-



PCB COMPONENT LAYOUT OF KEYBOARD

FIGURE 11
-14.11-

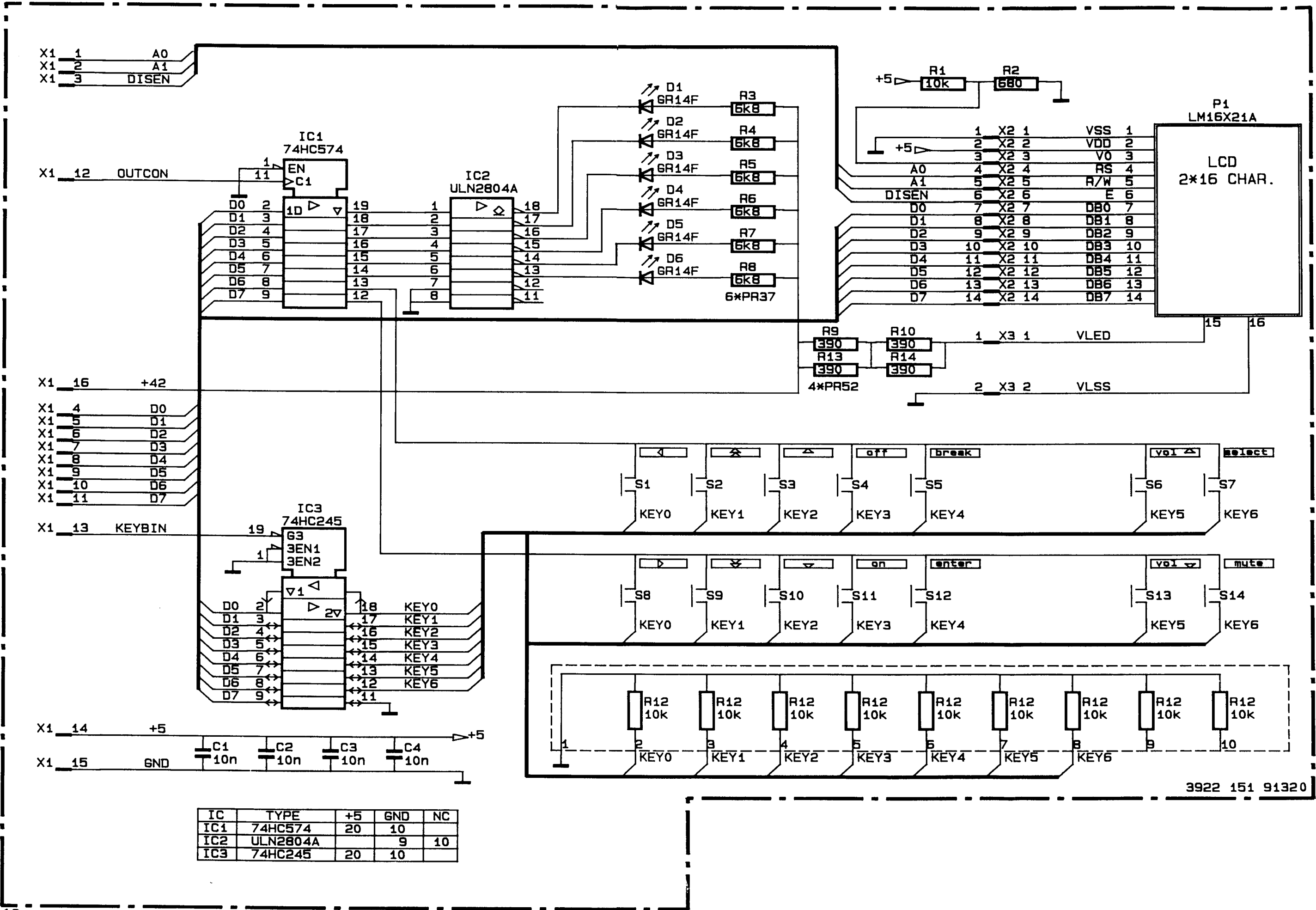
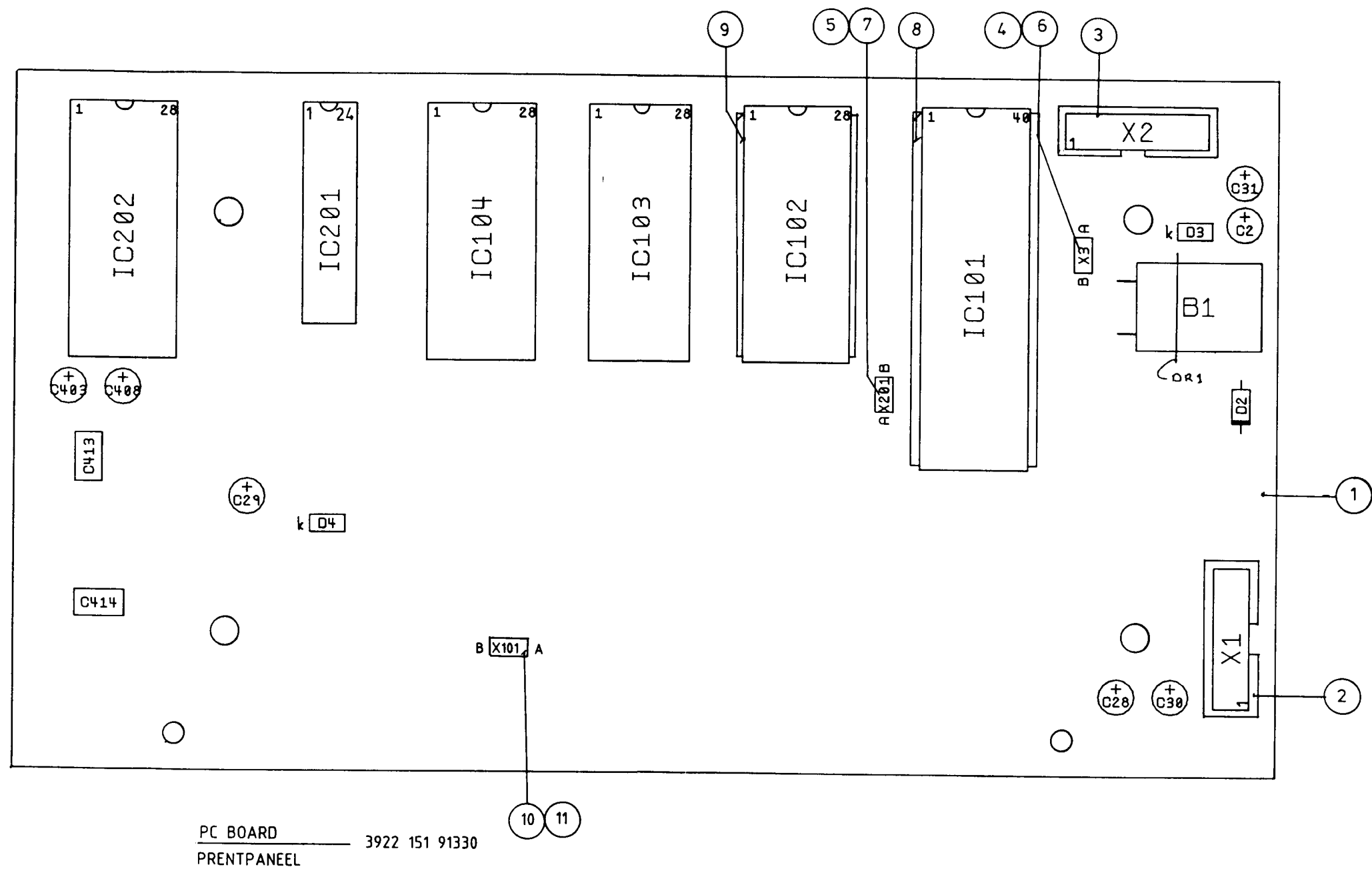
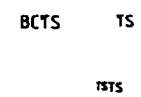


FIGURE 12
-14.12-
CIRCUIT DIAGRAM OF KEYBOARD



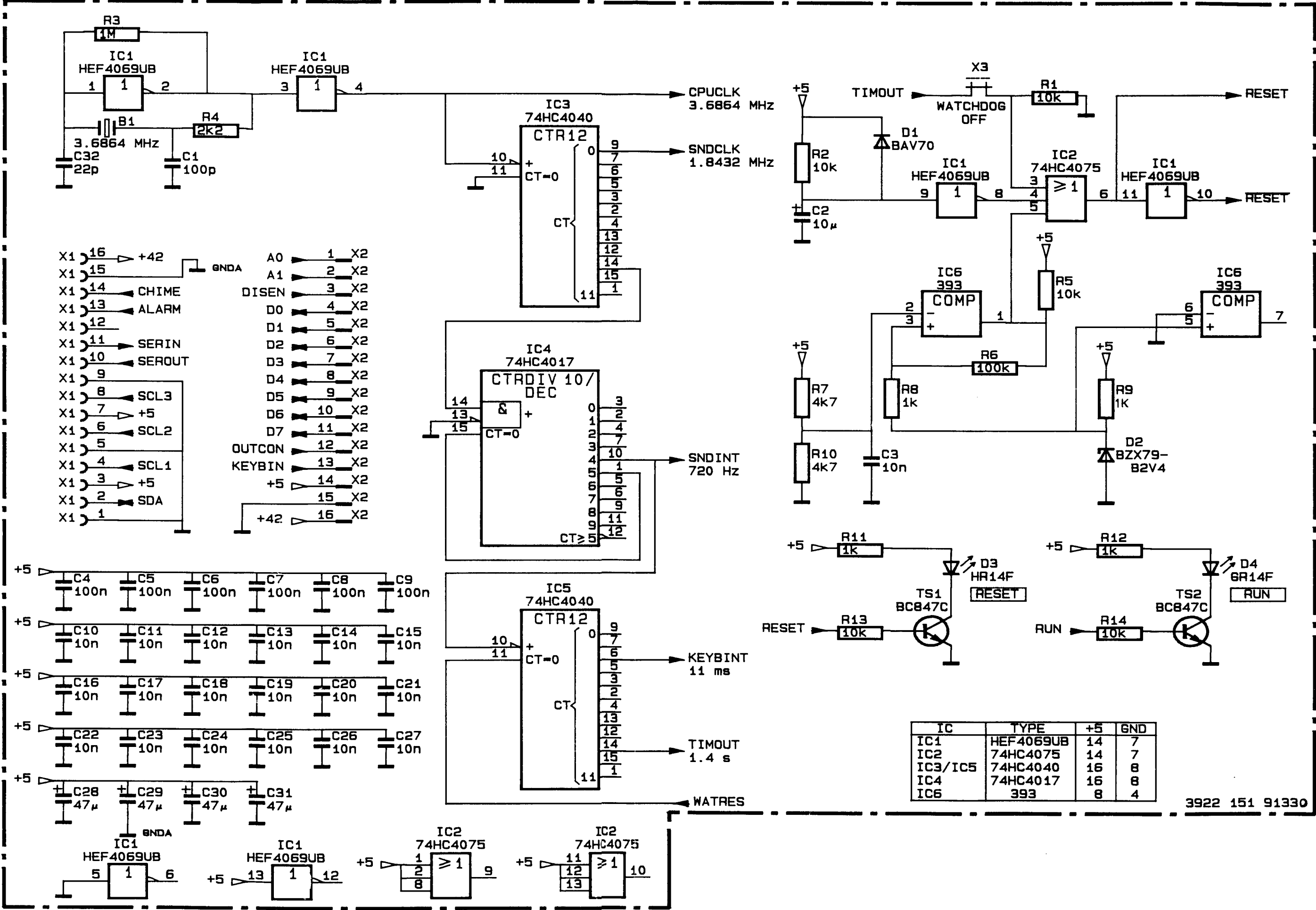
PCB COMPONENT LAYOUT OF MICRO-PROCESSOR BOARD

FIGURE 13
-14.13-



PC BOARD
PRENTPANEEL 3922 151 91330

PCB COMPONENT LAYOUT, TRACK SIDE OF MICRO-PROCESSOR BOARD



CIRCUIT DIAGRAM OF THE MICRO-PROCESSOR BOARD, SHEET 1

FIGURE 15

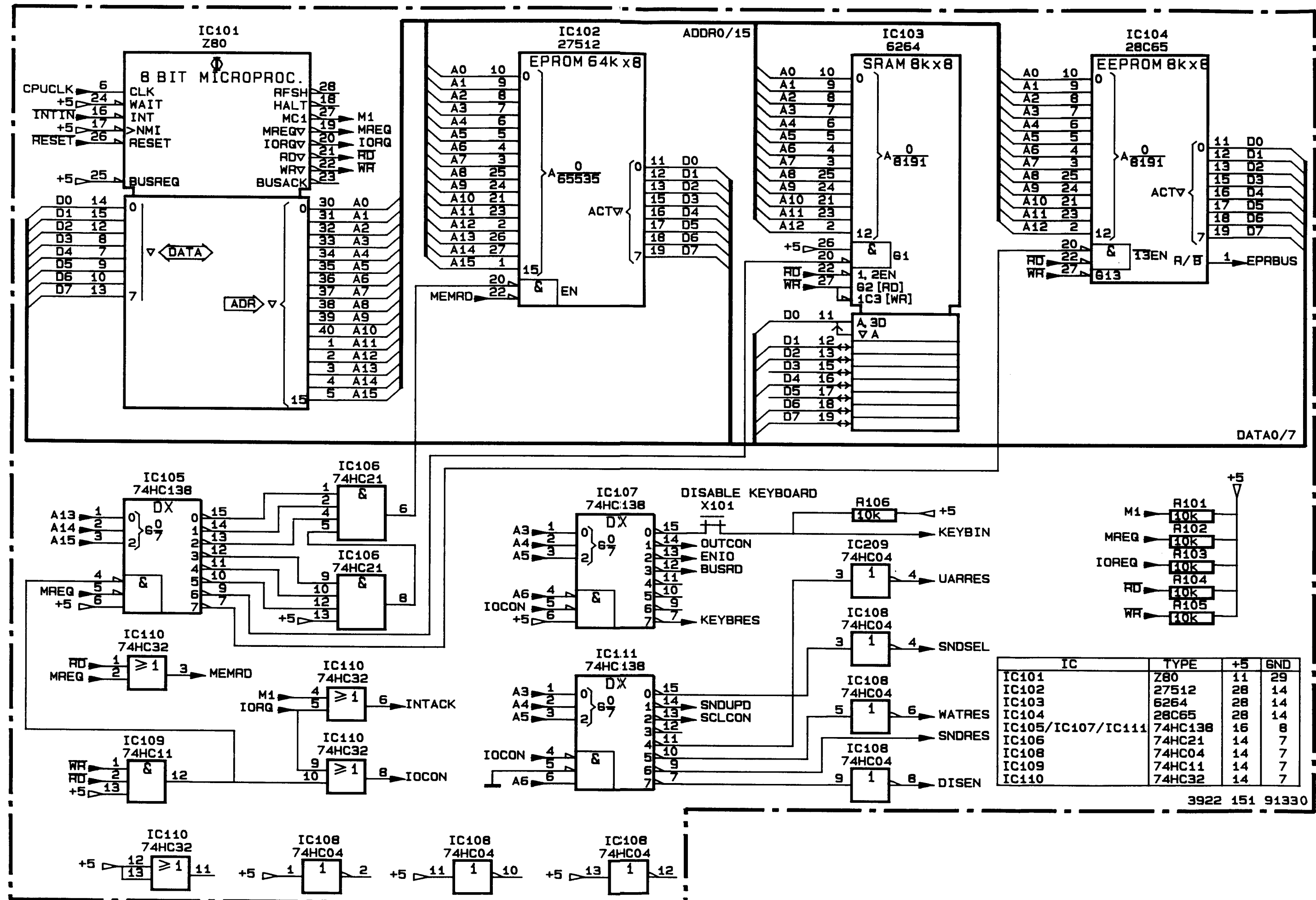
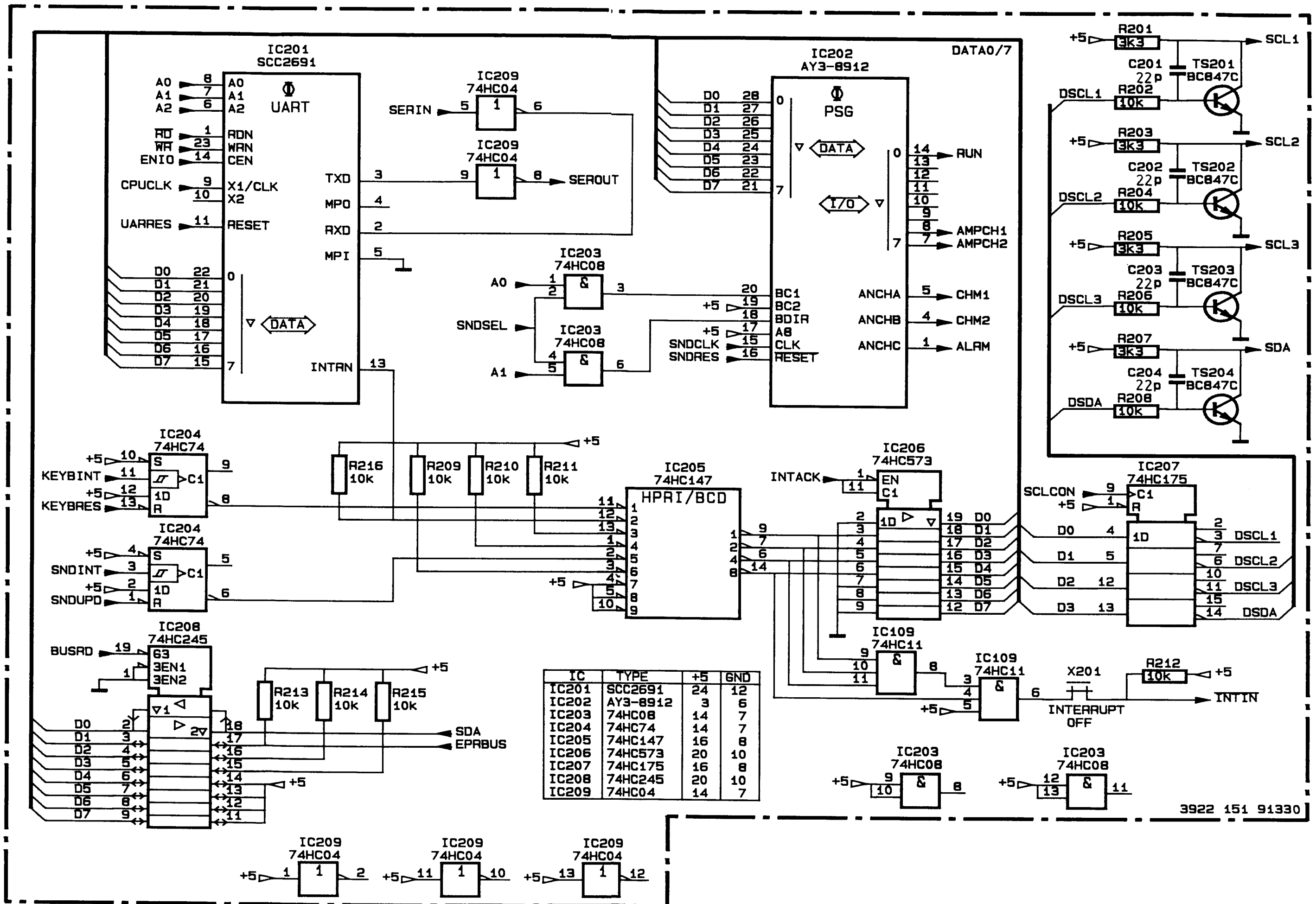


FIGURE 16

CIRCUIT DIAGRAM OF MICRO-PROCESSOR BOARD, SHEET 2



CIRCUIT DIAGRAM OF THE MICRO-PROCESSOR BOARD, SHEET 3

FIGURE 17

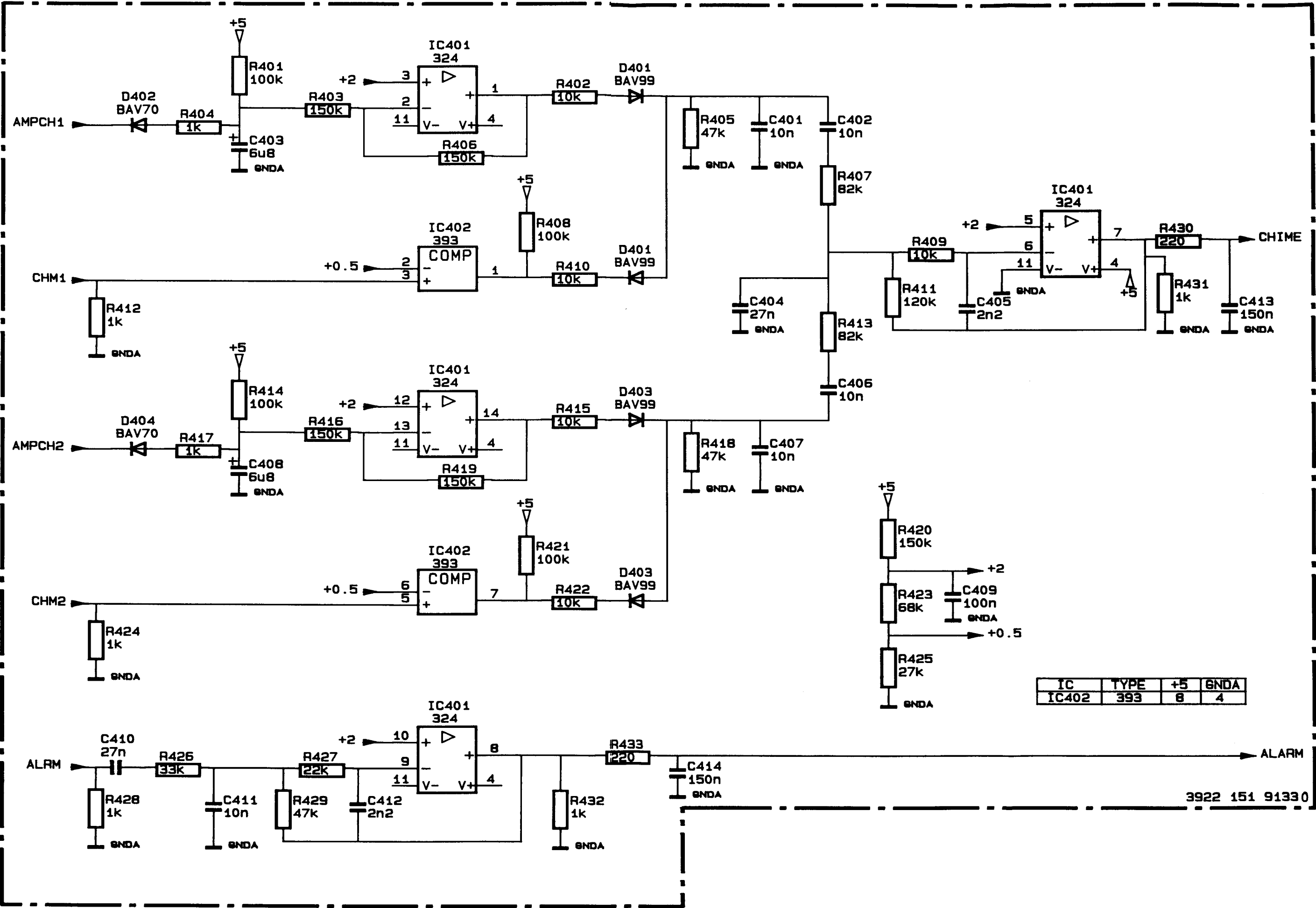
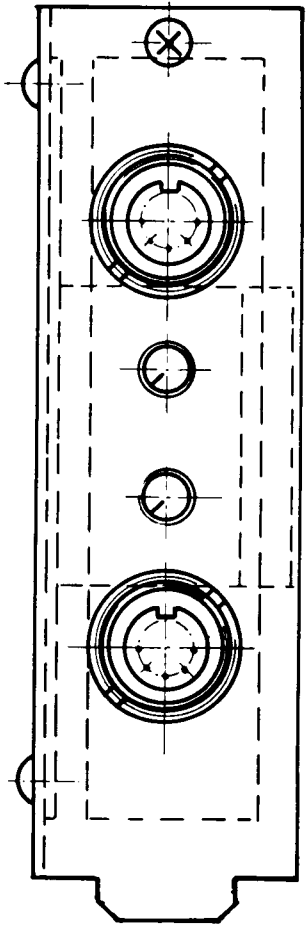
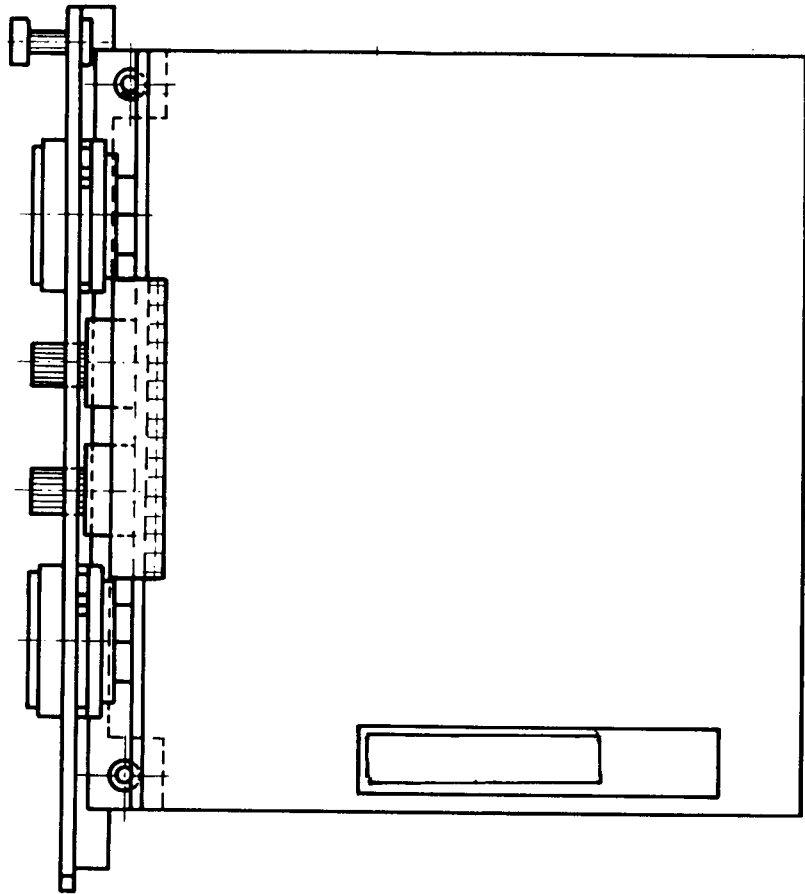


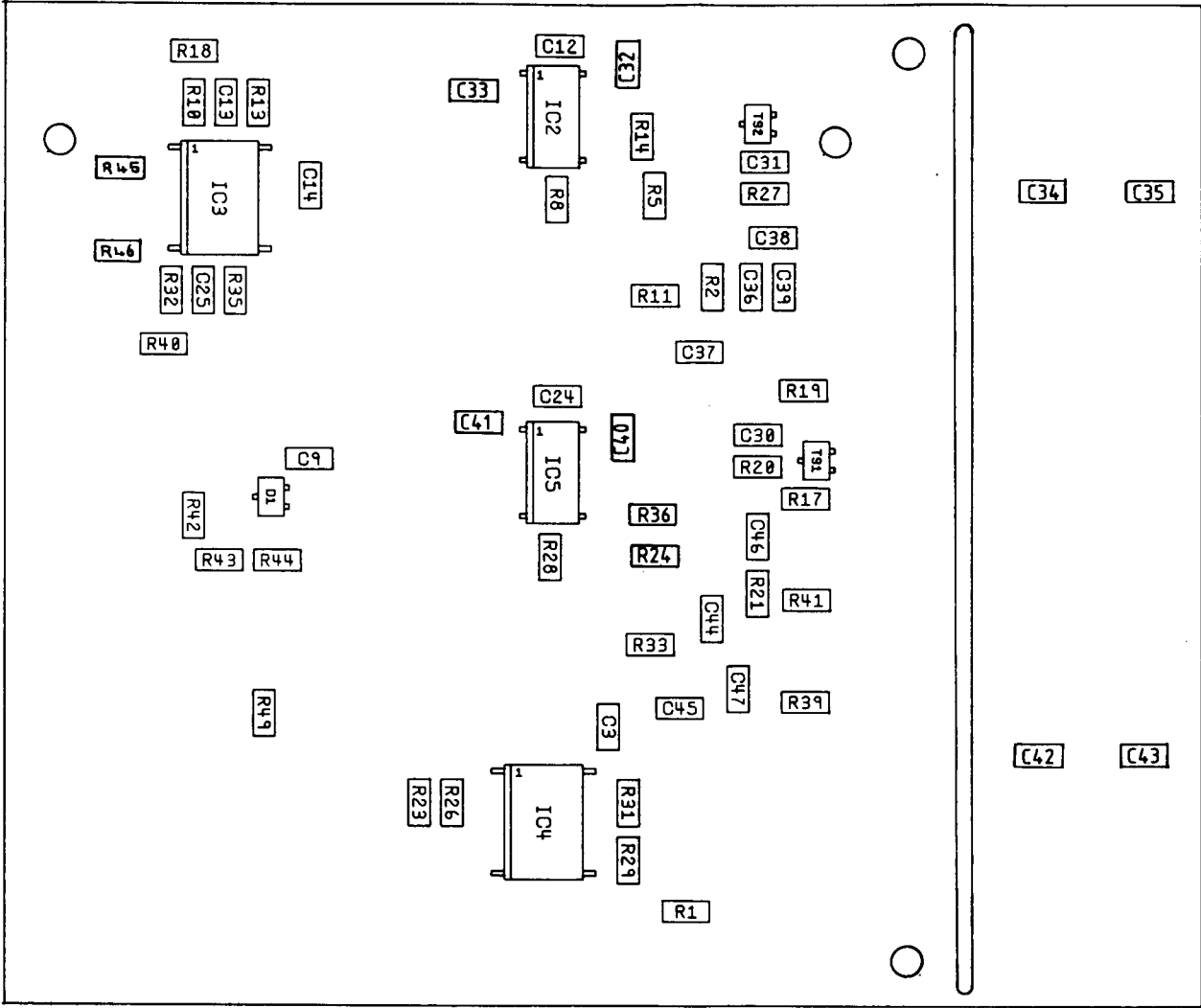
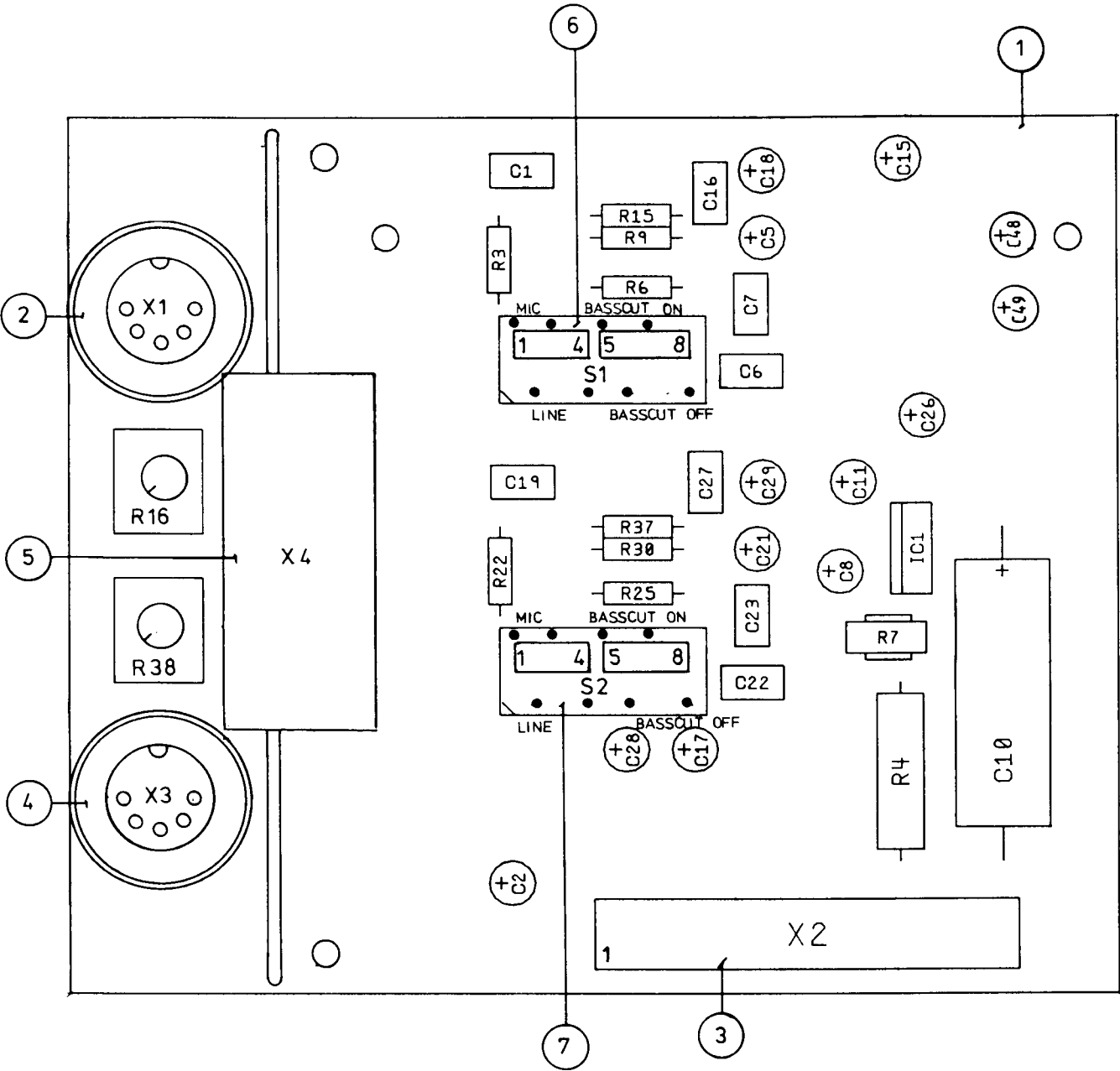
FIGURE 18
-14.18-

CIRCUIT DIAGRAM OF MICRO-PROCESSOR BOARD, SHEET 4



MECHANICAL DRAWING OF LBB1282/00

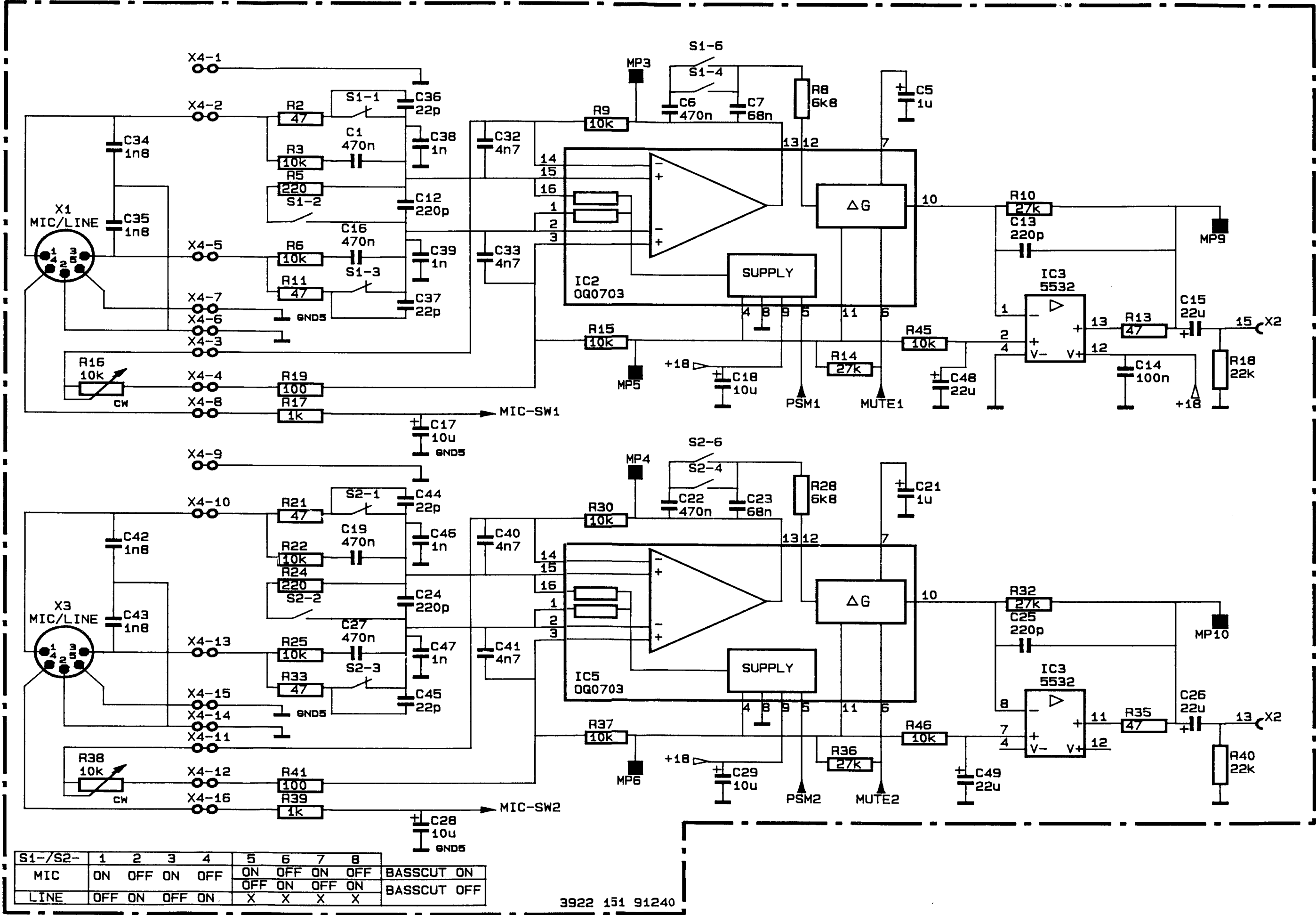
FIGURE 19
-14.19-



PC BOARD 3922 151 91240
PRENT PANEEL

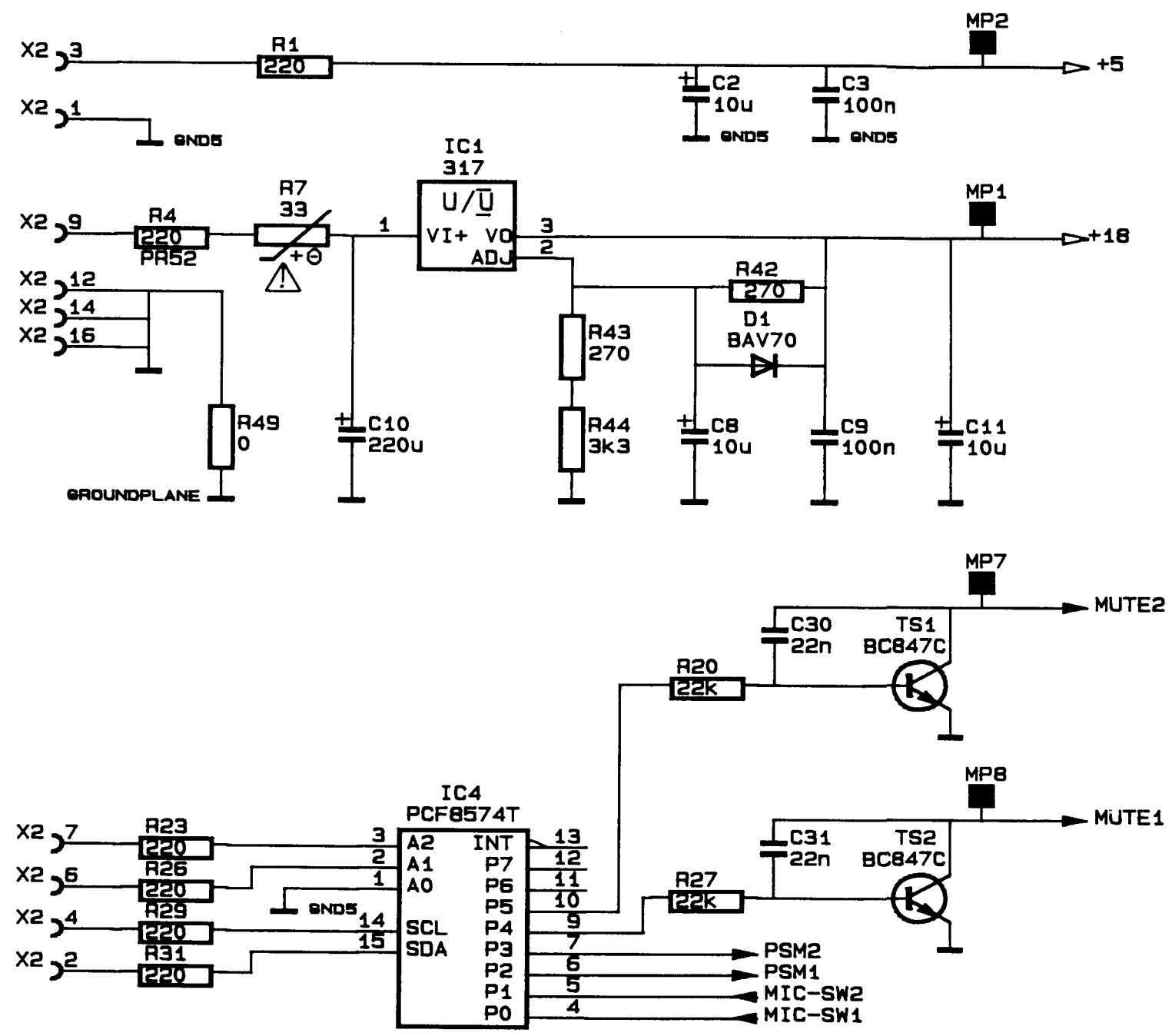
FIGURE 20
-14.20-

PCB COMPONENT LAYOUT OF LBB1282/00



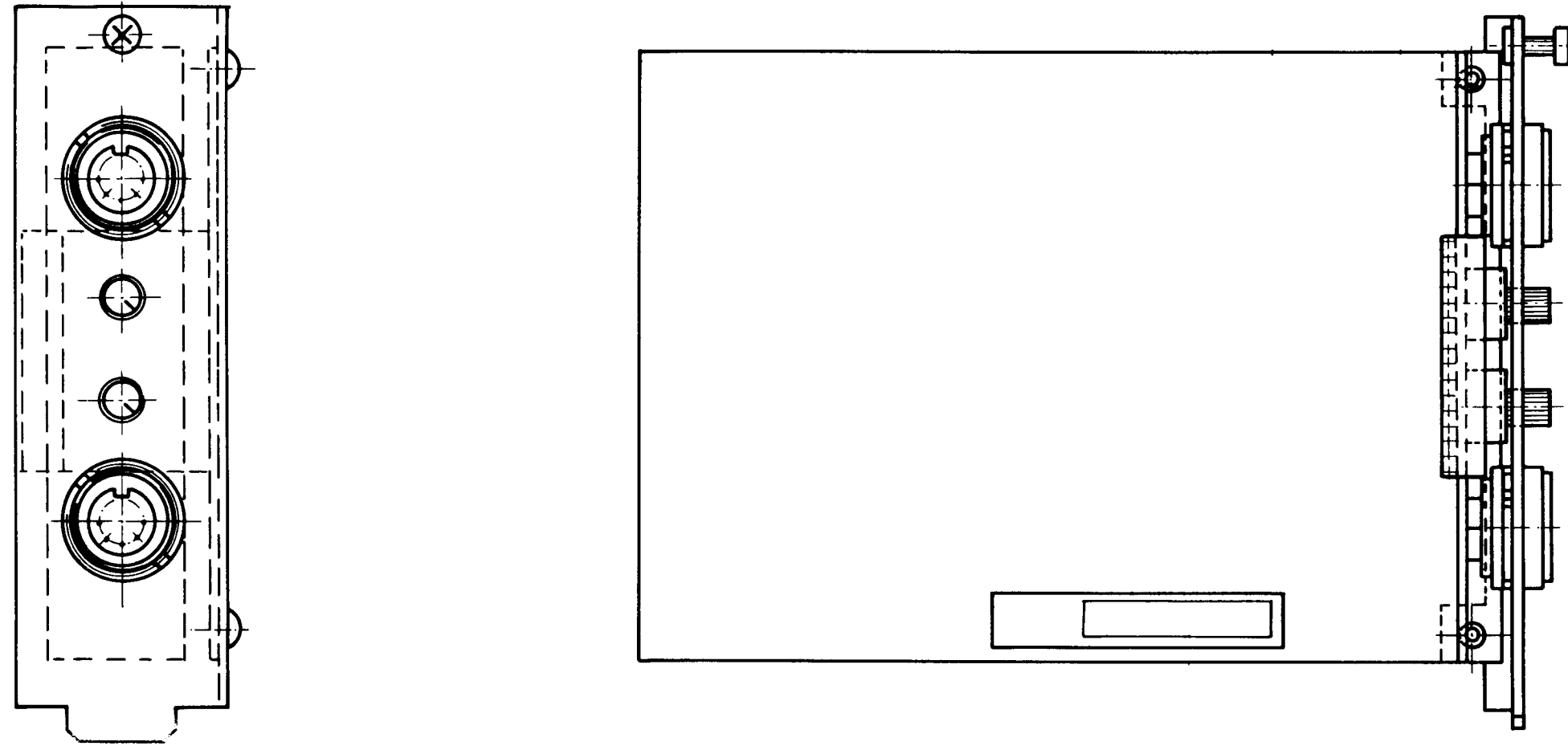
CIRCUIT DRAWING OF LBB1282/00, SHEET 1

FIGURE 21



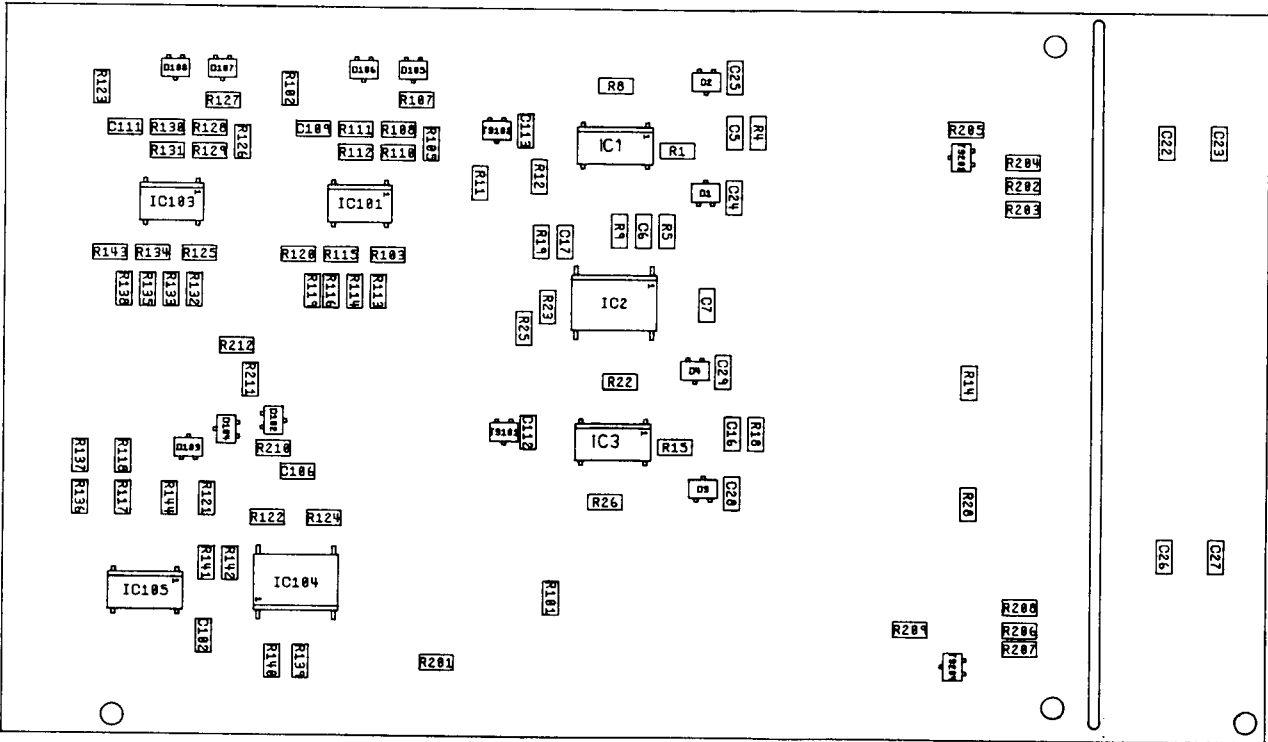
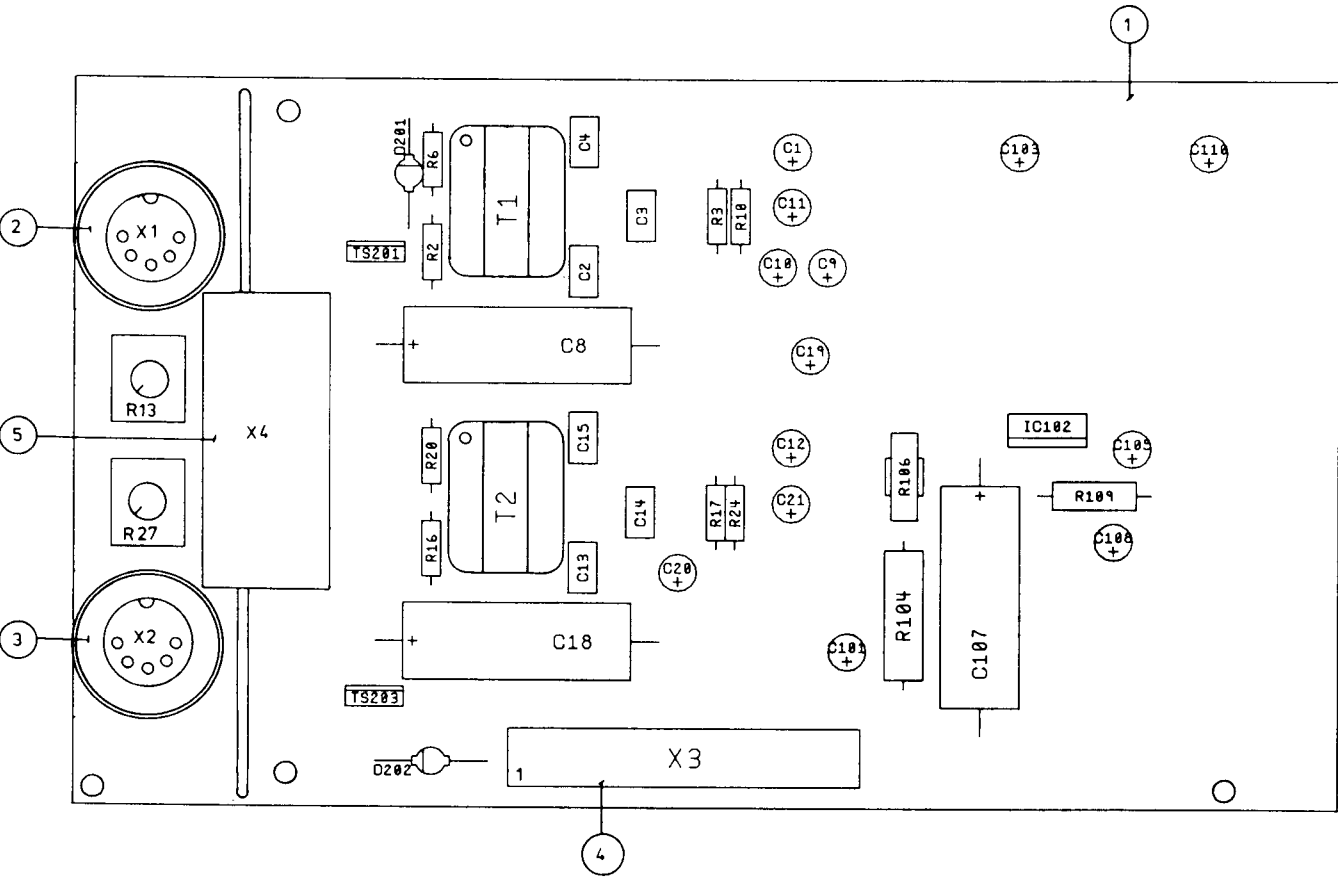
3922 151 91240

IC NR	TYPE	+5	GND5
IC4	PCF8574T	16	8



MECHANICAL DRAWING OF LBB1283/00

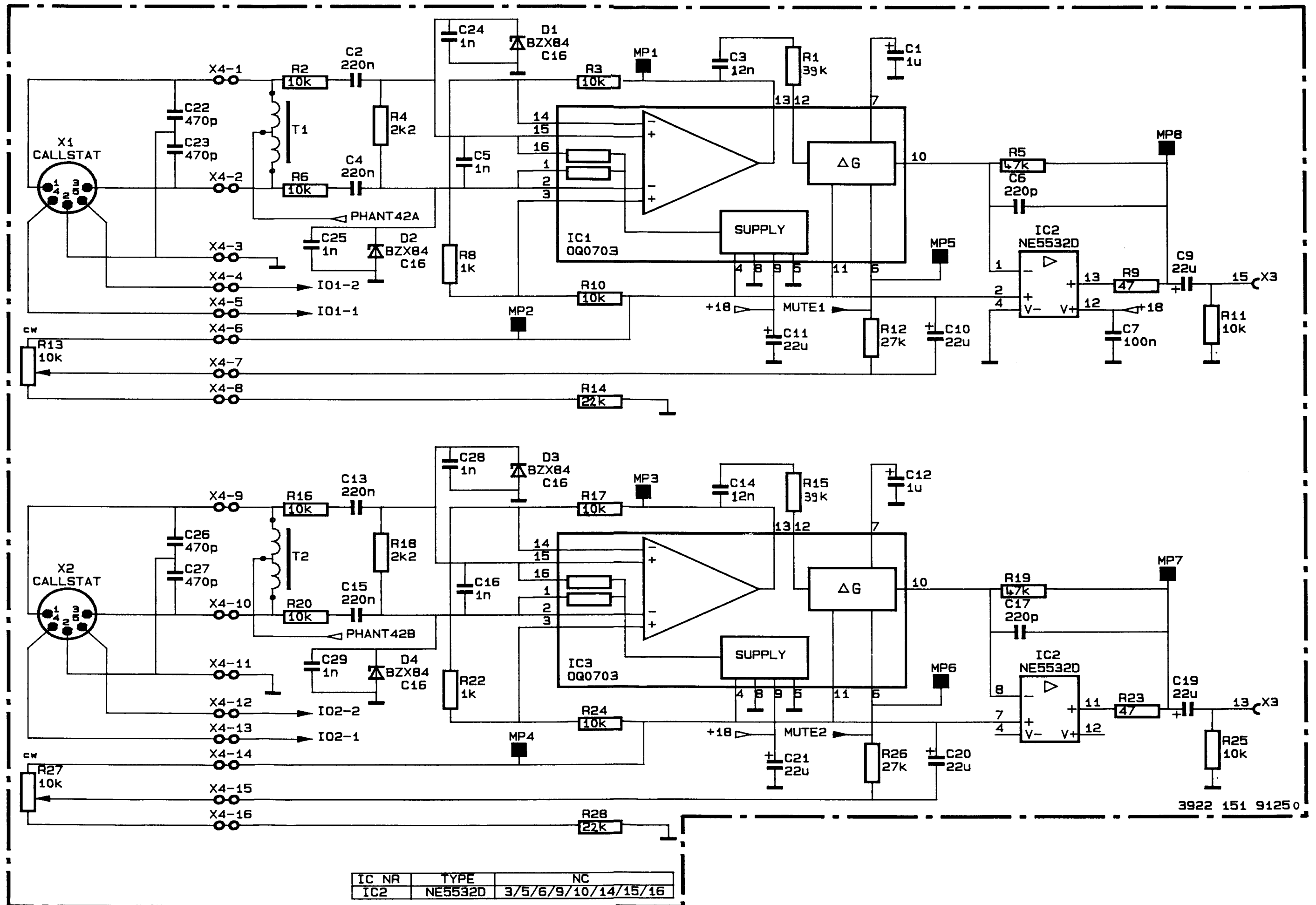
FIGURE 23



PC BOARD
PRENTANEEL 3922 151 91250

FIGURE 24
-14.24-

PCB COMPONENT LAYOUT OF LBB1283/00



CIRCUIT DIAGRAM OF LBB1283/00, SHEET 1

FIGURE 25

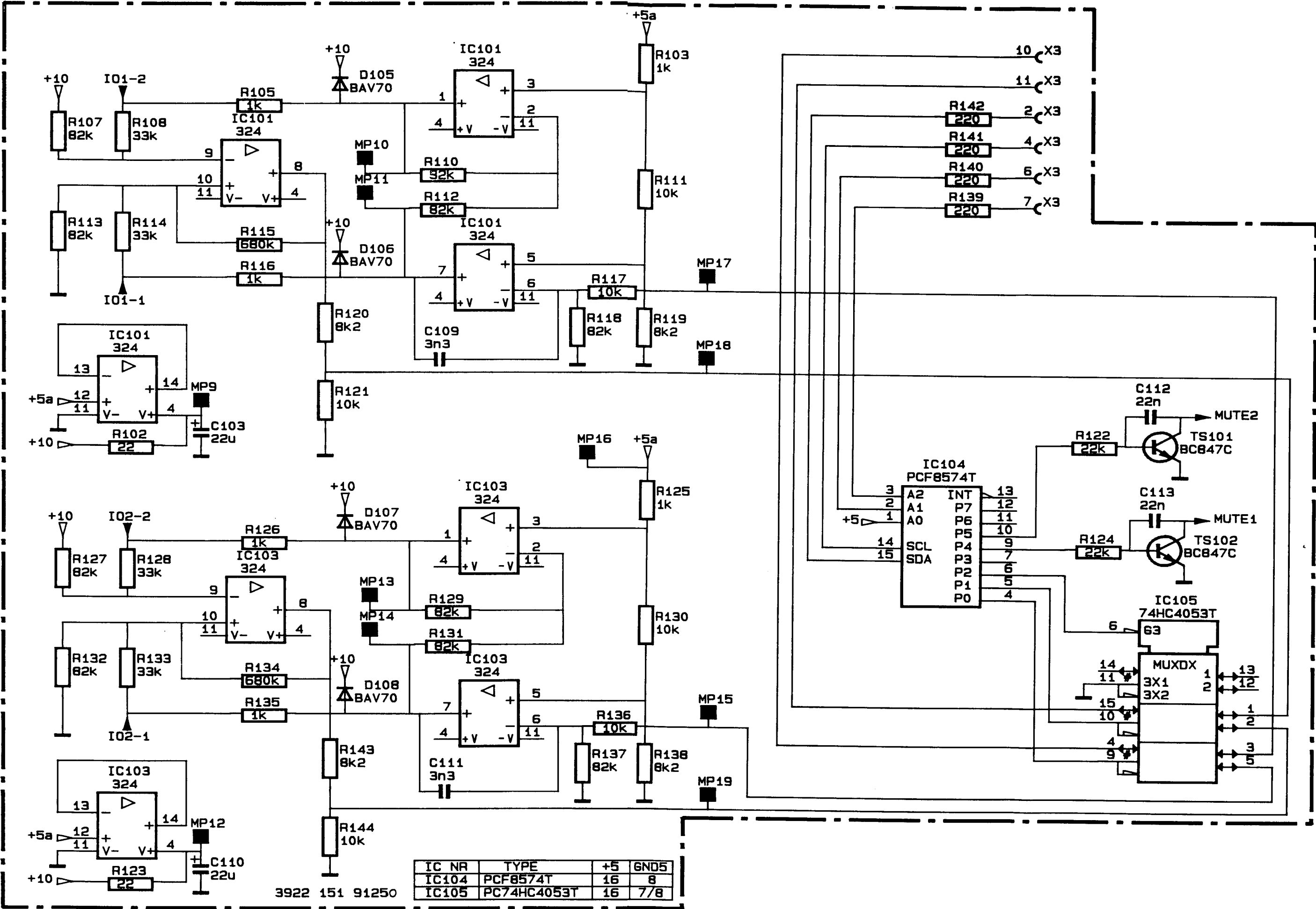
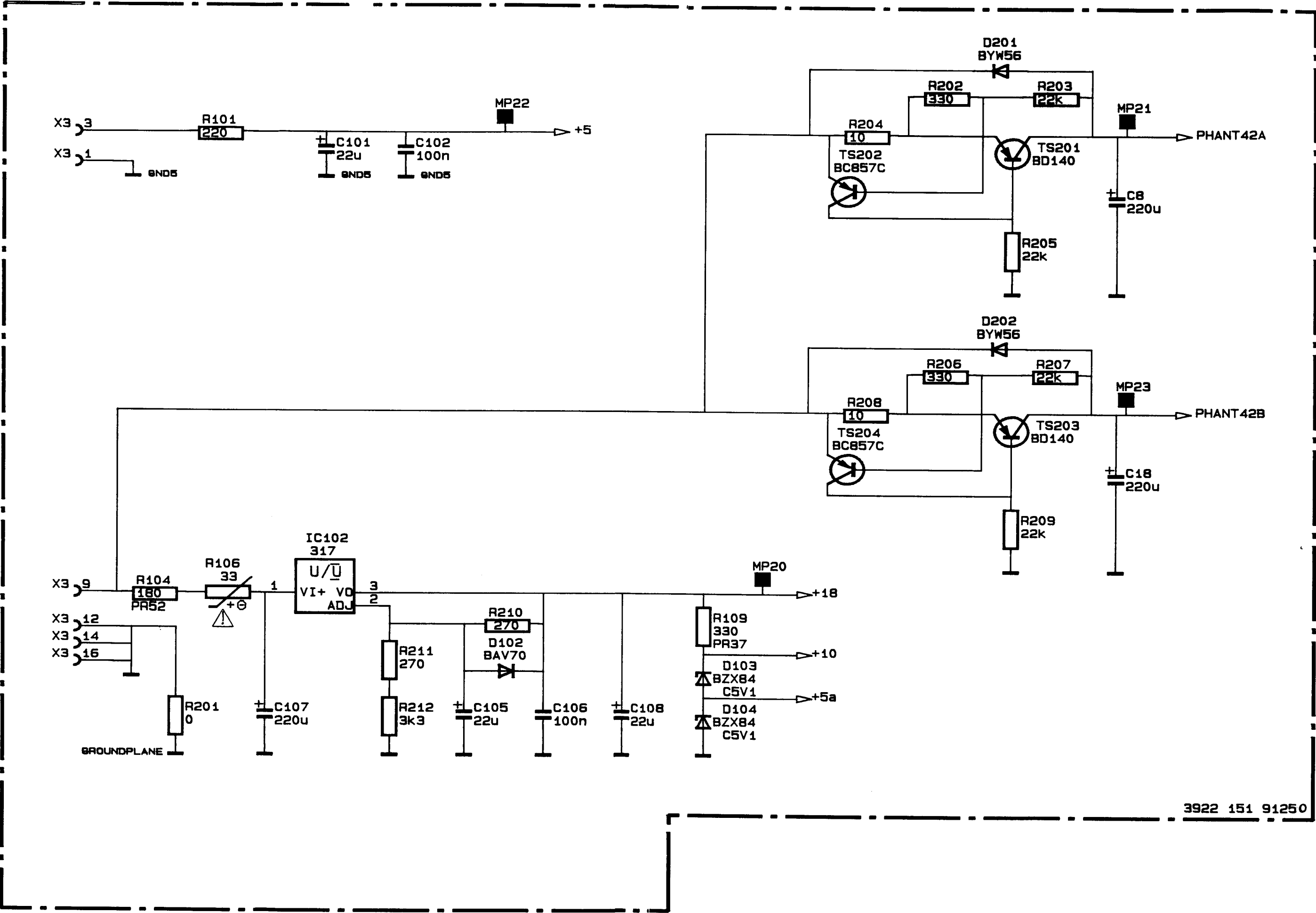


FIGURE 26



CIRCUIT DIAGRAM OF LBB1283/00, SHEET 3

FIGURE 27
-14.27-

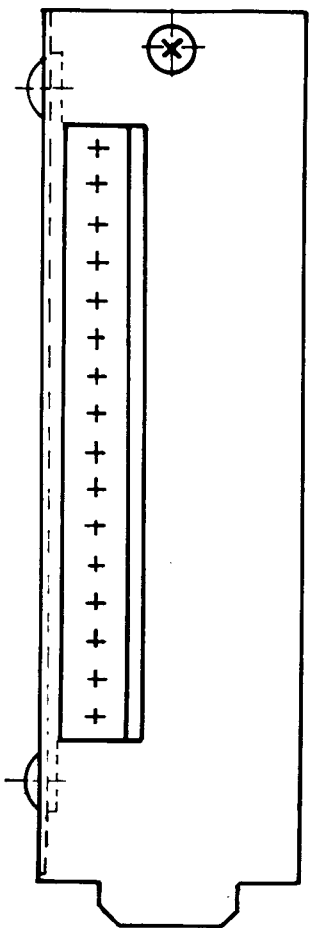
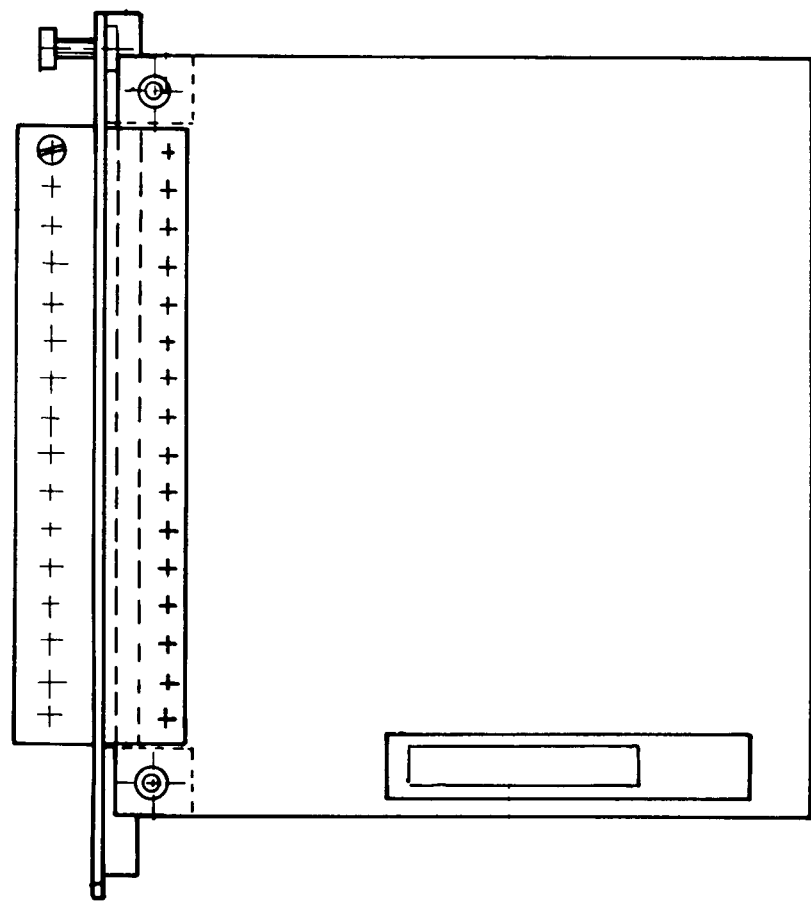
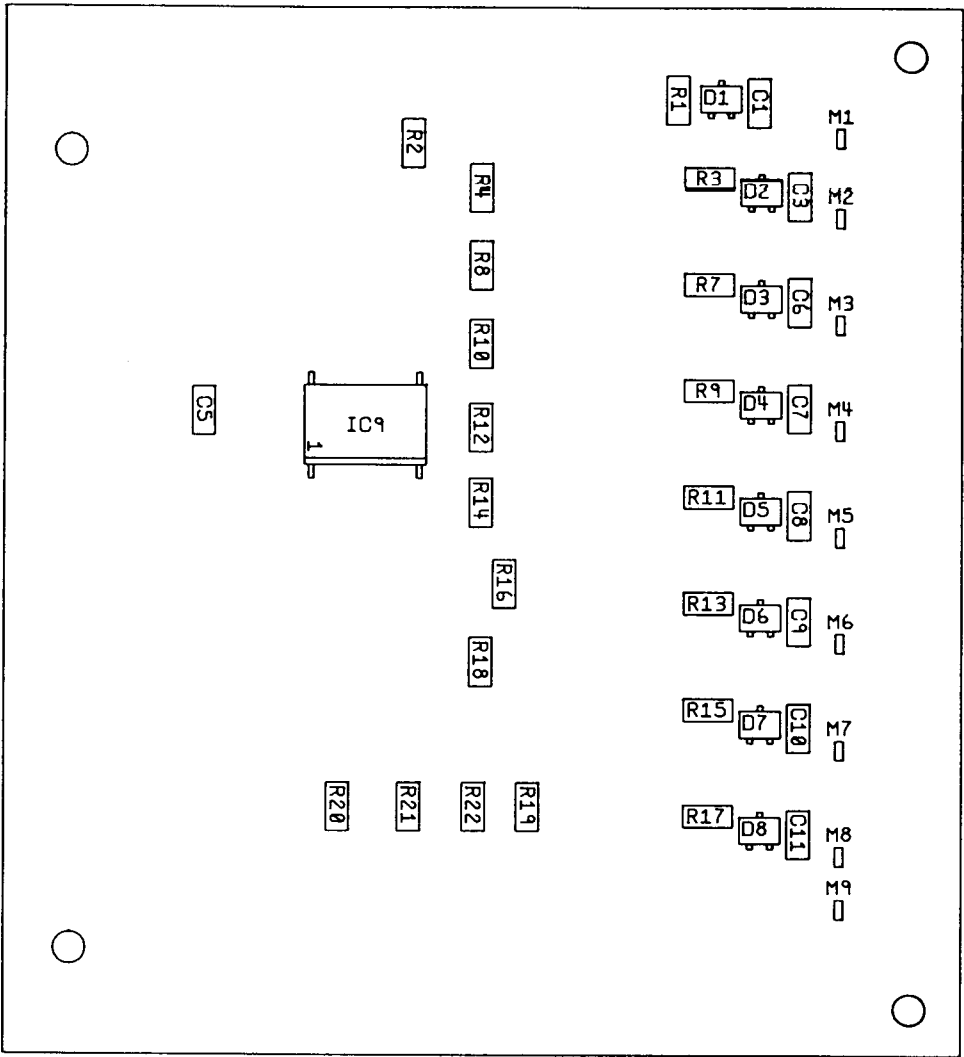
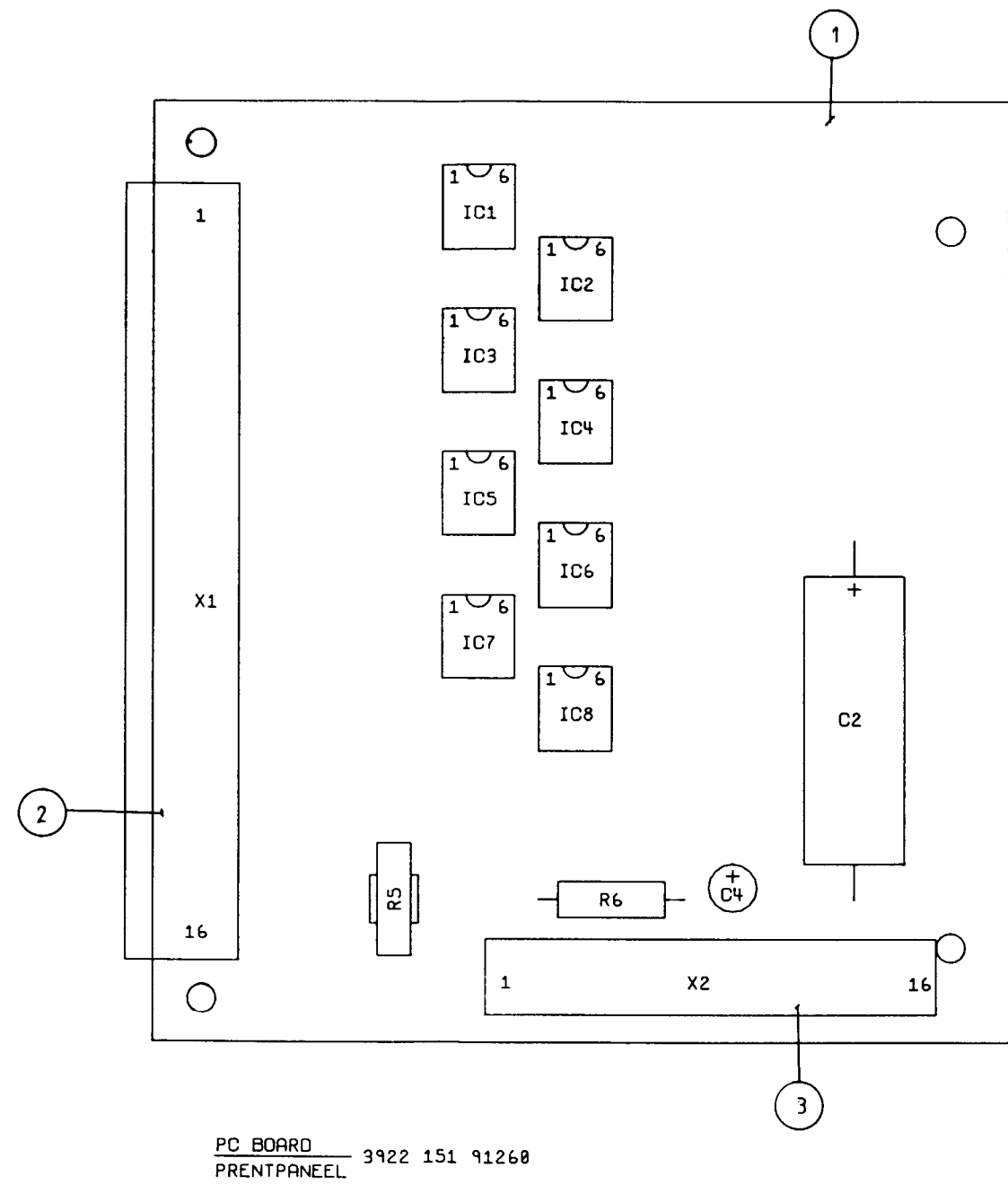


FIGURE 28
-14.28-



PCB COMPONENT LAYOUT OF LBB1284/00

FIGURE 29
-14.29-

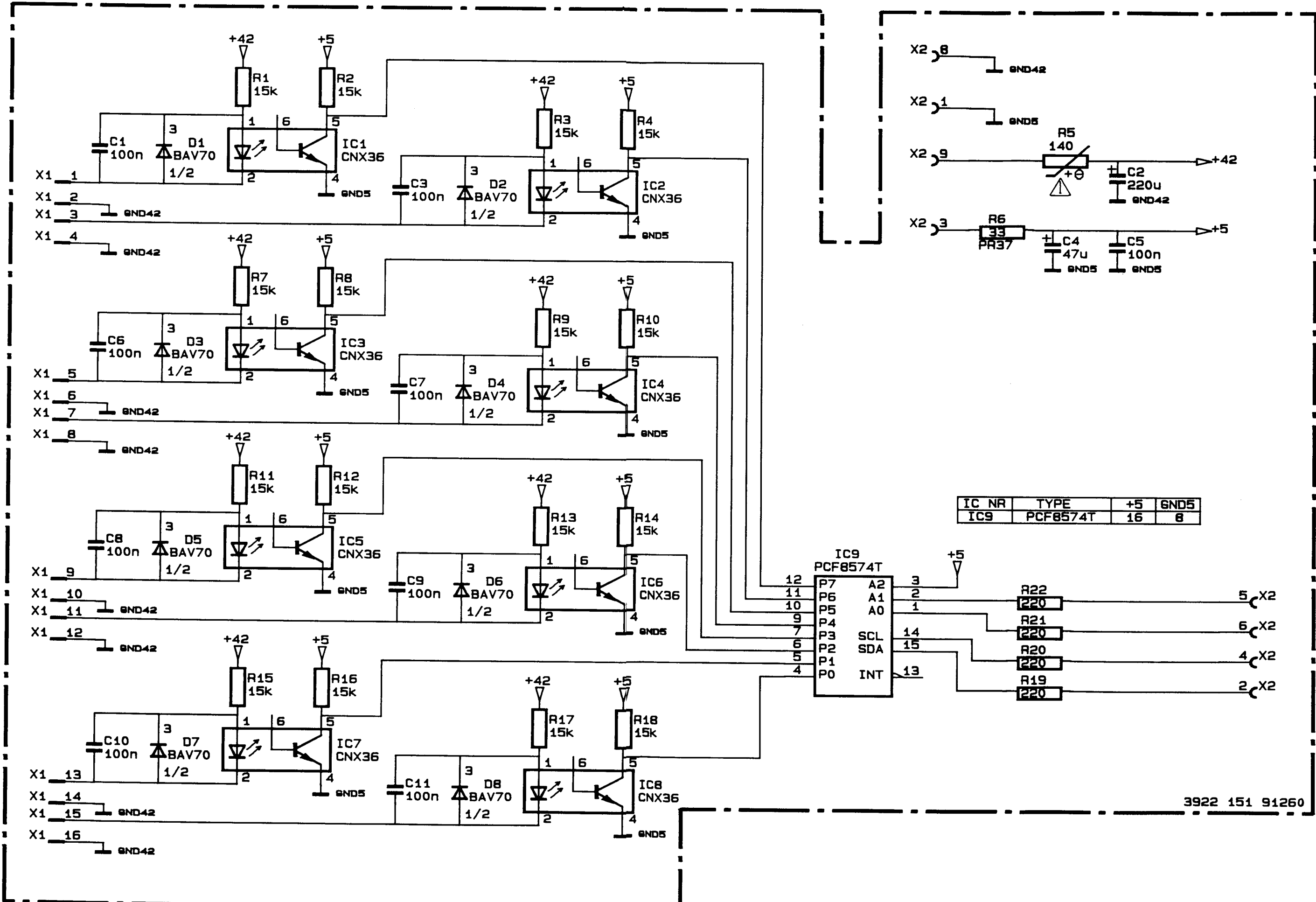
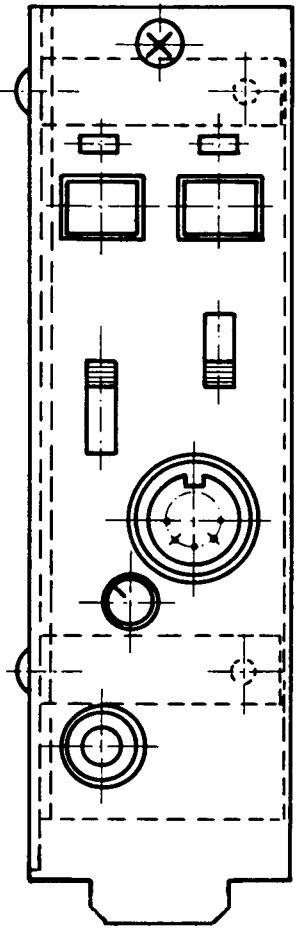
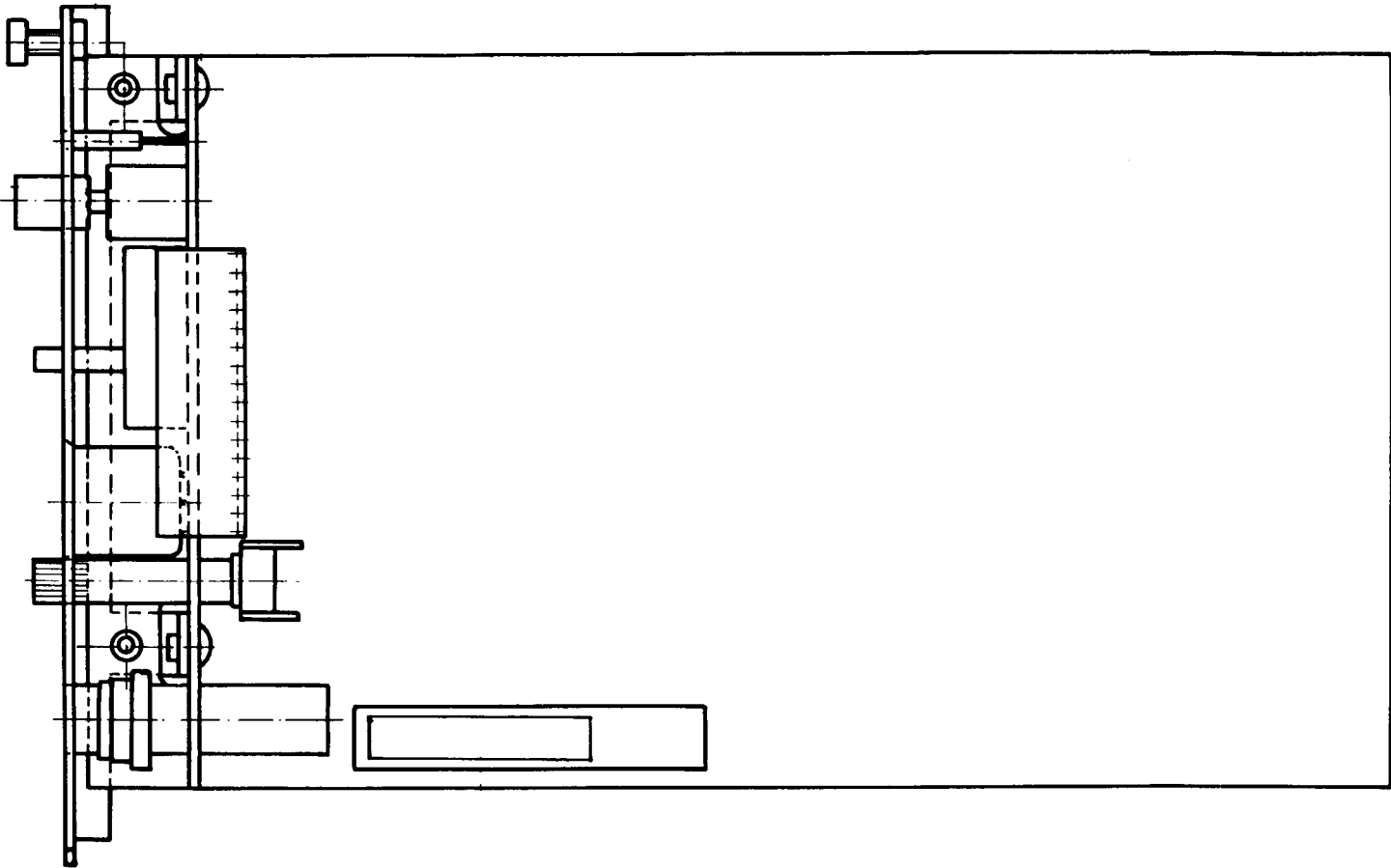
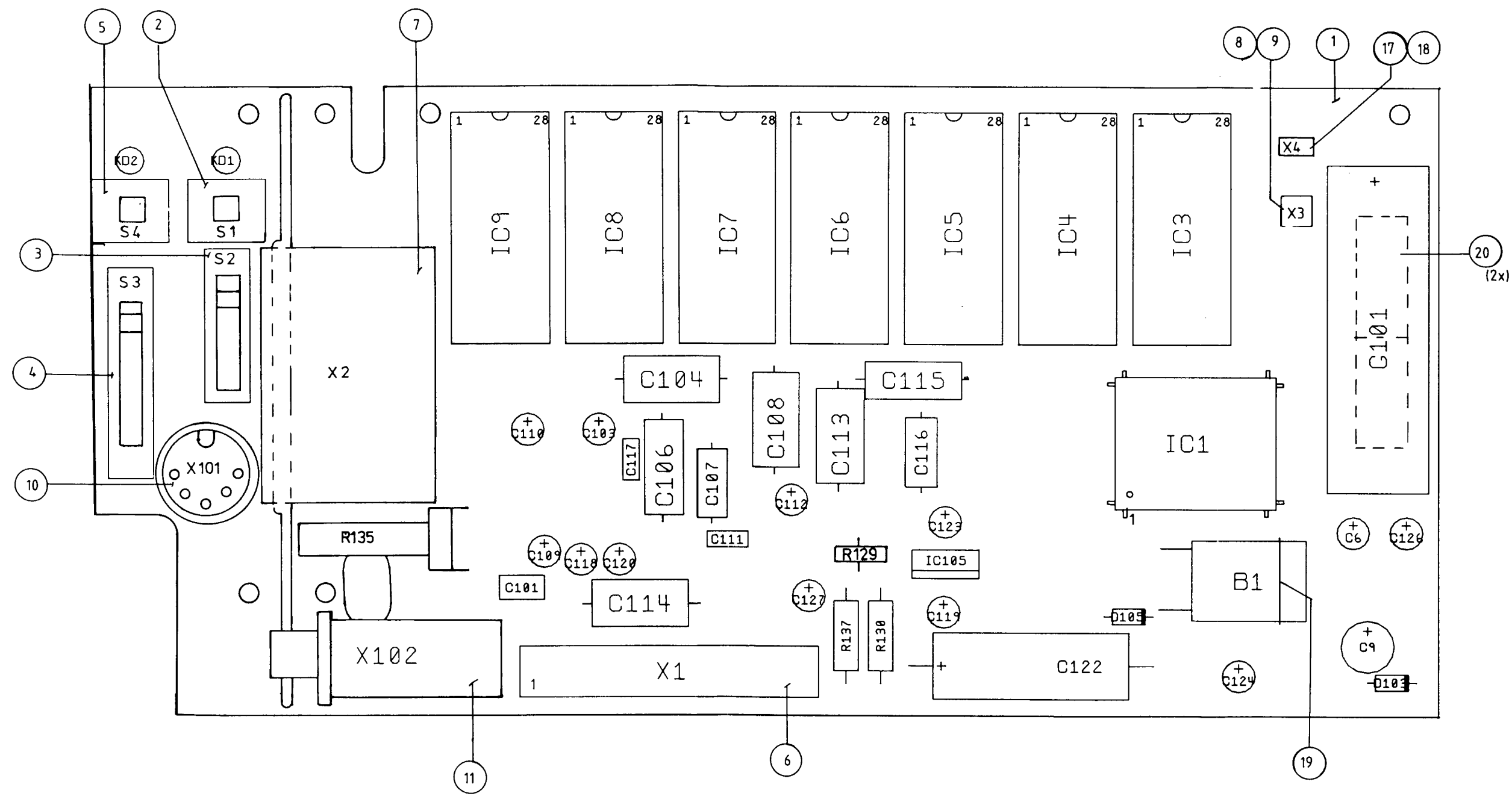


FIGURE 30
-14.30-



MECHANICAL DRAWING OF LBB1285/00

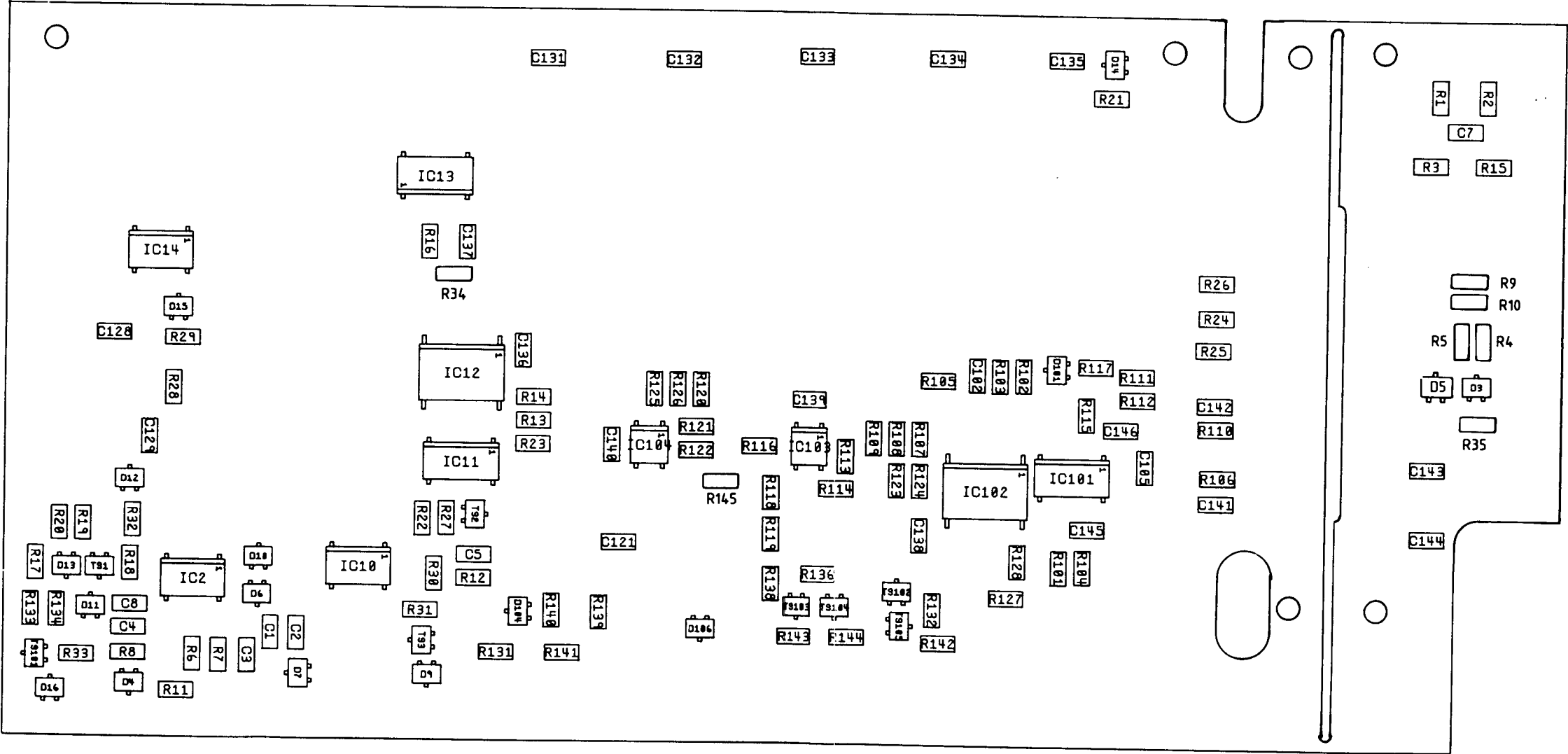
FIGURE 31
-14.31-



PC BOARD
PRENTPANEEL 3922 151 91270

FIGURE 32
-14.32-

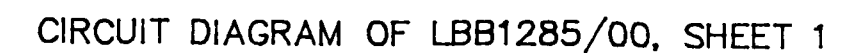
PCB COMPONENT LAYOUT, COMPONENT SIDE OF LBB1285/00

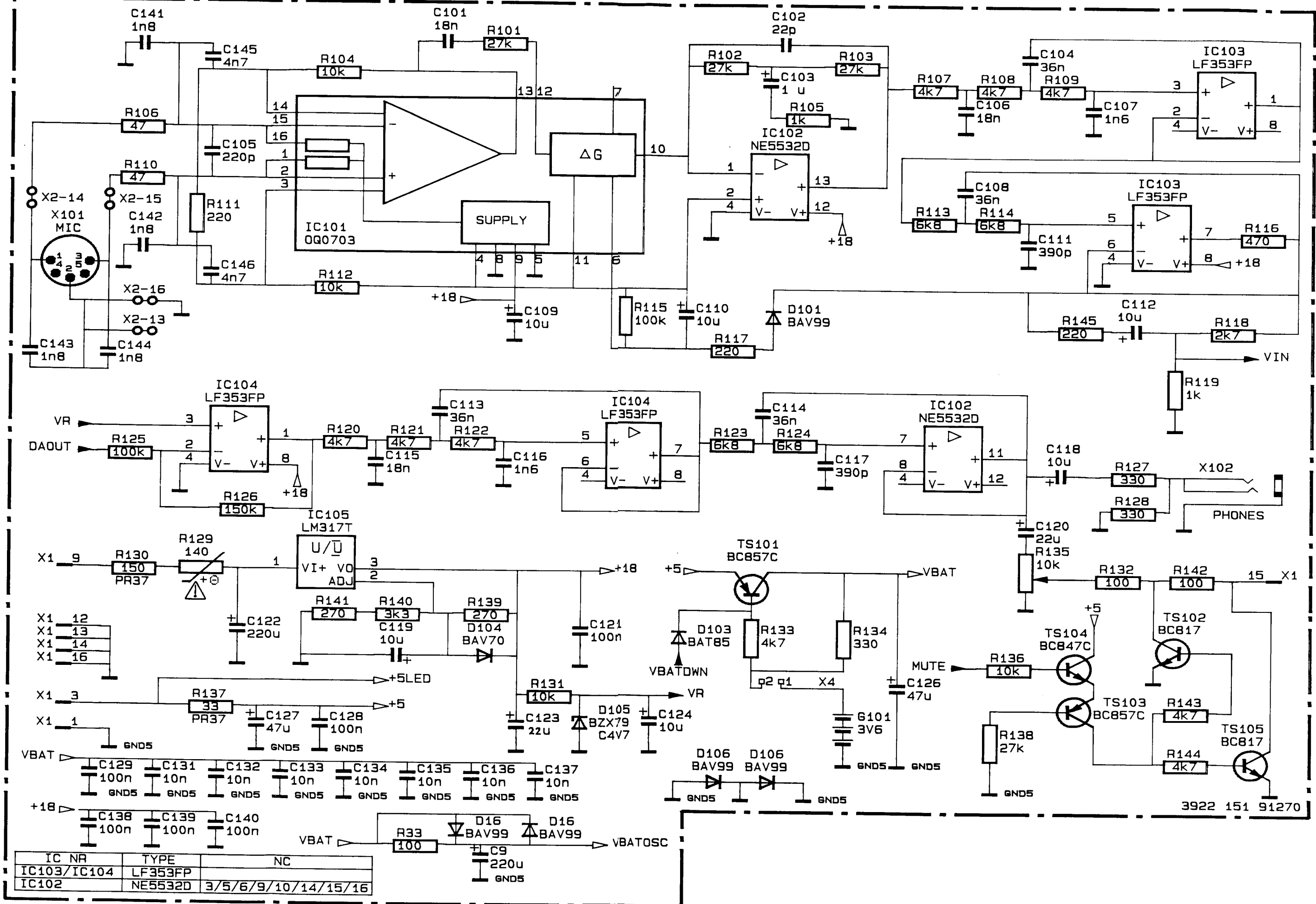


PC BOARD
3922 151 91270
PRENTPANEEL

PCB COMPONENT LAYOUT, TRACK SIDE OF LBB1285/00

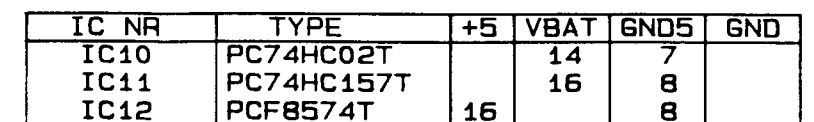
FIGURE 33
-14.33-





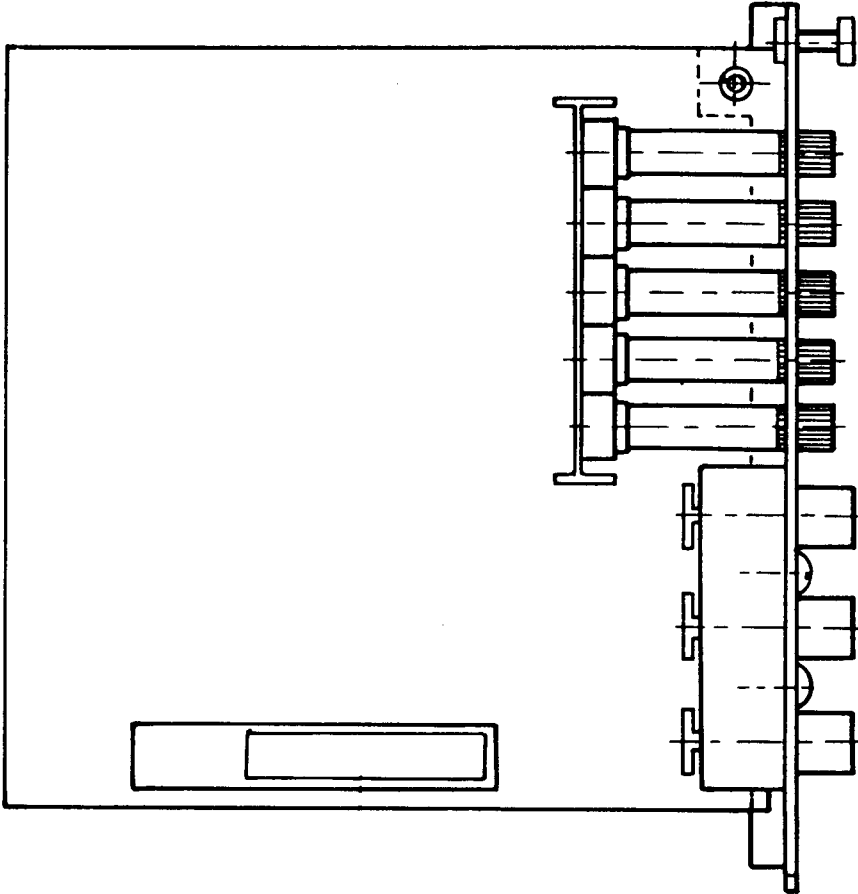
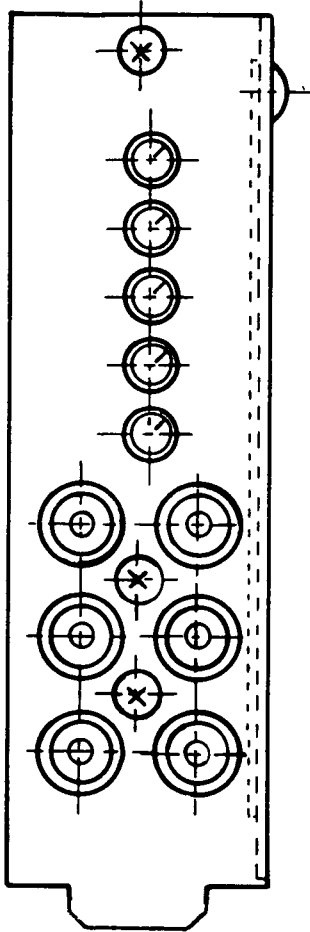
CIRCUIT DIAGRAM OF LBB1285/00, SHEET 2

FIGURE 35



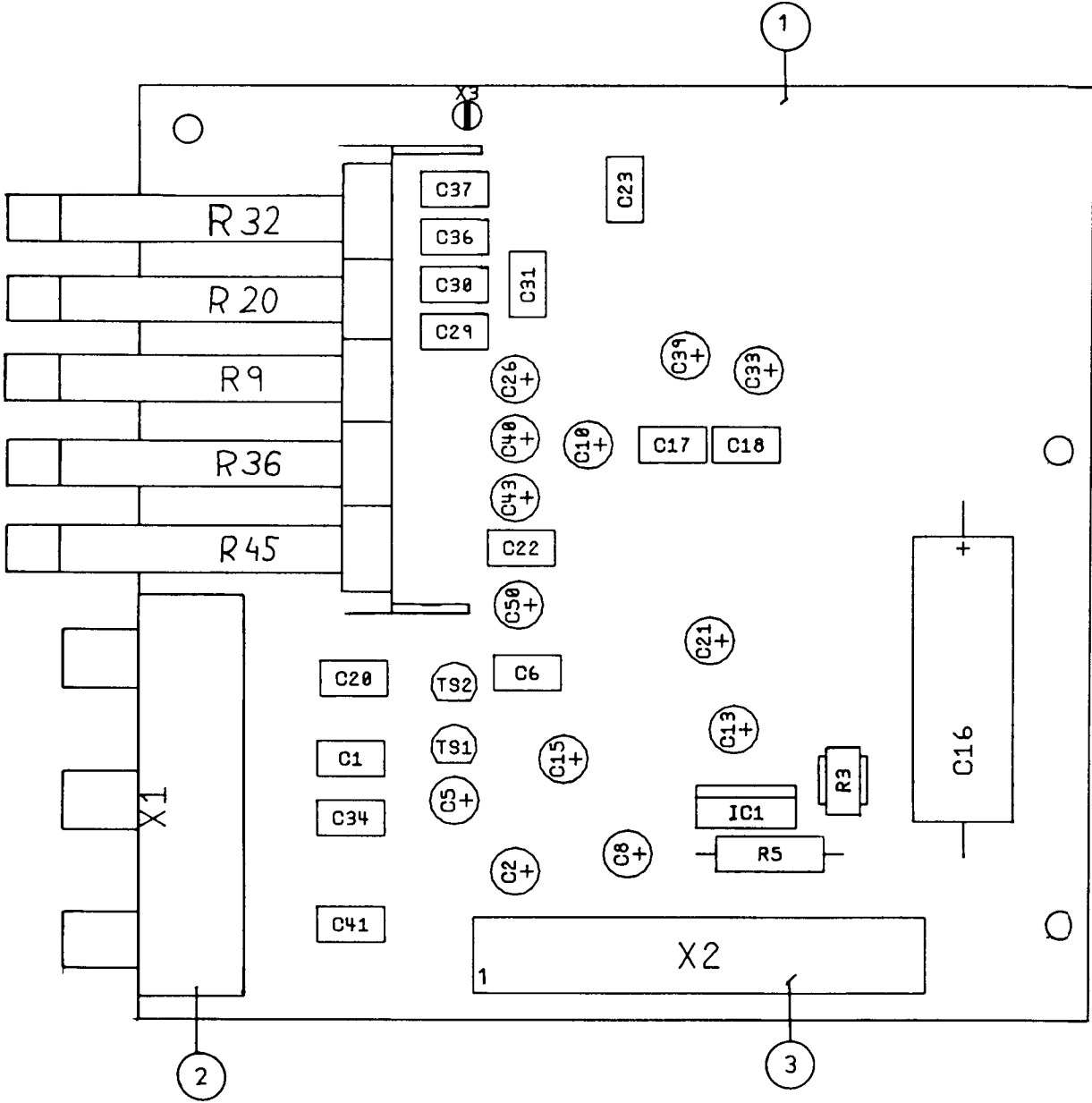
3922 151 91270

CIRCUIT DIAGRAM OF LBB1285/00, SHEET 3

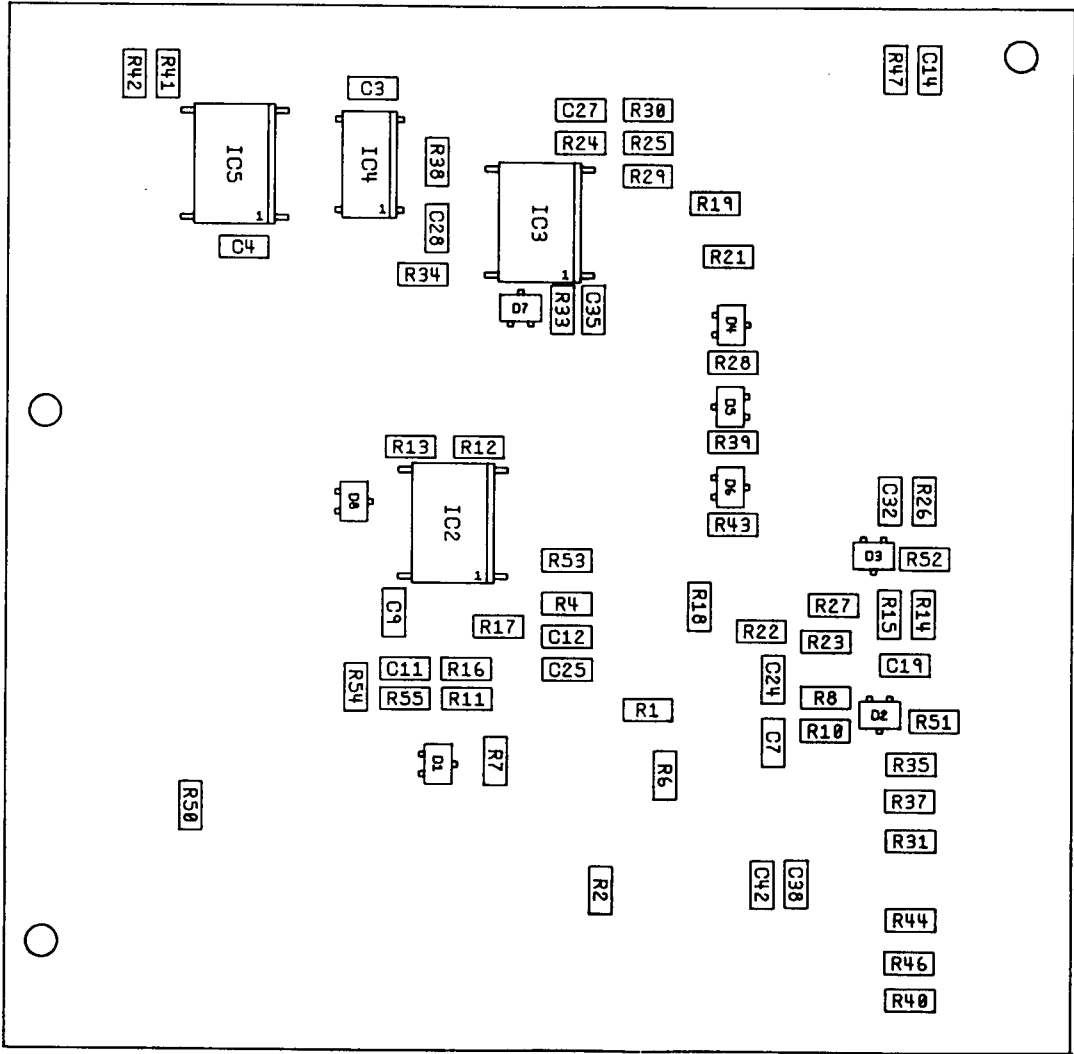


MECHANICAL DRAWING OF LBB1286/00

FIGURE 37
-14.37-

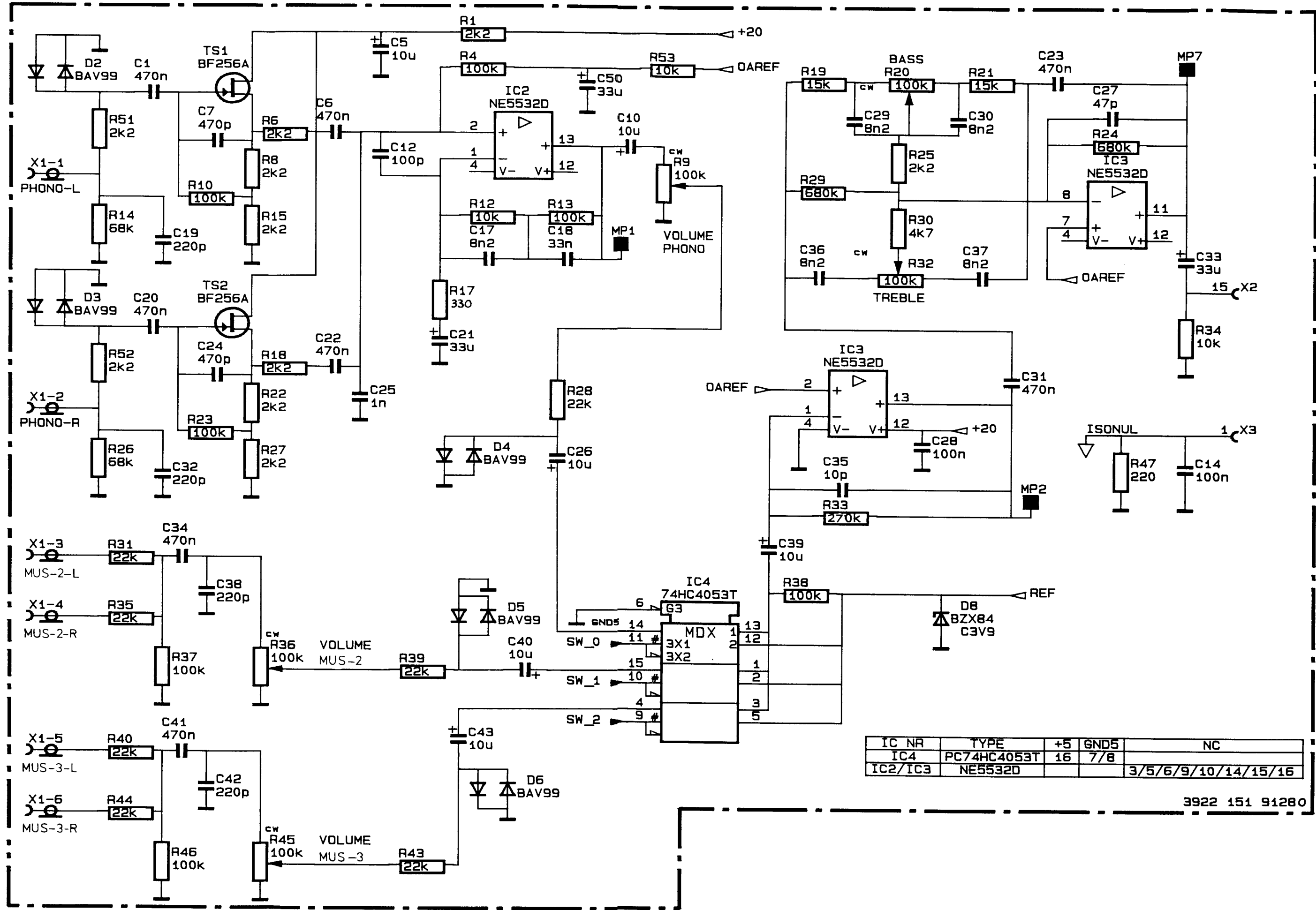


PC BOARD
PRENTPANEEL 3922 151 91280



PCB COMPONENT LAYOUT OF LBB1286/00

FIGURE 38
-14.38-



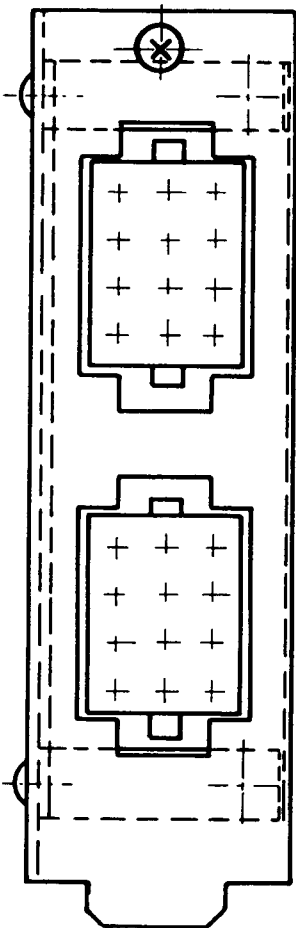
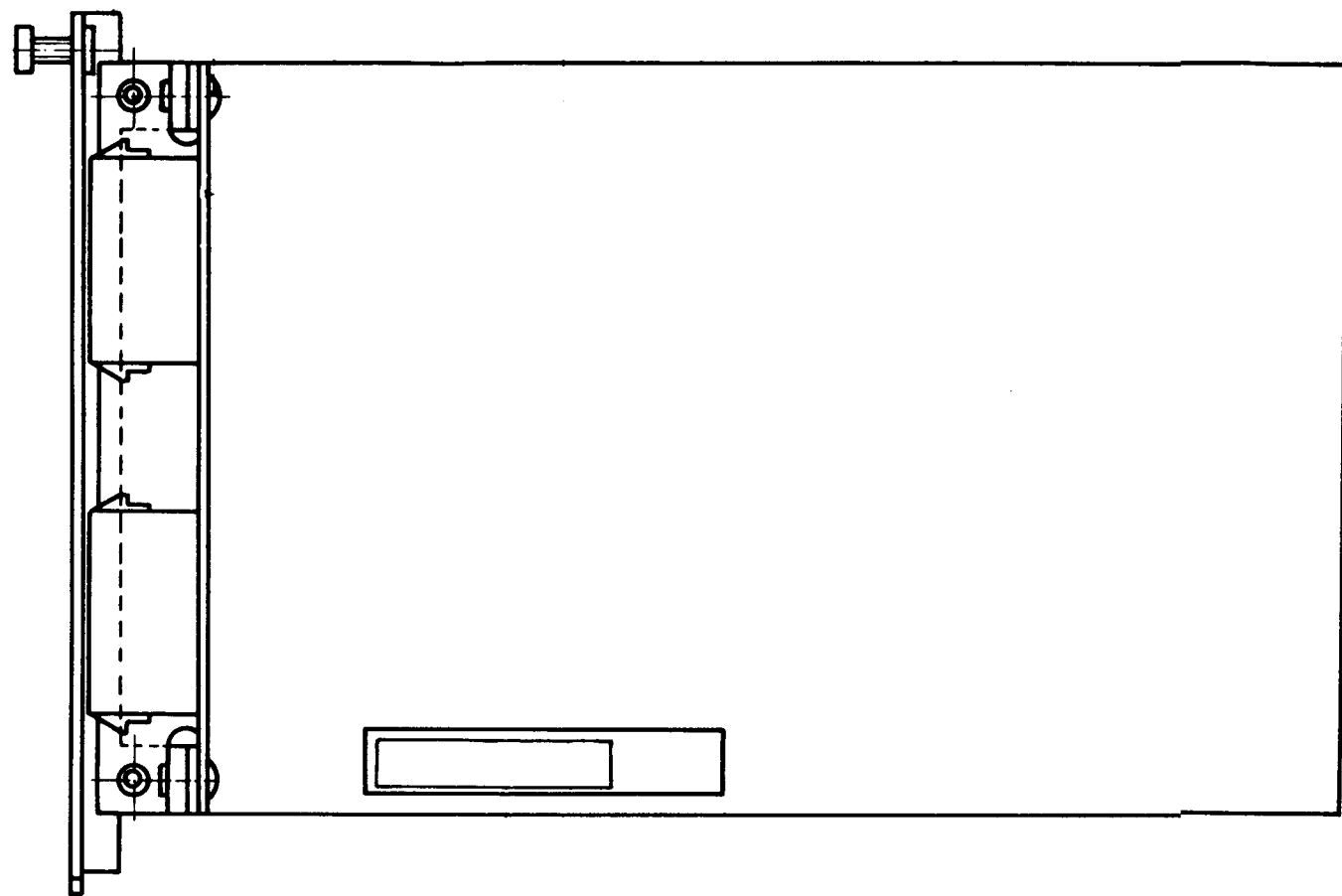
CIRCUIT DIAGRAM OF LBB1286/00, SHEET 1

FIGURE 39



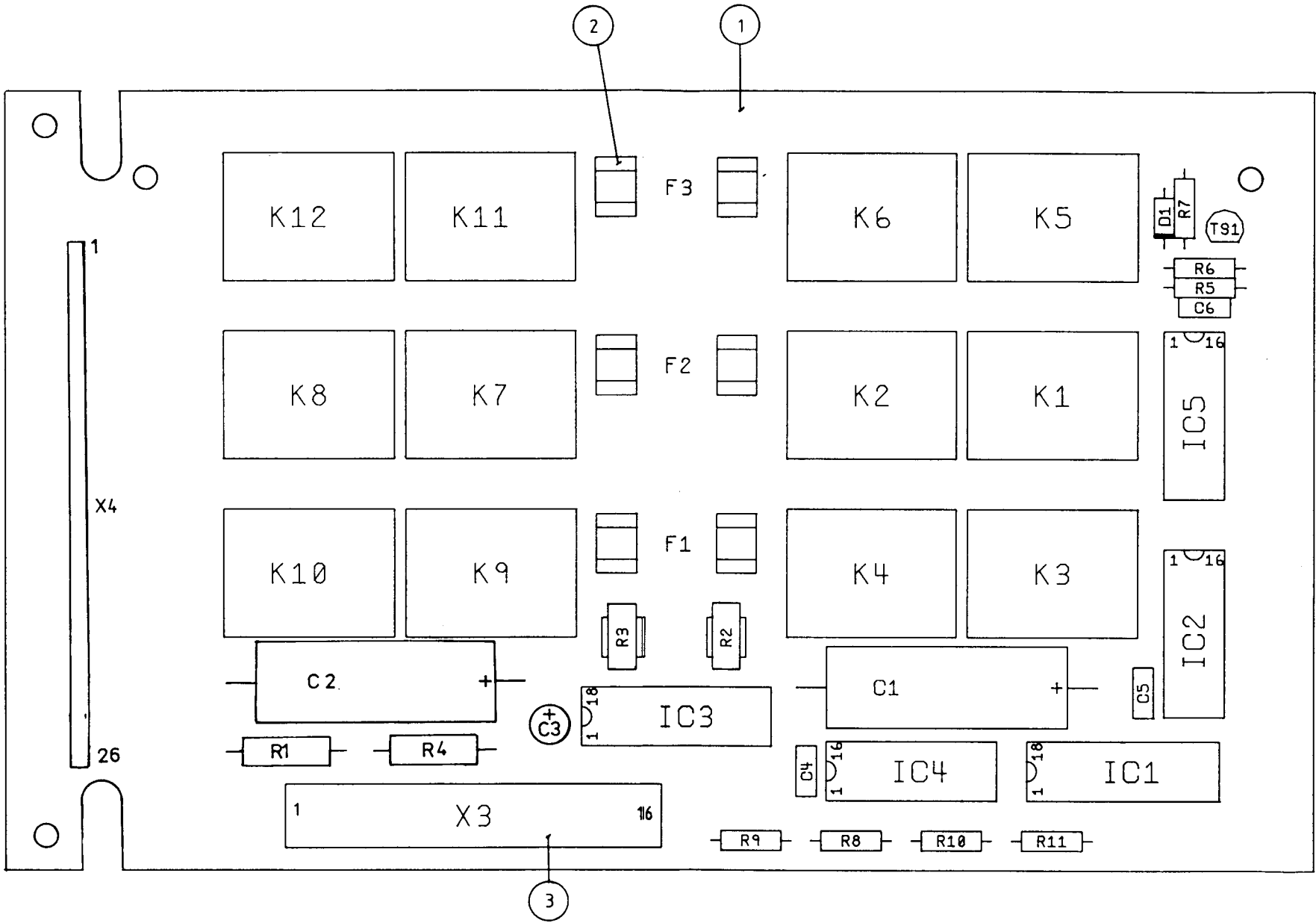
3922 151 91280

CIRCUIT DIAGRAM OF LBB1286/00, SHEET 2



MECHANICAL DRAWING OF LBB1287/00

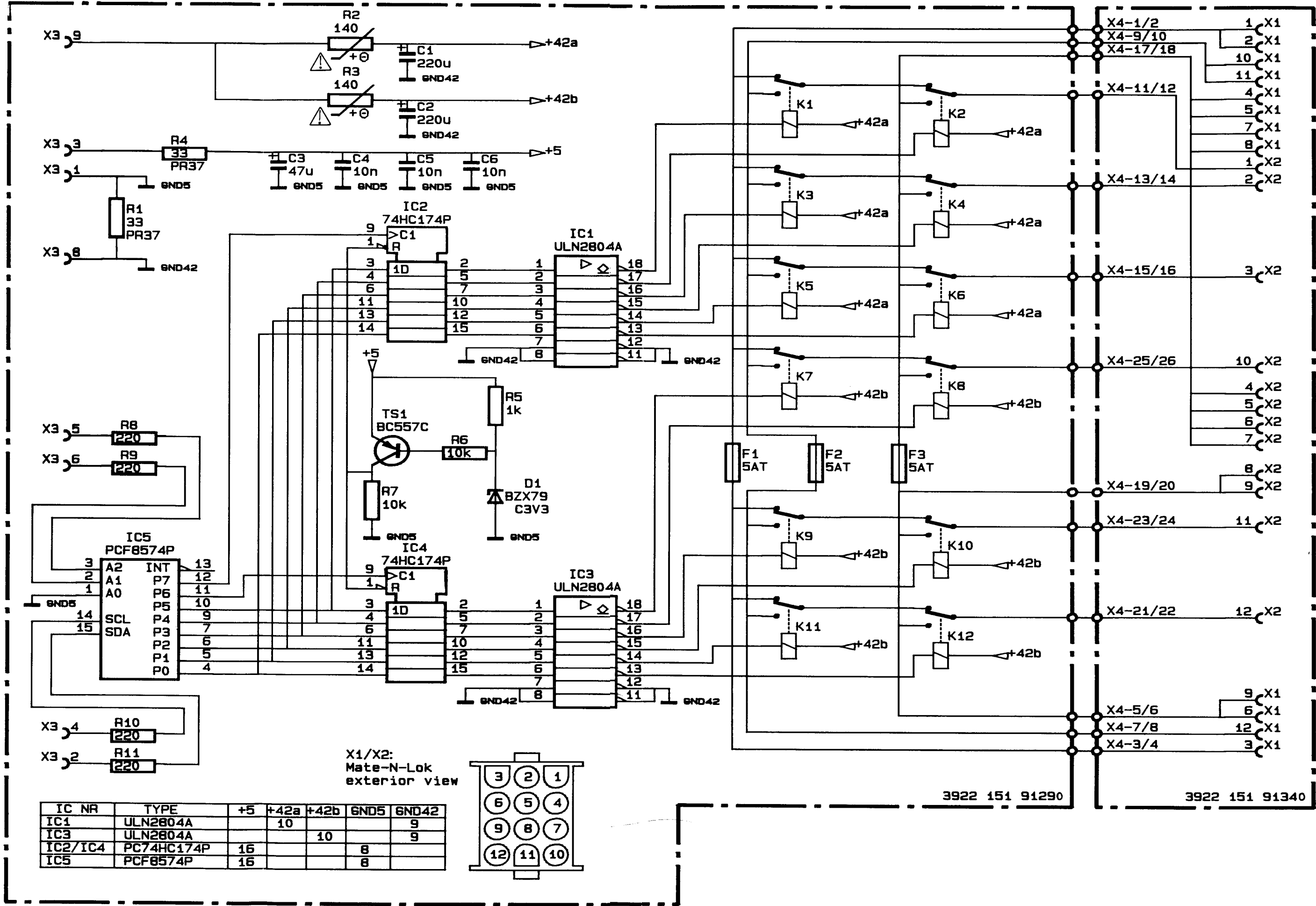
FIGURE 41
-14.41-



PC BOARD
PRENTPANEEL 3922 151 91290

FIGURE 42
-14.42-

PCB COMPONENT LAYOUT OF LBB1287/00



CIRCUIT DIAGRAM OF LBB1287/00

FIGURE 43

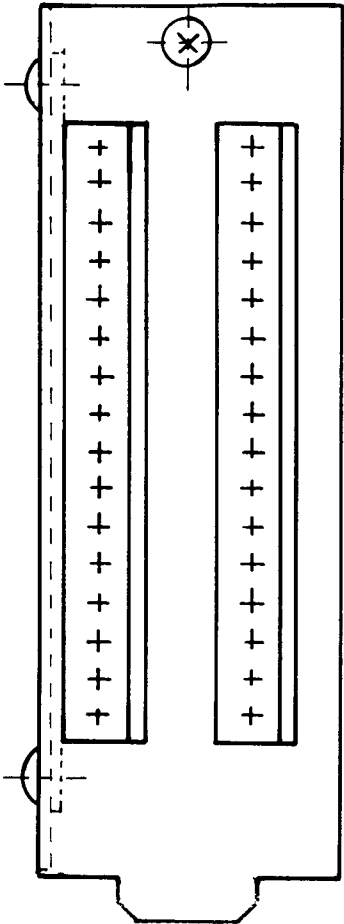
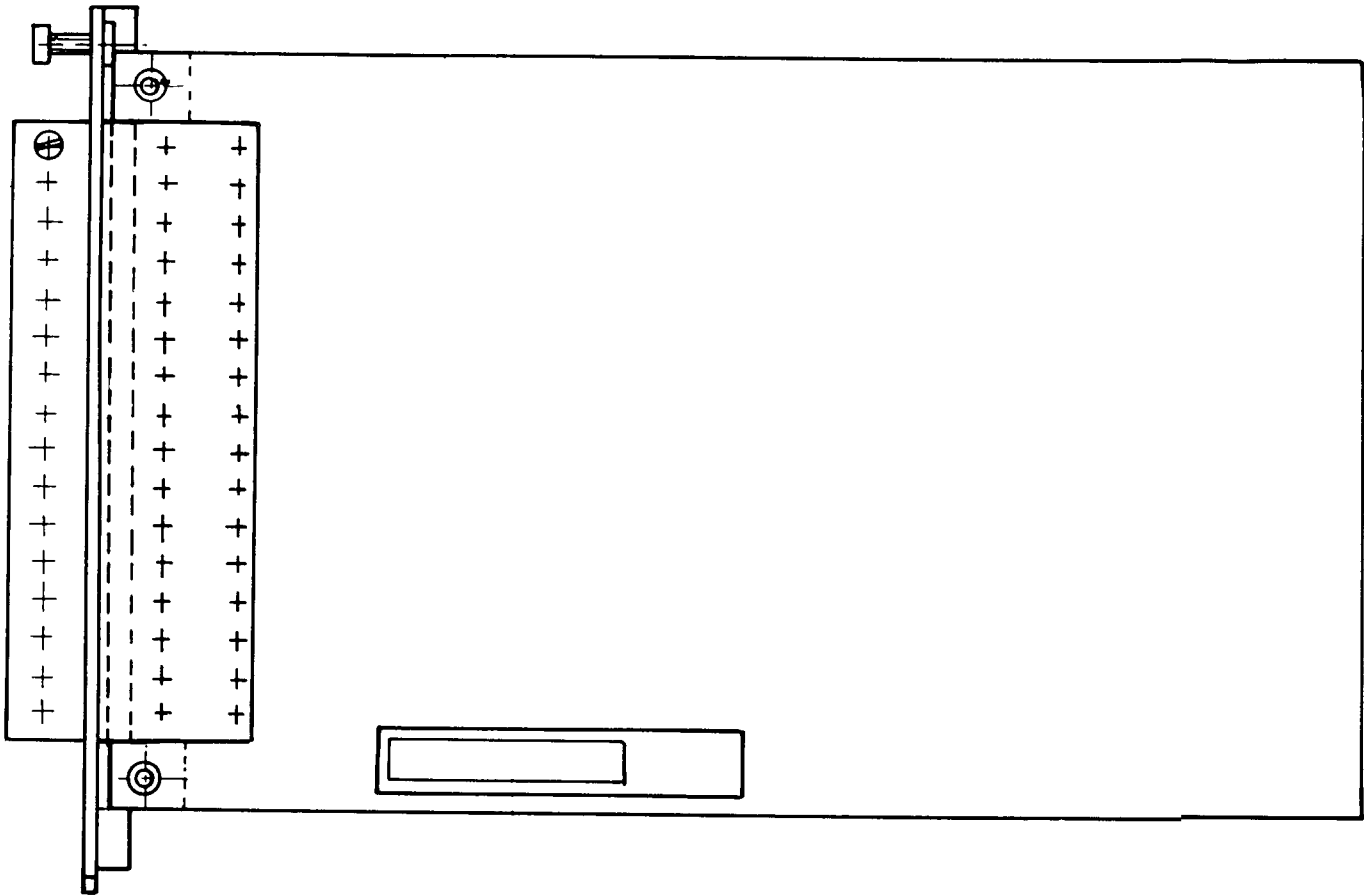
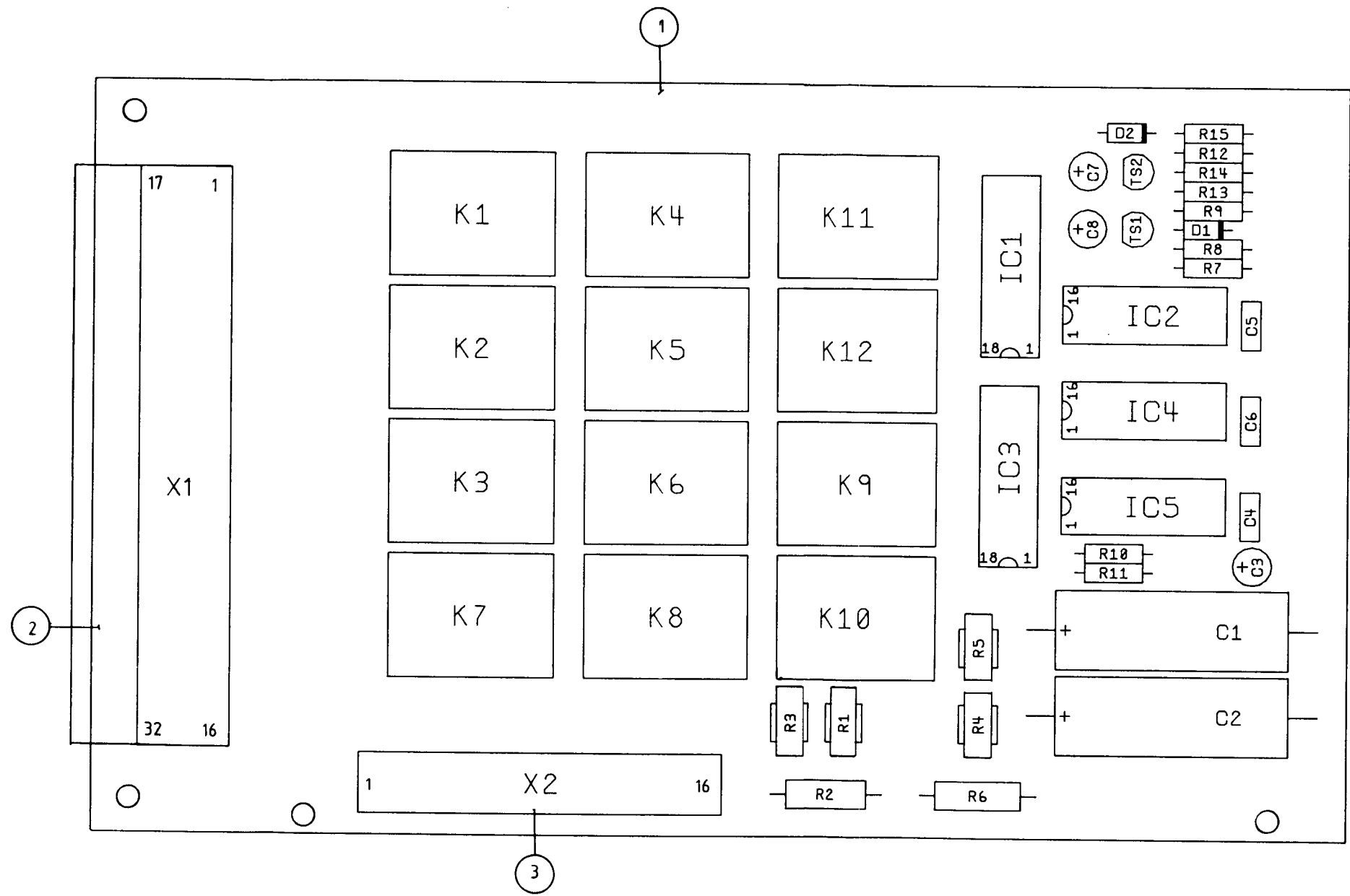


FIGURE 44
-14.44-

MECHANICAL DRAWING OF LBB1288/00



PC BOARD
PRENTPANEEL 3922 151 91300

PCB COMPONENT LAYOUT OF LBB1288/00

FIGURE 45
-14.45-

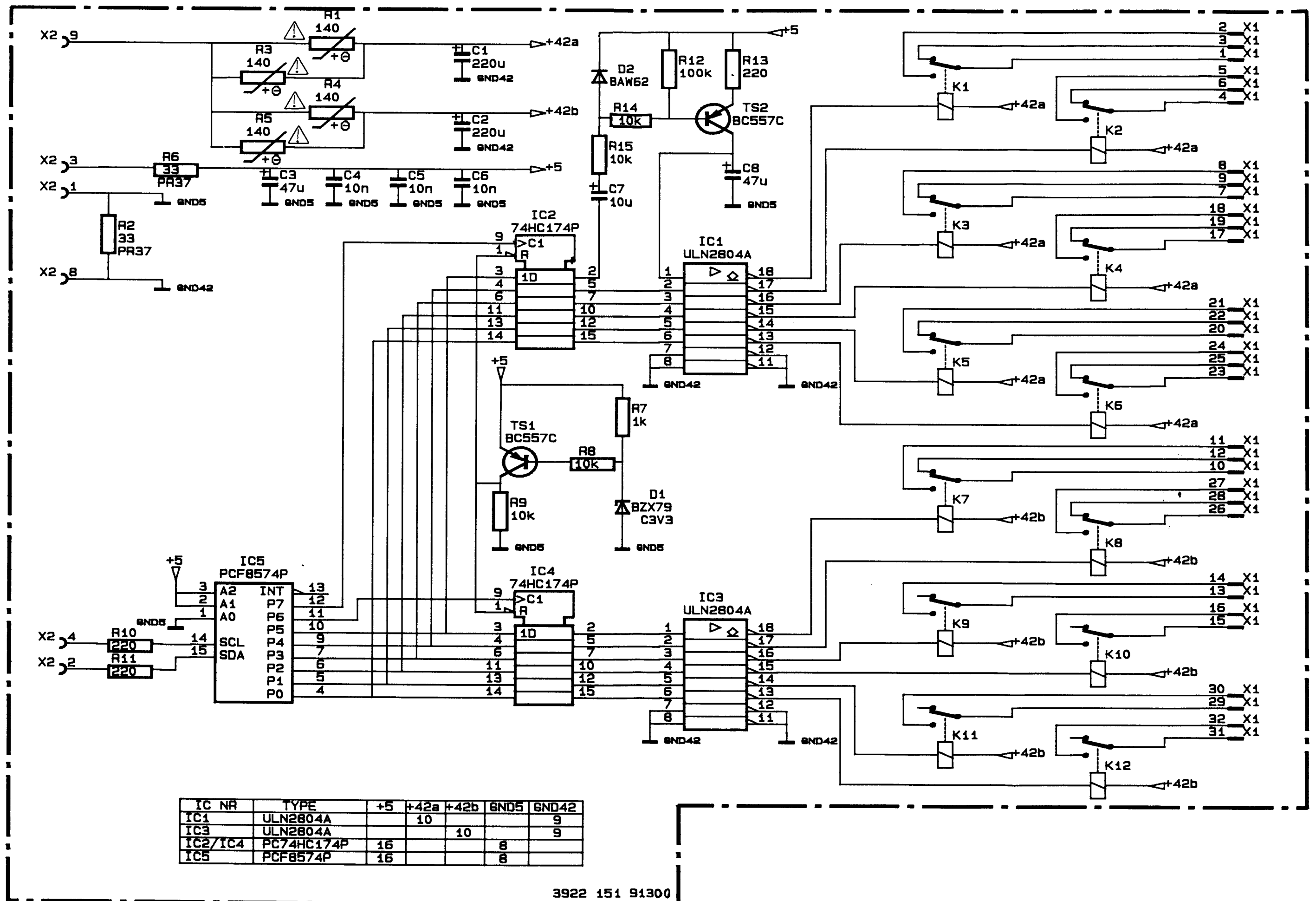
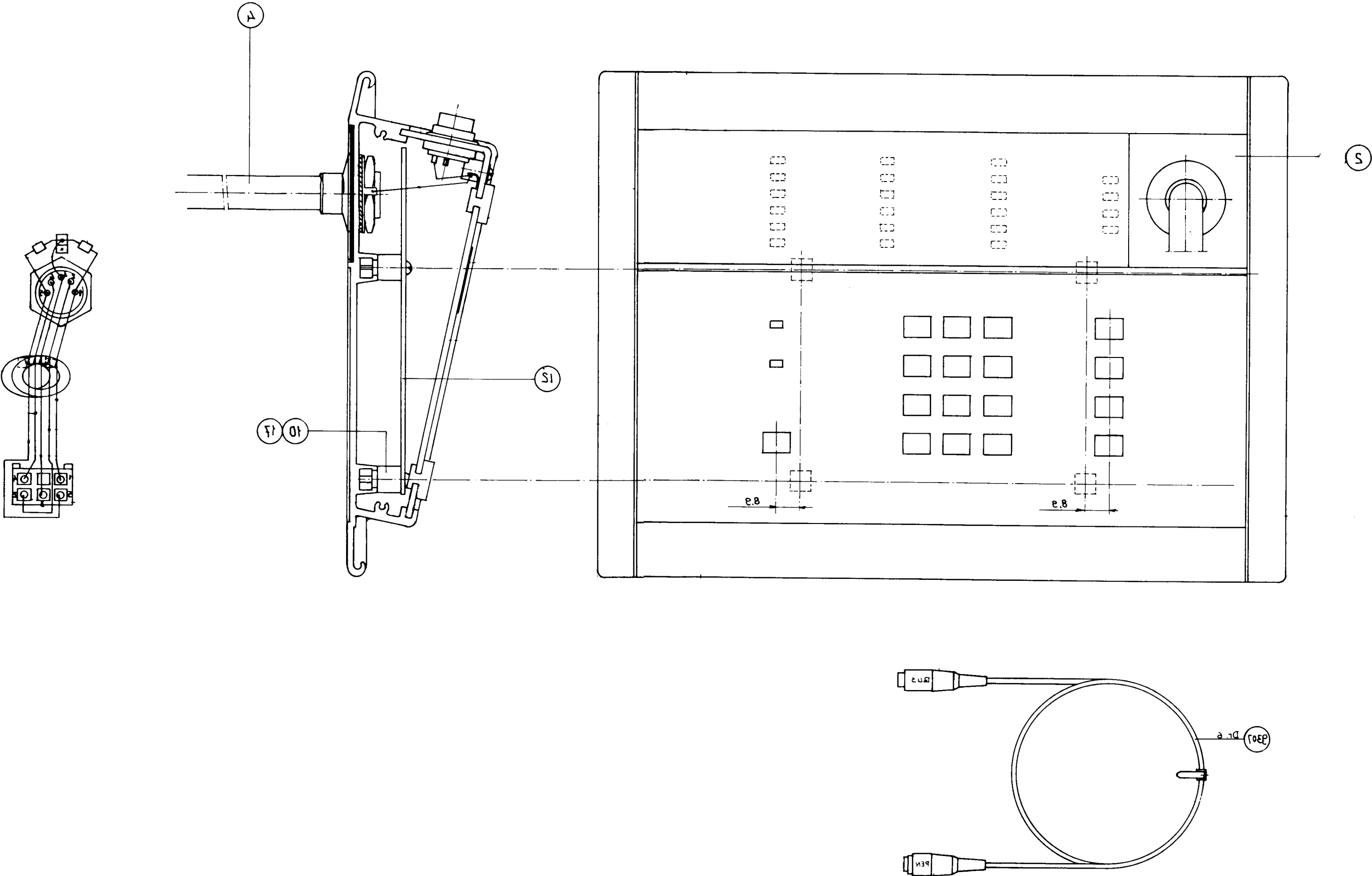


FIGURE 46



MECHANICAL DRAWING OF CALL STATION LBB9068/00

FIGURE 47
-14.47-

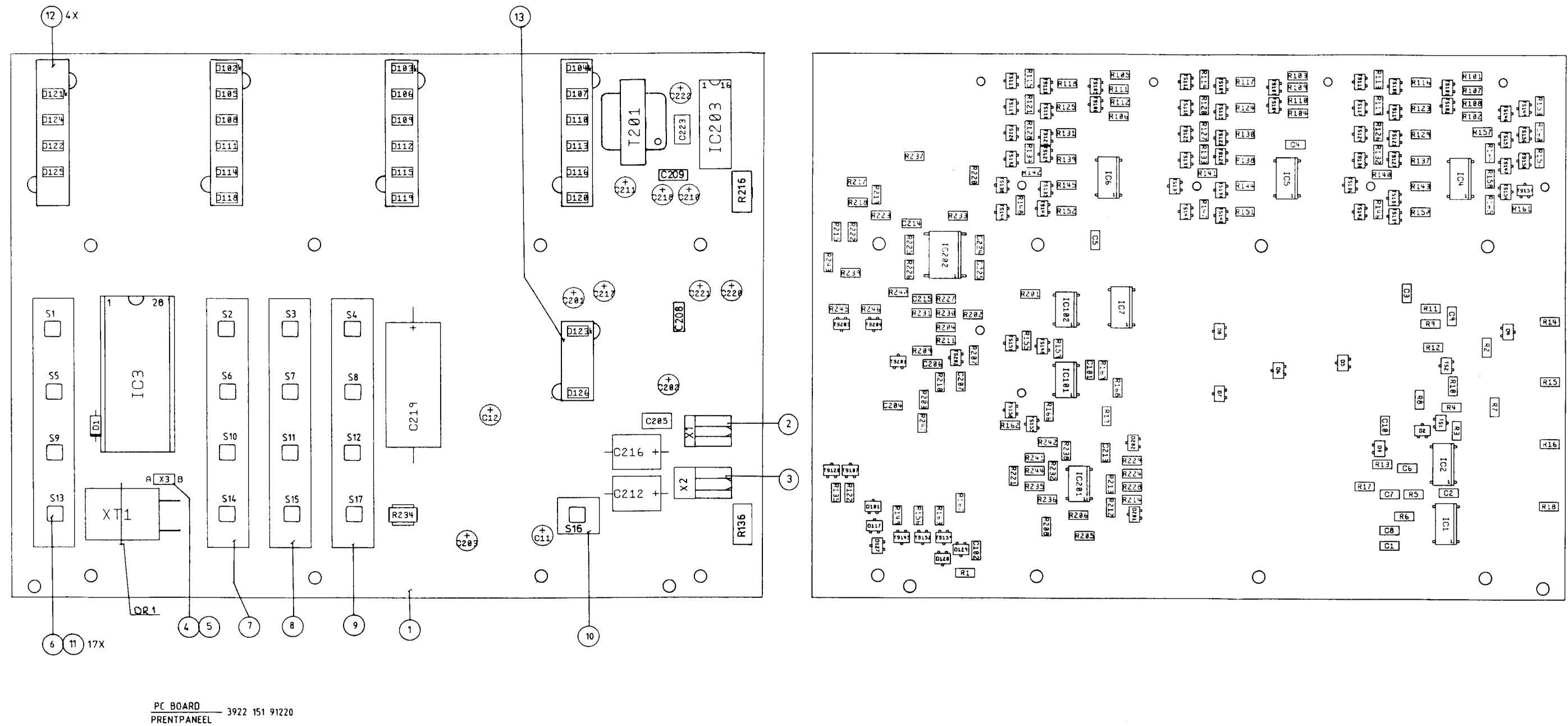
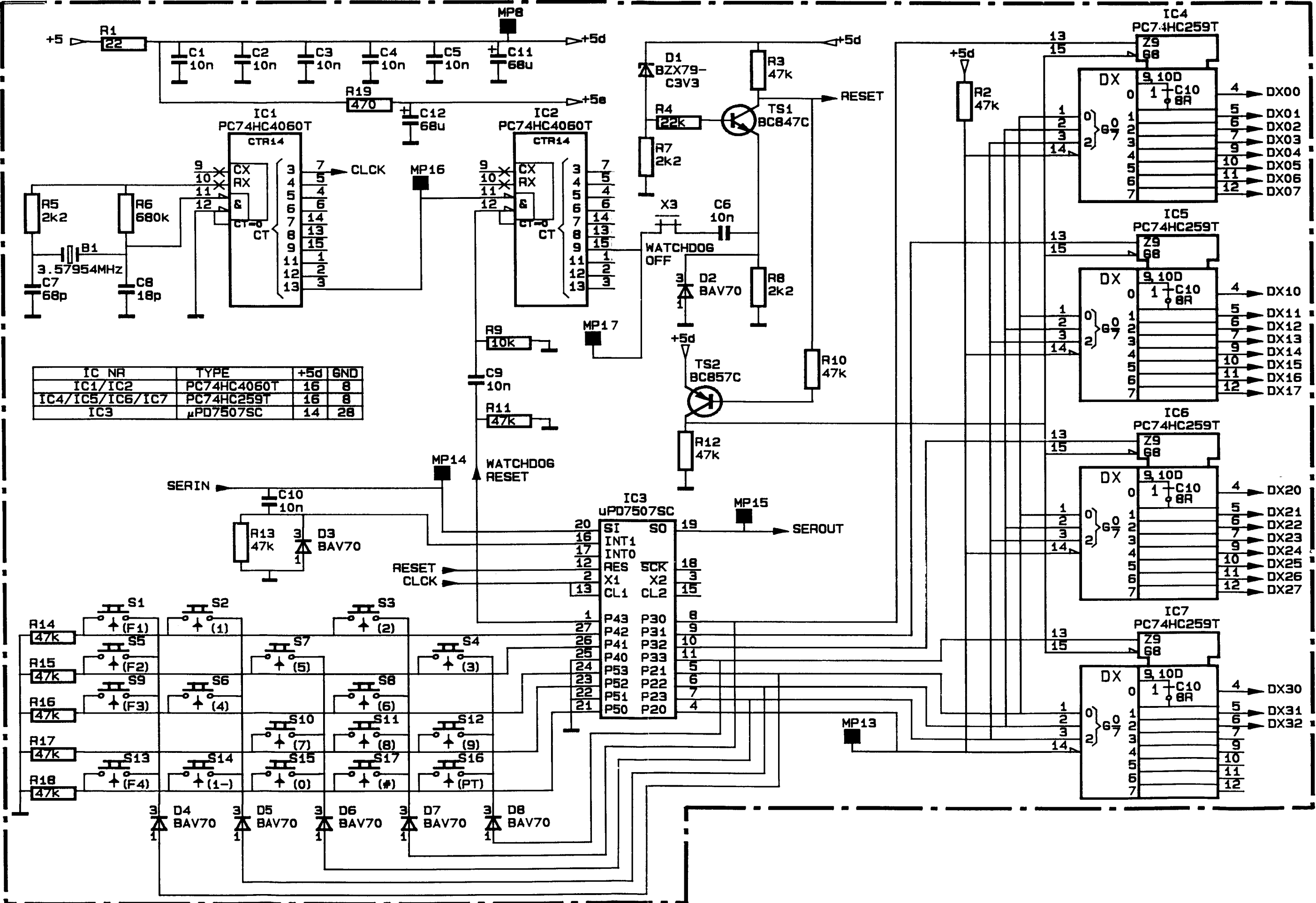


FIGURE 48

PCB COMPONENT LAYOUT OF CALL STATION LBB9068/00



CIRCUIT DIAGRAM OF CALL STATION LBB9068, SHEET 1

FIGURE 49

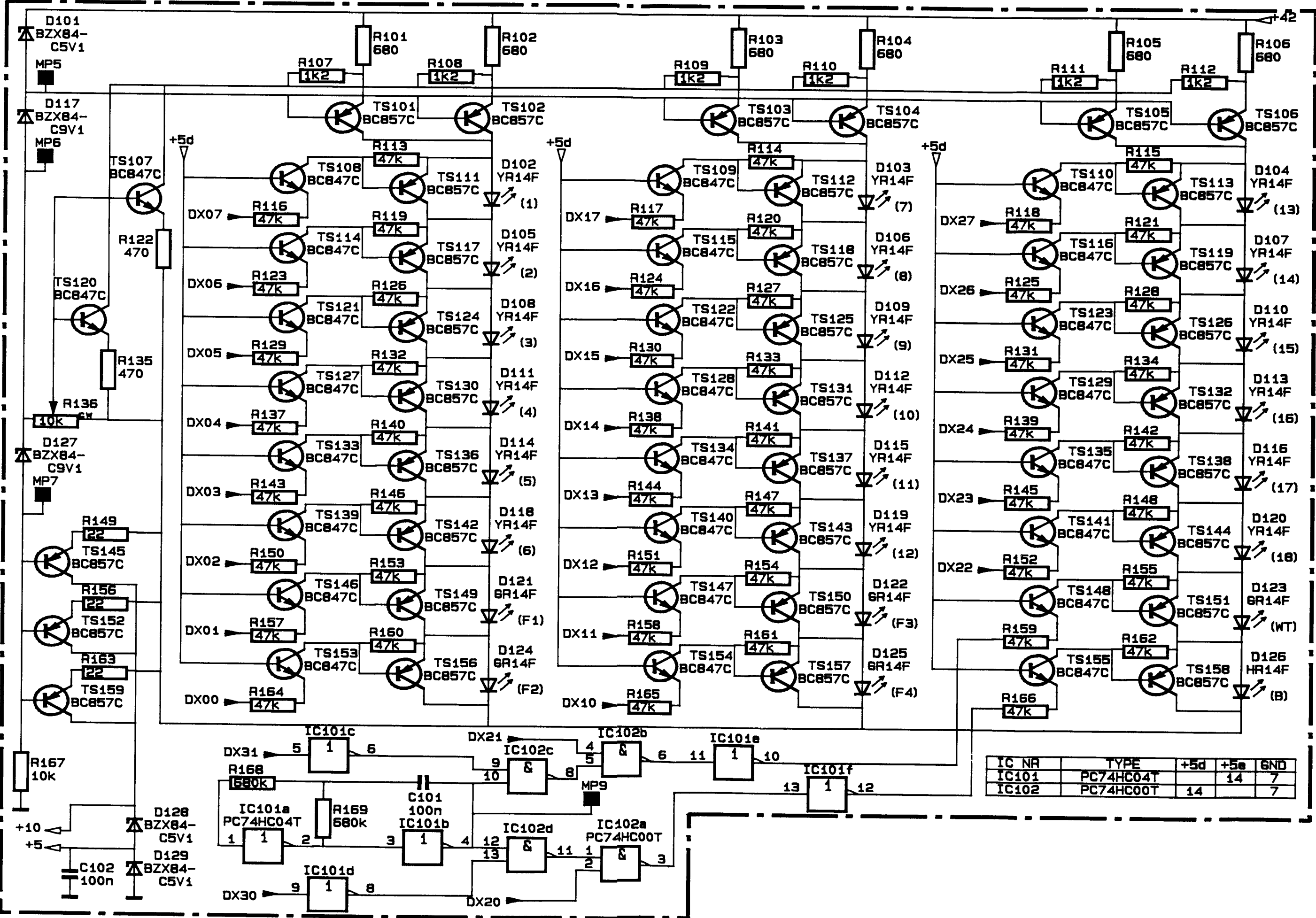
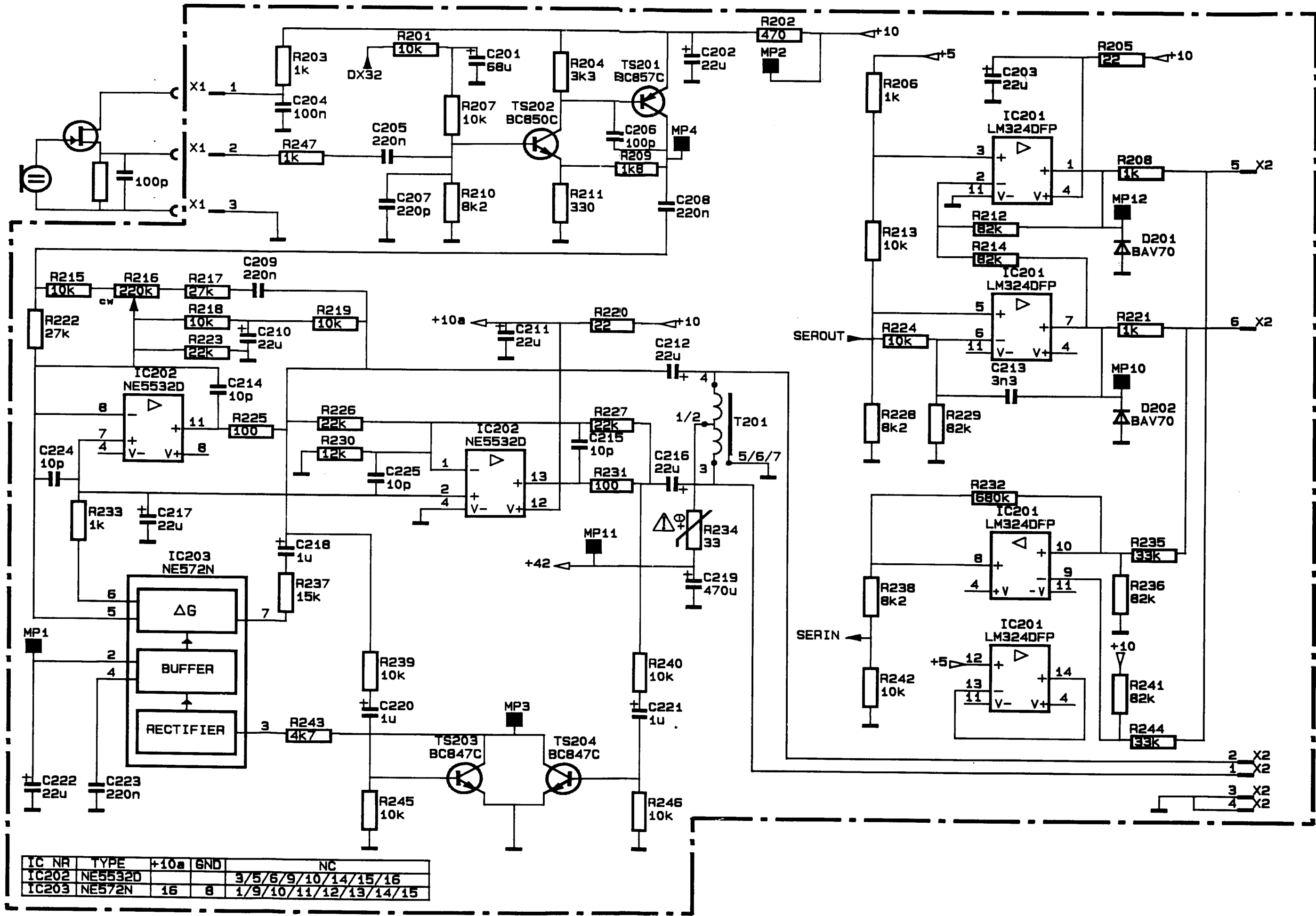


FIGURE 50

CIRCUIT DIAGRAM OF CALL STATION LBB9068/00, SHEET 2

-14.50-



CIRCUIT DIAGRAM OF CALL STATION LBB9068, SHEET 3

FIGURE 51