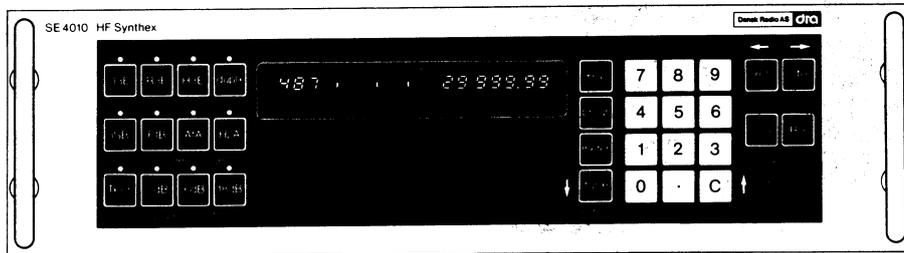


Technical Manual

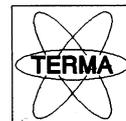
SE 4010 HF Synthex



TERMA Elektronik AS

Hovmarken 4, DK-8520 Lystrup, Denmark

FSCM R0567



SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Dansk Radio AS assumes no liability for the customer's failure to comply with these requirements.

GROUND THE EQUIPMENT

To minimize shock hazard, the equipment chassis and cabinet must be connected to an electrical ground. The equipment is equipped with a three-conductor ac power socket. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove equipment covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

SAFETY SUMMARY (continued)

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustments unless another person, capable of rendering first aid and resuscitation is present.

DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the equipment.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing and adjusting.

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1 GENERAL INFORMATION

1.1 Introduction

This Technical Manual contains information required to install, operate, test, adjust and service the Synthex. The designation "Synthex" is used instead of synthesized exciter.

Specifications are listed in paragraph 1.7. These specifications are the performance standards or limits against which the Synthex has been tested.

Due to the experience obtained from the production and operation of the equipment, minor differences between the Synthex and the manual may occur.

Wherever possible such differences are covered in section 7 "MANUAL CHANGES".

1.2 Safety Considerations

This manual contains information, cautions and warnings which must be followed to ensure safe operation and to maintain the Synthex in a safe condition.

1.3 Overall Description

The SSB/ISB Synthex SE4010 is a high-performance synthesized exciter intended to serve as a drive module in a radio communication transmitter for telephony, telegraphy and data transmission including ECCM operation.

The Synthex covers the frequency range 1.5 MHz to 29.99999 MHz in 10 Hz increments. It offers a choice of upper and lower side band, independent side band, radio telegraphy, telex and data operation.

In the telephony modes it is possible to select a continuous transmission, a key controlled transmission and a voice operated transmission (VOX).

The Synthex is designed to control an automatic antenna coupler as well as a power amplifier system. ALC, SWR decoding, PA filter shift decoding, antenna attenuator control and error control circuits are included.

The Synthex is equipped with microprocessor control. This provides intelligence in the form of factory programmed instruction memory that introduces new concepts in HF exciters, providing improvements in

performance, ease of operation and reliability.

The microprocessor control includes features such as:

- Instant push-button tuning.
- Battery back-upped memory storage for 699 user-programmable frequencies and modes.
- Digitally keyed ALC.
- ALC hold-time synchronized with SIMPLEX or ARQ burst keying.
- Built-in diagnostic routines (BITE).
- Error conditions automatically displayed on front panel.
- AEL automatic error log with date and time.
- Fully remotely controllable (option).
- Changing of frequencies in FSK from keyboard (option).

The Synthex controls are arranged in groups enabling the operator to easily identify and control exciter operation with a minimum of operations.

The Synthex has several LED-displays which inform the operator about frequency, channel number, emission mode, audio input levels, SWR and other status information.

During supply drop-out the Synthex settings as well as the information contained in the user-programmed memory storage is energized from a built-in battery back-up. When the drop-out is terminated, the Synthex settings are automatically recalled to the front panel.

The Synthex incorporates in addition to a battery back-upped real-time clock circuit advanced programming facilities.

A detailed operating instruction is contained in section 3 of this manual.

1.4 Specifications

FREQUENCY RANGE

1.5 MHz to 29.99999 MHz in 10 Hz increments

TYPE OF EMISSION

A1A, H2A (USB/LSB), H3E (USB/LSB), R3E (USB/LSB), J3E (USB/LSB), F1B and B8E, B9W with optional ISB module

FREQUENCY STABILITY

With OCXO:

0.1 ppm -15 to +50°C

0.3 ppm -25 to +55°C

ageing (after 30 days power on) <0.01 ppm/day
 <0.04 ppm/month
 <0.1 ppm/year

PHASE JITTER

< 1.5° RMS within 1 Hz to 6 kHz

SYNTHESIZER TUNE TIME

Less than 5 msec.

Less than 1 msec. within defined 1 MHz band.

OUTPUT POWER

1 W PEP/average into 50 ohm unbalanced

OUTPUT POWER SETTING

0 dB, -3 dB, -6 dB, -12 dB, -18 dB

CARRIER SUPPRESSION

H2A, H3E: 6 dB +0/-1.5 dB

R3E, B8E, B9W: 17 dB +/-1 dB

J3E: >50 dB

INTERMODULATION

In-band: <-45 dB

Out-of-band: <-48 dB

relative to each tone in a standard two tone test

HUM AND NOISE

<-50 dB/PEP in 3 kHz BW (Line input)

SUPPRESSION OF UNWANTED SIDE BAND

>50 dB/PEP

SPURIOUS EMISSION

<-50 dB/PEP (except of harmonics)

MUTING

>130 dB/PEP

AUDIO INPUT LEVELS

Line, Tlx inputs:

-30 dBm to +10 dBm/600 ohm balanced

Return loss better than 26 dB across audio BW

Dynamic microphone:

2 mV to 0.2 V into 500 ohms

AUDIO AGC

Less than +/-0.4 dB for +/-10 dB input variation

KEYING SPEED

A1A, H2A: >50 Baud

REMOTE CONTROL (optional)

All functions via single telephone line or data bus

MEMORY

Built-in lithium battery for approx. 2 years memory back-up

POWER SUPPLY

Single phase 47-63 Hz, 99-138 V, 198-280 V

POWER CONSUMPTION

Typically 80 VA

CONDUCTED EMISSIONS

VDE0871, Level K

OPERATING ENVIRONMENT

Temperature: Full performance range 0°C to +50°C
Operating range -25°C to +55°C
Storage -40°C to +70°C

Humidity: To 95% relative humidity at +40°C

Vibration: MIL-STD-810D-514.3, Category 8, 514.3-1 (10-150 Hz), 514.3-34, Category 9

Shock: MIL-STD-810D-516.3, Procedure II (30 g for 20 msec.)

WEIGHT

16 kg excl. cabinet

DIMENSIONS

Height: 133 mm (3 times 1³/₄")

Width: 483 mm (19")

Depth: 450 mm (17³/₄")

Synthex cabinet (optional)

Height: 165 mm

Width: 538 mm

Depth: 559 mm

1.5 Operational Features

FREQUENCY TUNING

Numerical frequency keyboard entry

ALC SYNCHRONIZATION

The ALC control is synchronized with mute command and modulation signal

USER-PROGRAMMABLE CHANNELS

Number of channels : 699

Channel information : Transmit frequency, emission mode, and power level

Data storage time : Approx. 2 years

DIMMER CONTROL

Continuously variable

AUTO RESTART

Retention of Synthex settings during power failure

AEL: AUTOMATIC ERROR LOG

Registration of up to 15 errors with date and time

POWER ON-TIME

Registration of mains-on hours of Synthex and of connected transmitter.

1.6 User-Programmable Features

The Synthex is equipped with extended user-programmable features such as:

- 699 addressable user-programmable channels that allow the operator to store and recall complete Synthex settings
- A 24 hour clock with battery back-up
- F1B frequency offset setting
- B9W side band exchanging
- Programming of frequencies of optional FSK modulator

The programmable features are stored in CMOS memory that maintains the contents even though the Synthex is turned off or disconnected from power sources.

When the Synthex is turned on, it will restart at the last settings before the power was turned off.

1.7

Options

In order to extend the usefulness of the Synthex a number of different assemblies and filter options are available.

In table 1.1 the standard selectable and the optional assemblies are listed:

Table 1.1

A2	Frequency Standard with OCXO	BR460354
A2	Frequency Standard with OCXO and input	BR492817 + BR378275
A5	Interface Assembly, DRA	210892-001
A5	Interface Assembly, SRT	210635-001
A5	Interface Assembly, Collins	210908-001
A6	FSK Modulator with RTTY interface	237641-001
A7	ISB Module, bandwidths up to 3400 Hz	BR490466
A7	SSB Module, bandwidths up to 3400 Hz	BR496103
A9	Standard Remote Interface	BR490598

Other assemblies are available upon request.

In table 1.2 the standard Crystal Filter Options are listed:

Table 1.2

2700 Hz SSB	BR454052
3000 Hz ISB	210905-001 + BR489255
3000 Hz SSB	210905-001
3400 Hz ISB	BR489190 + BR489204
3400 Hz SSB	BR489204

Other crystal filter options are available upon request.

The following sections describe the use and the specifications of the assemblies and crystal filter options in table 1.1 and table 1.2.

1.7.1 Frequency Generator Standard

The Frequency Generator Standard may be selected with or without standard oscillator input.

The following assemblies are available.

1.7.1.1 Frequency Standard with OCXO, A2

Specifications

FREQUENCY STABILITY
See section 1.4 Specifications

Part No. BR460354

1.7.1.2 Frequency Standard with OCXO and Input, A2

OCXO with external standard oscillator input.

Specifications

FREQUENCY
1 MHz, 5 MHz or 10 MHz strappable

FREQUENCY STABILITY
See section 1.4 Specifications

INPUT LEVEL
0 to +20 dBm/50 ohm

EXTERNAL INPUT
BNC female connector

INTERNAL/EXTERNAL SWITCH
Manual toggle switch on rear plate

Part No. BR492817 + BR378275

1.7.2 Interface Assemblies

The Synthex is capable of controlling several power amplifiers, antenna tuners etc.

The following assemblies are available.

1.7.2.1 Interface Assembly, DRA, A5

The interface assembly contains interface for control of:

DRA Power Amplifier LA76150/LA76210
DRA Antenna Tuners TU4015/TU4013

Part No. 210892-001

1.7.2.2 Interface Assembly, SRT, A5

The interface assembly contains interface for control of:

SRT Power Amplifier SSA400
DRA Antenna Tuners TU4015/TU4013

Part No. 210635-001

1.7.2.3 Interface Assembly, Collins, A5

The interface assembly contains interface for control of:

Collins Power Amplifier 208U-10
Telefunken Antenna Switch 0257/0258

Part No. 210908-001

1.7.3 FSK Modulator

1.7.3.1 FSK Modulator with RTTY Interface, A6

Specifications

MODES

- 2-tone FSK (2-ary FSK)
- 4-tone FSK (4-ary MFSK)
- 8-tone FSK (8-ary MFSK)

FREQUENCY RANGE

Between 300 Hz and 2990 Hz in 5 Hz steps

OUTPUTS

- 1. Internal
- 2. External 600 ohms balanced. -20 dBm to +10 dBm adjustable
- 3. Current loop for teletype use
Strappable voltage and current 40,60,20 or 120V/20 or 40mA

INPUTS

- 1. RS232 data and control signal
- 2. Floating current detector for teletype use. 20 or 40mA +/-12V is available

Part No. 237641-001

1.7.4 Modulator, Assembly A7

The modulator assembly may be chosen in an ISB or an SSB version. The bandwidth depends upon the filter option chosen (see section 1.7.6 IF Selectivity).

The following assemblies are available.

1.7.4.1 ISB Module, Bandwidths up to 3400 Hz, A7

Modulator module for Independent Sideband emission.

Specifications

EMISSION MODES

A1A, H2A/B (USB/LSB), J3E (USB/LSB), R3E (USB/LSB), H3E (USB/LSB), F1B, B8E, B9W

BANDWIDTH

Up to 3400 Hz per sideband depending on the selected filters.

Part No. BR490466

1.7.4.2 SSB Module, Bandwidth up to 3400Hz, A7

Modulator module for Single Sideband emission.

Specifications:

EMISSION MODES

A1A, H2A/B (USB/LSB), J3E (USB/LSB), R3E (USB/LSB), H3E (USB/LSB), F1B.

BANDWIDTH

Up to 3400Hz per sideband depending on the selected filter.

Part No. BR496103

1.7.5 Remote Control

Remote control of the Synthex is possible from the Dansk Radio Transmitter Controller TC4010 or a remote computer.

1.7.5.1 Standard Remote Interface, A9

Serial remote control via control lines or external telephone modem.

Specifications

BAUD RATE

75, 110, 150, 300, 600, 1200, 2400, 4800, 9600 bps

INTERFACE STANDARDS

1. CCITT V24/RS232C
2. RS422 compatible
3. RS485 compatible

LINE OUTPUT

Balanced 600 ohm/0 dBm adjustable

CONNECTION

Sub-D female, 25 poles

Part No. BR490598

1.7.6 IF Selectivity

Several optional crystal filters exist. The specifications of these options are listed in the following sections.

1.7.6.1 Crystal Filter Option 04, 2700Hz SSB

SSB/USB:

Pass band ripple < 3dB

Relative att. < 6dB within +350 to +2700 Hz

Stop band att. > 60dB at -400 and +3700 Hz

SSB/LSB:

Pass band ripple < 3dB

Relative att. < 6dB within -350 to -2700 Hz

Stop band att. > 60dB at +650 and -3450 Hz

Part No. BR454052

1.7.6.2 Crystal Filter Option 07, 3000 Hz ISB

SSB/USB, ISB/USB:

Pass band ripple < 2dB

Relative att. < 3dB within +300 to +3000 Hz

Stop band att. > 60dB at -300 and +4400 Hz

Group delay distortion < 0.6 msec. within +700 to +2800 Hz

SSB/LSB, ISB/LSB:

Pass band ripple < 2dB

Relative att. < 3dB within -300 to -3000 Hz

Stop band att. > 60dB at +300 and -4400 Hz

Group delay distortion < 0.6 msec. within -700 to -2800 Hz

Part No. BR489247 + BR489255

1.7.6.3 Crystal Filter Option 01, 3000 Hz SSB

SSB/USB:

Pass band ripple < 1.5dB

Relative att. < 2dB within +300 to +3000 Hz

Stop band att. > 60dB at -500 and +3800 Hz

Group delay variation < 0.5 msec. within +450 to +2850 Hz

SSB/LSB:

Pass band ripple < 2dB

Relative att. < 3dB within -300 to -3000 Hz

Stop band att. > 60dB at +500 and +3800 Hz

Group delay variation < 0.5 msec. within -450 to -2850 Hz

Part No. 210905-001

1.7.6.4 Crystal Filter Option 05, 3000 Hz SSB

SSB/USB:

Pass band ripple < 2dB

Relative att. < 3dB within +300 to +3000 Hz

Stop band att. > 60dB at -300 and +4400 Hz

Group delay distortion < 0.6 msec. within +700 to +2600 Hz

SSB/LSB:

Pass band ripple < 2dB

Relative att. < 3dB within -300 to -3000 Hz

Stop band att. > 60dB at +1100 and -3600 Hz

Group delay distortion < 0.6 msec. within -700 to -2600 Hz

Part No. BR489247

1.7.6.5 Crystal Filter Option 06, 3400 Hz ISB

SSB/USB, ISB/USB:

Pass band ripple < 2dB
Pass band ripple < 1dB within +575 to +2910 Hz
Relative att. < 3dB within +300 to +3400 Hz
Stop band att. > 60dB at -450 and +4150 Hz
Group delay distortion < 0.5 msec. within +575 to +2910 Hz

SSB/LSB, ISB/LSB:

Pass band ripple < 2dB
Pass band ripple < 1dB within -575 to -2910 Hz
Relative att. < 3dB within -300 to -3400 Hz
Stop band att. > 60dB at +450 and -4150 Hz
Group delay distortion < 0.5 msec. within -575 to -2910 Hz

Part No. BR489190 + BR489204

1.7.6.6 Crystal Filter Option 02, 3400 Hz SSB

SSB/USB:

Pass band ripple < 2dB
Pass band ripple < 1dB within +575 to +2910 Hz
Relative att. < 3dB within +300 to +3400 Hz
Stop band att. > 60dB at -450 and +4150 Hz
Group delay distortion < 0.5 msec. within +575 to +2910 Hz

SSB/LSB:

Pass band ripple < 2dB
Pass band ripple < 1dB within -790 to -2910 Hz
Relative att. < 3dB within -300 to -3400 Hz
Stop band att. > 60dB at +450 and -4150 Hz
Group delay distortion < 0.5 msec. within -790 to -2910 Hz

Part No. BR489204

1.8 Operating and Service Manual

The part number of the Operating and Service Manual depends upon the version of the Synthex.

1.9 Accessories Available

The following items are available for use with the Synthex.

Stand alone Cabinet for SE4010, part No. 210911-001

Rack Slides Kit, Slides with lock, part No. BR458872.

Rack Slides Kit, Slides with lock and tilt, part No. BR496146.

Connector Kit, basic Synthex version, part No. BR496154.

Connector Kit for Standard Remote Interface, A9, BR490598, part No. BR485292.

Connector Kit for FSK Modulator with RTTY Interface, A6, 237641-001, part No. 240702-001.

Standard Spare Parts Kit, part No. BR496162.

Depot Spares Kit. Consult factory.

Special Tools Kit, part No. BR497223.

2 INSTALLATION

2.1 Introduction

This section of the manual provides installation instructions for the SE4010 communication exciter. It also includes information about initial inspection and damage claims, preparation for use and repacking for shipment information.

2.2 Initial Inspection

WARNING

To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the front or rear panel or outer covers. Read the safety summary at the front of this manual before installing or operating the exciter.

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the exciter has been checked mechanically and electrically. If the contents are incomplete, if there is a mechanical damage or defect, or if the exciter does not pass the performance tests, notify the nearest Dansk Radio agent. If the shipping container is damaged, or if the cushioning material shows signs of stress, notify the carrier as well as the Dansk Radio agent.

A full report of the damage should also be forwarded to Dansk Radio. Include the following:

- Order number
- Model and serial number
- Name of transportation agency

2.3 Storage

The exciter may be stored or shipped in temperatures within the limits -40°C to +75°C. It is advisable to protect the exciter from extreme temperature variation which can cause excessive condensation.

2.4 Repacking for Shipment

The shipping container for the SE4010 has been carefully designed to protect the exciter and its accessories during shipment. This container and its associated packing material should be used when repacking for shipment. If shipping to Dansk Radio for service is planned, attach a tag indicating the type of service required, return address, model number and full serial number. Mark the container "FRAGILE" to ensure careful handling. If the original shipping container is not available, the following general instructions should be used for repacking with commercially available materials:

Wrap the exciter in heavy paper or plastic. If shipping to Dansk Radio for service, attach a tag indicating the type of service required, return address, model number and full serial number.

Use a strong shipping container, e.g. a double walled carton of 160 kg. test material.

Protect the control panel with cardboard and insert a 7 to 10 cm layer of shock absorbing material between all surfaces of the equipment and the sides of the container.

Seal the shipping container securely.

Mark the shipping container "FRAGILE" to ensure careful handling.

2.5 Mounting Information

The exciter may be conveniently mounted in a standard 19 inch rack using a pair of rack slides or chassis angles appropriate for the rack system.

The exciter in the rack mounted configuration requires a standard panel space 5.25 inches high.

The exciter may also be mounted in a cabinet for bench operation, part No. 210911-001. The cabinet is designed to be mounted on a table or on a shelf, fastened to the support by means of four bolts.

When operating the exciter, provide at least 75 mm of clearance at the rear and at least 7 mm on all sides of the exciter. Failure to allow adequate air circulation will result in excessive internal temperature, reducing exciter reliability.

2.6 Power Requirements

99-138 V_{AC}, 198-280 V_{AC}, 47-63 Hz, 100 VA.

CAUTION

The exciter has a label on the power supply A10 back panel indicating the factory set voltage.

The selection of 110/220 volt nominal mains voltage is made by changing connections on the PC board of the power supply assembly A10. To change the mains voltage setting, proceed as follows:
(refer to Fig. 2.1 and Fig. 2.20).

- a. Disconnect the input power cord from the exciter.
- b. Remove the Wide Band Amplifier heat sink panel by removing the four retaining screws at the rear end of the exciter side profiles. Disconnect the coax cable from A3J1 and the cable from A10J2.
- c. Remove the eight screws positioned at the edge of the power supply rear panel A10 and withdraw the power supply assembly.
- d. Change connections on power supply assembly A10 as appropriate in accordance with Figure 2.1.
- e. Reposition the power supply assembly A10 in the exciter.
- f. Reposition the Wide Band Amplifier heat sink panel and connect the coax cable to A3J1 and the multicable to A10J2.
- g. Connect the input power cord to the exciter.

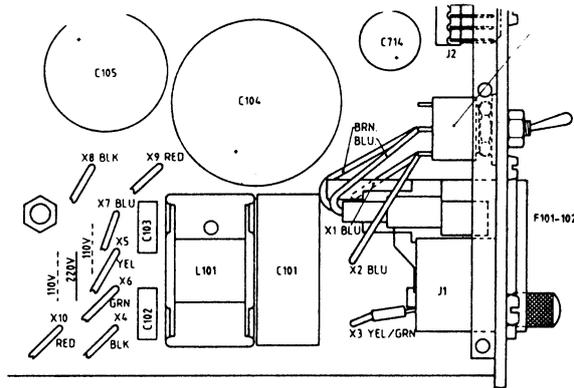


Figure 2.1 Mains strapping

2.7 Fuses

The fuses on the Rear Panel of the power supply assembly A10 must be rated as listed below:

Nominal mains voltage: 110V_{AC}
 Fuses, F101 and F102 : 2AT

Nominal mains voltage: 220V_{AC}
 Fuses, F101 and F102 : 1AT

2.8 Power Cable

In accordance with international safety standards this exciter is equipped with a three terminal power connector. When connected with an appropriate power cable, the exciter cabinet should be grounded via the power connector center tap. If the power cable is terminated with a mains plug, this should only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of a power cable without a protective conductor (grounding).

2.9 Interface and Strapping

The following sections contain information about external connectors and strapping possibilities of the assemblies. Information about application of the assemblies are located in conjunction with description of the connectors and strapping possibilities of the assemblies. Information about the assemblies is provided in separate sections in order of assembly number (A2, A4, A5 etc.).

To get proper function from the Synthex, it is necessary that some of the assemblies are strapped correctly. From factory the Synthex is normally strapped in accordance with customer requirements. If a module is exchanged, the strapping should be checked.

Please note that intervention in the equipment within the period of guarantee, may cause the guarantee to repeal!

2.10 Frequency Standard with OCXO and Input, A2 (Optional)

Assembly 492817

2.10.1 External Frequency Standard Input, A2J1

BNC, Female.

The input socket is located on the rear frame of the exciter and accepts 1, 5 or 10 MHz (strappable) input from external frequency standards. The acceptable level is from 0 to +20 dBm/50 ohms. A switch on the rear plate of the A2 assembly selects internal/external frequency standard.

2.11 Wide Band Amplifier, A4

Assembly 489492

2.11.1 RF Output, A4J1

BNC, Female.

RF Output of the Synthex. Nominal level of 1W/50 ohms balanced. The output is short circuit and open circuit protected.

The appropriate cable connector may be ordered from Dansk Radio as part No. BR473774.

2.12 Interface Assembly, A5

Assembly 210892

2.12.1 Antenna Tuner Control, A5J1

Sub-D, Female, 9-poles, Screw lock.

The Antenna Tuner control input/output connector provides the connection between the Synthex and the Dansk Radio Antenna Tuner TU4013/TU4015. The necessary data communication for controlling the Antenna Tuner is transmitted through this connector. The signals of the connector are shown in Figure 2.2.

Pin	Circuit	Description
1	RS485B	Se below
2	RS485A	-
3	ATU SENSE	-
4	<u>GND</u>	Ground
5	<u>UP STOP</u>	Se below
6	<u>POWER ON</u>	-
7	<u>AUX OUT</u>	Auxillary output, open drain
8	<u>AUX IN</u>	Auxillary input, pulled up to +5V
9	MUTE IN	Se below

Figure 2.2 Antenna tuner control

- RS485 : Serial data communication for control lines of TU4013/TU4015. Compatible with interface standard RS485.
- ATU SENSE : Detects if Antenna Tuner is connected. Input impedance: 20 kohms. Open circuit voltage: $2.5V_{DC}$ (ATU not connected). $V_{IN} < 0.8V$ indicates antenna tuner connected but mains voltage switched off. $4.0V < V_{IN} < 5.0V$ indicates antenna tuner connected and mains voltage switched on.
- UP STOP : Used to set microcomputer in the Output antenna tuner in idle mode. The open drain output is active low and can withstand $24V_{DC}$ open circuit and max 100mA when activated.

POWER ON : Used to switch on the mains voltage of
Output the antenna tuner. The open drain
output is active low and can withstand
24V_{DC} open circuit and max 100mA when
activated.

MUTE IN : Used by the antenna tuner to mute the
output power of the transmitter. Input
resistance is 100 kohms.
Applied voltage:
0 - 2.5V: Transmitter muted.
3.5 - 24V: Transmitter not muted.

The appropriate cable connector may be ordered from
Dansk Radio as part no. BR496006.

2.12.2 Transmitter Control, A5J2

Sub-D Female, 25 poles, Screw Lock.

The control input/output connector provides control
signals for filters, error signals, power controlling
signals etc. for the Dansk Radio Power Amplifier
LA76150 (500W) or LA76210 (1000W). The signals of the
connector are shown in Figure 2.3.

Pin	Circuit	Description
1	<u>TX ON</u>	Se below
2	-12dB CONTROL	-
3	FORWARD VOLTAGE	-
4	PREF	-
5	<u>SWR VOLTAGE IN</u>	-
6	<u>-3dB CONTROL</u>	-
7	<u>LEFT UPPER</u>	-
8	<u>RIGHT UPPER</u>	-
9	<u>LEFT LOWER</u>	-
10	RIGHT LOWER	-
11	GND	Ground
12	PA SENSE A	Se below
13	PA SENSE B	-
14	FILTER 1	1.5-2.3 MHz
15	FILTER 2	2.3-3.3 MHz
16	FILTER 3	3.3-4.8 MHz
17	FILTER 4	4.8-6.8 MHz
18	FILTER 5	6.8-10 MHz
19	FILTER 6	10-14.3 MHz
20	FILTER 7	14.3-21 MHz
21	FILTER 8	21-30 MHz
22	BIAS6 OUT	Se below
23	BIAS5 OUT	-
24	<u>BIAS4 OUT</u>	-
25	DRA SENSE	-

Figure 2.3 Transmitter control

- TX ON : Controls the relays in the transmitter which switch on the DC voltage to the power amplifier. The output provides a voltage of $+24V_{DC}/35mA$.
- 12 DB CONTROL : Used to bypass the final amplifiers during low power transmission. The open collector output is active low and can withstand $60V_{DC}$ open circuit and max 2A when activated.
- FORWARD VOLTAGE: Voltage proportional to forward output voltage of power amplifier. Used for control of power amplifier output power. 1kW forward output power corresponds to a voltage of $9.8V_{DC}$. The input resistance is approx. 47 kohms.

- PREF Input : Voltage proportional to reflected output voltage of power amplifier. Used for control of power amplifier output power. 1kW reflected output power corresponds to a voltage of $9.8V_{DC}$. The input resistance is approx. 47 kohms.
- SWR VOLTAGE IN Input : Voltage equal to $10 \cdot \Gamma$ (" Γ " is the reflection coefficient at power amplifier output) Used for monitoring of SWR on the LED meter. The input resistance is approx. 47 kohms.
- 3dB CONTROL Output : Used for control of 3dB attenuator in power amplifier. The open drain output is active low and can withstand $60V_{DC}$ open circuit and 150mA when activated.
- Error lines (LEFT UPPER) Inputs : The four error lines indicate possible errors of the power amplifier. The "No Error" condition are inputs between $+32V_{DC}$ and $+40V_{DC}$. To activate an error line the voltage must be less than $+30V_{DC}$.
- PA SENSE Inputs : The sense lines is used to detect which type of power amplifier that is connected. The number of error lines used depends on type of power amplifier. Table 2.1 shows relation between sense and error lines and type of power amplifier.

Table 2.1 Sense and error lines

	P12-P11	P13-P11	Active error lines
1 kW 4 lines	+	+	J2-7, J2-8 J2-9, J2-10
500 W 2 lines	+	-	J2-7, J2-8
No lines	-	-	None

"+" denotes connection
 "-" denotes no connection

Filter control : The Filter control lines is used
Outputs for selection of low pass filters
in the power amplifier. The open
drain outputs are active low and
can withstand $60V_{DC}$ open circuit
and 150mA when activated.

BIAS outpts : Reserved for future application.
The open drain outputs are active
low and can withstand $60V_{DC}$ open
circuit and 150mA when activated.

DRA SENSE : Used to detect if connected
power
Input amplifier is a Dansk Radio type.
When a Dansk Radio power
amplifier is connected the
terminal must be connected to
GND.

The appropriate cable connector may be ordered from
Dansk Radio as part no. BR495980.

2.12.3 Strapping

Strapping of baud rate for serial communication with
a connected antenna tuner is carried out as described
in Figure 2.4 below.

Baud rate	Strap
1200	D
2400	C
4800	B
9600	A

Figure 2.4 Baud rate strapping

For location of straps, please refer to the Service
Sheets for the assembly.

2.13 FSK Modulator, A6 (Optional)

Assembly 237641

2.13.1 Control Inputs, A6J1

Sub-D Male, 9 poles, Screw Lock.

The connector provides 3 inputs for selecting
frequencies and 1 input for activating the FSK
Modulator. All input levels are according to RS232.

The signals of the connector are shown in Figure 2.5.

Pin	Circuit	Description
1	GND	Ground
2	FC0/MARK	LSB of frequency, RS232 level
3	FC2	MSB of frequency, RS232 level
4	FC1	Bit of frequency, RS232 level
7	ACTIVATE RTS	Keying input, RS232 level
8	RxD IN	RX Data input, RS232 level

Figure 2.5 FSK modulator input

For 2-tone FSK only FC0/MARK is connected:

FC0/MARK	Frequency
0	Freq 1
1	Freq 2

For 4-tone FSK both FC0/MARK and FC1 must be connected:

FC1	FC0/MARK	Frequency
0	0	Freq 1
0	1	Freq 2
1	0	Freq 3
1	1	Freq 4

For 8-tone FSK FC0/MARK, FC1 and FC2 must all be connected:

FC2	FC1	FC0/MARK	Frequency
0	0	0	Freq 1
0	0	1	Freq 2
0	1	0	Freq 3
0	1	1	Freq 4
1	0	0	Freq 5
1	0	1	Freq 6
1	1	0	Freq 7
1	1	1	Freq 8

"0" denotes +12V_{DC} to +15V_{DC}

"1" denotes -12V_{DC} to -15V_{DC} or open circuit

2.13.2 Outputs, A6J2

Sub-D Male, 9 poles, Screw Lock.

The connector provides all the outputs from the FSK Modulator. The signals of the connector are shown in Figure 2.6.

Pin	Circuit	Description
1	GND	Ground
2	LINE OUT	Balanced output 600 ohms
3	LINE CT	Center tap for LINE OUT
4	LINE OUT	Balanced output 600 ohms
6	KEY OUT	Output when module is active, open collector

Figure 2.6 FSK modulator output

LINE OUT is a balanced line with an output impedance of 600 ohm. The output level is adjustable from -20 dBm to +10 dBm. The signal may be used for external modulation.

KEY OUT is an open collector output activated by the ACTIVATE input. The signal may be used for external keying.

2.13.3 Teleprinter Interface, A6J3

Sub-D Female, 9-poles, screw lock.

The teleprinter connector provides connections for two or four wire lines to the teleprinter. The signals of the connector are shown in Figure 2.7.

Pin	Circuit	Description
1	RxD IN	Input from demod., RS232 level
2	+12V OUT	+12V _{DC} output to ext. key
3	ACTIVATE RTS	Input from ext. key, RS232 level
4	+12V 20/40mA	+12V _{DC} 20/40mA output
5	TX sense +	See below
6	TX sense -	-
7	HL OUT	HL return to teleprinter
8	GND	Ground
9	HL RETURN	HL return from teleprinter

Figure 2.7 Teleprinter interface

Pin 9, HL RETURN should be used with highly inductive loads such as older teletype machines. Normally GND may be used as a return for the high level current

loop and it is allowed to interconnect pin 8 and 9.

Mark (data is 1) is defined as current ON.

When TX sense detects a space for more than 5 sec., it automatically returns to Mark. This eliminates the need to connect the TX sense inputs when not used.

2.13.4 Strapping

For location of straps, please refer to the Service Sheets for the assembly.

When pin 1 and 2 on W1 are connected by the jumper, the FSK modulator will be activated when the ACTIVATE input is connected to a voltage between 0V and -15V, or is floating.

When pin 2 and 3 on W1 are connected by the jumper, the FSK modulator will be activated when the ACTIVATE input is connected to a voltage between +12V and +15V.

In order to get maximum performance of the RTTY modulator it is necessary to strap the interface circuits (current loop and loop back). How to do this is described in the following.

The high level current strapping is shown in Figure 2.8.

Output	W2	Current	W3	Voltage	W4
active	1-2	20mA	1-2	120V	7-8
disabled	2-3	40mA	2-3	80V	5-6
				60V	3-4
				40V	1-2

Figure 2.8 High level current strapping

The low level current strapping is shown in Figure 2.9.

Current	W6	W7	Output	W8
20mA	2-3	2-3	active	1-2
40mA	1-2	1-2	disabled	2-3

Figure 2.9 High level current strapping

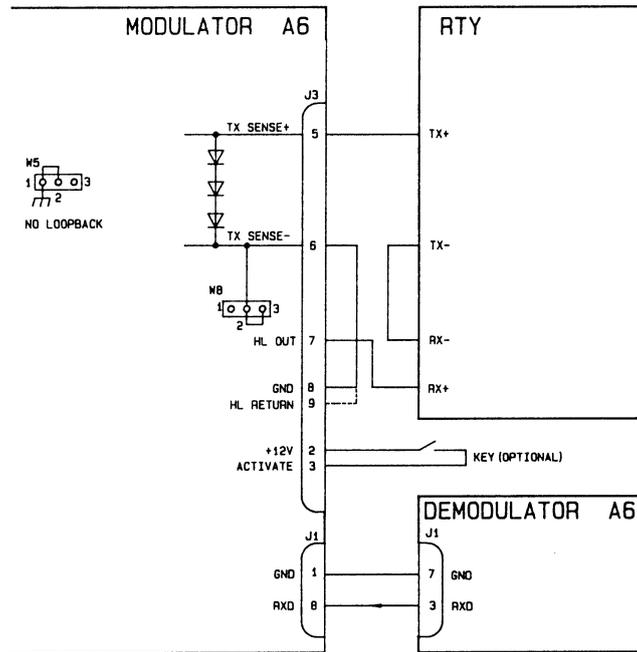
The loopback strapping is shown in Figure 2.10.

Loopback	W5
ON	2-3
OFF	1-2

Figure 2.10 Loopback strapping

Figure 2.11 shows connections in typical applications.

2-wire operation



4-wire operation

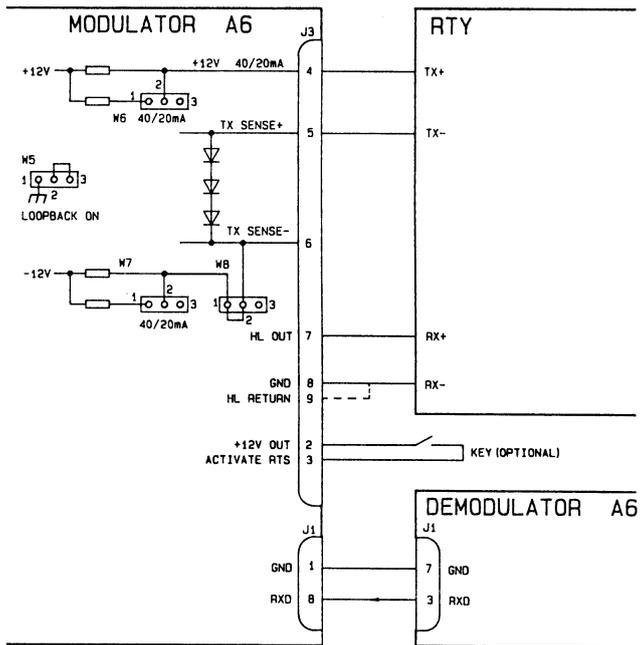


Figure 2.11 Typical teletype applications.

2.14 Modulator, A7

Assemblies 490466 (ISB) and 496103 (SSB).

2.14.1 Audio and Key Inputs, A7J2

Sub-D, Female, 25 poles, Screw Lock.

The audio and key input connector provides line and microphone inputs and a side tone output (used during simplex A1 keying). Refer to Figure 2.12 for ISB version and Figure 2.13 for SSB version.

The input/output socket also provides keying inputs and mute output.

Pin	Circuit	Description
1	USB MIC	USB mic. input, 500 ohm unbalanced
13	LSB MIC	LSB mic. input, 500 ohm unbalanced
4	GND	Ground
10	GND	Ground
16	USB LINE	USB line input, 600 ohm balanced
3	COMMON	USB line input, common
15	USB LINE	USB line input, 600 ohm balanced
24	LSB LINE	LSB line input, 600 ohm balanced
11	COMMON	LSB line input, common
23	LSB LINE	LSB line input, 600 ohm balanced
21	TLX LINE	Telex line input, 600 ohm balanced
22	COMMON	Telex line input, common
8	<u>TLX LINE</u>	Telex line input, 600 ohm balanced
5	KEY 2	Open drain output, 60V _{DC} /150mA
9	MORSETONE	Morse tone output, 0 dBm/600 ohm
6	+15V	+15V _{DC} output, max. 100mA
17	MUTE NC	Mute normally closed, max. 100mA
18	MUTE COM	Mute common
19	<u>MUTE NO</u>	Mute normally open, max. 100mA
14	<u>USB MIC KEY</u>	Off: 5V open, On: 0.3mA GND
25	<u>LSB MIC KEY</u>	Off: 5V open, On: 0.3mA GND
2	<u>USB LINE KEY</u>	Off: 5V open, On: 0.3mA GND
12	<u>LSB LINE KEY</u>	Off: 5V open, On: 0.3mA GND
20	<u>TLX KEY</u>	Off: 5V open, On: 0.3mA GND
7	MORSE KEY	Off: 5V open, On: 0.3mA GND

Figure 2.12 Audio and key input for ISB version

Pin	Circuit	Description
1	MIC	USB mic. input, 500 ohm unbalanced
4	GND	Ground
10	GND	Ground
16	LINE	Line input, 600 ohm balanced
3	COMMON	Line input, common
15	LINE	Line input, 600 ohm balanced
21	TLX LINE	Telex line input, 600 ohm balanced
22	COMMON	Telex line input, common
8	<u>TLX LINE</u>	Telex line input, 600 ohm balanced
5	KEY 2	Open drain output, 60V _{DC} /150mA
9	MORSETONE	Morse tone output, 0 dBm/600 ohm
6	+15V	+15V _{DC} output, max. 100mA
17	MUTE NC	Mute normally closed, max. 100mA
18	MUTE COM	Mute common
19	<u>MUTE NO</u>	Mute normally open, max. 100mA
14	<u>MIC KEY</u>	Off: 5V open, On: 0.3mA GND
2	<u>LINE KEY</u>	Off: 5V open, On: 0.3mA GND
20	<u>TLX KEY</u>	Off: 5V open, On: 0.3mA GND
7	MORSE KEY	Off: 5V open, On: 0.3mA GND

Figure 2.13 Audio and key input for SSB version

The Audio level accepted by the exciter is between +10 and -30 dBm/600 ohms for the line inputs and between 2 mV and 200 mV/500 ohms for the microphone inputs.

The Line input(s) are selected in the voice modes, ie. J3E, R3E, H3E and ISB, provided that no keys are activated. If a Mic. key is activated, the corresponding microphone input will be selected. As Line key has priority over Mic. key, the Line input will be selected if both keys are activated.

The appropriate cable connector may be ordered from Dansk Radio as part No. BR496014.

2.14.1.1 Audio Inputs

The Audio inputs available for the ISB version are shown in Table 2.2 and in Table 2.3 for the SSB version.

Table 2.2 Audio inputs for ISB

MODE	USB		LSB		TLX
	LINE	MIC.	LINE	MIC.	
J3E-USB	+	+	-	-	-
R3E-USB	+	+	-	-	-
H3E-USB	+	+	-	-	-
F1B	-	-	-	-	+
A1A	-	-	-	-	-
H2A-USB	-	-	-	-	-
J3E-LSB	-	-	+	+	-
R3E-LSB	-	-	+	+	-
H3E-LSB	-	-	+	+	-
H2A-LSB	-	-	-	-	-
USB/LSB	+	+	+	+	-
USB/F1B	+	+	-	-	+
LSB/F1B	-	-	+	+	+

"+" denotes input available
 "-" denotes input not available

Table 2.3 Audio inputs for SSB

MODE	LINE	MIC.	TLX
J3E-USB	+	+	-
R3E-USB	+	+	-
H3E/USB	+	+	-
F1B	-	-	+
A1A	-	-	-
H2A/LSB	-	-	-
J3E/LSB	+	+	-
R3E/LSB	+	+	-
H3E/LSB	+	+	-
H2A/LSB	-	-	-

"+" denotes input available

"-" denotes input not available

2.14.1.2 Sensitivity Adjustment

The sensitivity of the different Audio inputs are adjusted in the following way.

- a. Apply a test signal with a level equal to the drive signal normally used.
- b. Select the appropriate meter.
Check for a meter deflection of 0 dB.
If the deflection is more than 0 dB or less than -20 dB, an adjustment is necessary.
- c. Pull out the exciter.

The adjustment entries for the different input levels are marked on the top of the chassis. Use a small screw driver to adjust for a meter deflection of -10 dB. This adjustment has to be carried out for all five Audio inputs. When adjusting the sensitivity of the microphone inputs, remember to activate the associated key to select the microphone input.

2.14.1.3 Keying Inputs

The keying inputs are energized by grounding. The inputs are protected against reverse voltage. Off voltages are 5 V_{DC} and on currents are 0.3 mA. This makes the inputs suitable for interfacing mechanical keys, optocouplers and open collector keys.

Table 2.4 and 2.5 show the key inputs available for the ISB version and the SSB version, respectively.

Table 2.4 Key inputs for ISB

MODE	USB		LSB		TLX	MORSE
	LINE	MIC.	LINE	MIC.		
J3E/USB	+	+	-	-	-	-
R3E/USB	+	+	-	-	-	-
H3E/USB	+	+	-	-	-	-
F1B	-	-	-	-	+	-
A1A	-	-	-	-	-	+
H3A/USB	-	-	-	-	-	+
J3E/LSB	-	-	+	+	-	-
R3E/LSB	-	-	+	+	-	-
H3E/LSB	-	-	+	+	-	-
H2A/LSB	-	-	-	-	-	+
USB/LSB	+	+	+	+	-	-
USB/F1B	+	+	-	-	+	-
LSB/F1B	-	-	+	+	+	-

"+" denotes input available
 "-" denotes input not available

Table 2.5 Key inputs for SSB

MODE	LINE	MIC.	TLX	MORSE
J3E/USB	+	+	-	-
R3E/USB	+	+	-	-
H3E/USB	+	+	-	-
F1B	-	-	+	-
A1A	-	-	-	+
H2A/USB	-	-	-	+
J3E/LSB	+	+	-	-
R3E/LSB	+	+	-	-
H3E/LSB	+	+	-	-
H2A/LSB	-	-	-	+

"+" denotes input available
 "-" denotes input not available

2.14.1.4 Muting

The muting outputs have 3 connections. The common, the normally open (NO) and the normally closed (NC) terminal. The muting functions are only active during simplex operation. The terminals are floating with respect to ground. The maximum voltage between ground and any of the terminals should be limited to 500 V_{AC}.

2.14.1.5 Strapping

Assembly 496103

Strapping of the A7 Assembly (SSB version) is covered in the circuit description of the assembly. See the appropriate Service Sheet.

2.15 Microcomputer Module, A8

Assembly 487740

2.15.1 Control Input/Output, A8J1

Sub-D, Female, 15-poles, Screw Lock.

The control input/output connector provides different control inputs and a 110 bps RS232 serial control port. The connections are shown in Figure 2.14.

Pin	Circuit	Description
1	RS232 IN	110 bps serial com., RS232 level
2	GND	Ground
3	MUTE-	Se below
4	MUTE+	-
5	DUPLEX-	-
6	DUPLEX+	-
7	SCAN STOP-	-
8	SCAN STOP+	-
9	RS232 OUT	110 bps serial com., RS232 level
10	<u>GND</u>	Ground
11	<u>MUTE</u>	Se below
12	<u>DUPLEX</u>	-
13	SCAN STOP	-
14	<u>N.C.</u>	Not connected
15	RST 6.5	Se below

Figure 2.14 Control input/output

SCAN STOP-: Floating, isolated input.
SCAN STOP+ : 24V/10mA will enable Tx on.
Input

SCAN STOP : GND enables Tx on. Internally pulled
Input up to +5 V. The input pin must be
driven by an open collector source,
capable to sink min. 5 mA.

MUTE - : Floating, isolated input.
MUTE + : 24V/10mA will interlock SE4010.
Input

MUTE : GND will interlock SE4010. Internally
Input pulled up to +5 V. The input pin must
be driven by an open collector source,
capable to sink min. 5 mA.

DUPLEX- : Floating, isolated input, 24V/10mA.
DUPLEX+ :
Input

DUPLEX : Internally pulled up to +5 V.
Input The input pin must be driven by an open collector source, capable to sink min. 5mA.

RST 6.5 : Active low, internally pulled
Input up to +5 V. The input pin must be driven by a driver capable to sink min. 5 mA.

The appropriate cable connector may be ordered from Dansk Radio as part No. BR495980.

2.15.2 Open Collector Outputs, A8J2

Sub-D, Female, 9-poles, Screw Lock.

The connector provides an 8 bits output port. The connections are shown in Figure 2.15.

Pin	Circuit	Description
1	OC1	Open collector out max. 30V/40mA
2	OC2	-
3	OC3	-
4	OC4	-
5	OC5	-
6	OC6	-
7	OC7	-
8	OC8	-
9	GND	Ground

Figure 2.15 Open collector outputs

The appropriate cable connector may be ordered from Dansk Radio as part No. BR496006.

2.15.3 Strapping

Strapping of S1 to S6 depends on the types of EPROMS used. Figure 2.16 below shows the strapping.

S1,S2,S3	S4	S5	S6	U23	U24	U25
32	32	32	32	2732	2732	2732
64	-	32	-	2764	2732	N.U.
64	-	-	32	2764	2764	2732
64	-	-	-	2764	2764	2764
128	128	32	-	27128	2732	N.U.
128	128	64	-	27128	2764	N.U.
128	128	128	-	27128	27128	2764
128	128	128	128	28128	28128	27128

(N.U. = not used).

Figure 2.16

If U45 is mounted it must always be of size 64k bit. Therefore no strap exists for U45.

S7 must be strapped between pin 1 and 2 when used in SE4010, and between pin 2 and 3 when used in RX4010. The strap has no function when used in other equipment than SE4010 and RX4010.

2.16 Remote Interface, A9 (Optional)

Assembly 490598

2.16.1 Remote Interface, A9J1

Sub-D, Female, 25 poles, Screw Lock.

The connector provides data and control signals for serial remote control in accordance with the CCITT V24/RS232C standard and serial remote control compatible with the RS422 and RS485 standards. The connector also contains a mute input (RS232 level) for interlock of the Synthex. The connections are as shown in Figure 2.17.

Pin	Circuit	Description
1	GND	Ground
2	TXD-232	Transmit Data, RS232
3	RXD-232	Receive Data, RS232
4	RTS-232	Request To Send, RS232
5	CTS-232	Clear To Send, RS232
6	DSR-232	Data Set Ready, RS232
7	GND	Ground
9	LINE OUT	600 ohm, not used in SE4010
10	LINE OUT	600 ohm, not used in SE4010
11	MUTE	Interlock of SE4010
18	TXDA-422	Diff. Transmit Data A, RS422
19	TXDB-422	Diff. Transmit Data B, RS422
20	DTR-232	Data Terminal Ready, RS232
23	RXDA-422/485	Rec. Data A, RS422 / data, RS485
24	RXDB-422/485	Rec. Data B, RS422 / data, RS485

Figure 2.17 Remote Interface

The appropriate cable connector may be ordered from Dansk Radio as part No. BR496014.

2.16.2 Strapping

Please refer to Section 5 "REMOTE CONTROL" for strapping of the assembly.

2.17 Installation Check-out

When the installation has been completed, refer to Section 3 "OPERATION" and fully check the operation of the exciter.

4 OPTIONS

4.1 Introduction

This section provides information about optional features which is not described elsewhere in this manual.

4.2 Remote Key Module, A7A2

Assembly 490083

The Remote Key Module A7A2 is used in SE4010 in conjunction with the Audio Module in TC4010 to obtain the same Audio and Key connections of the TC4010 as are standard of the SE4010.

The Remote Key Module contains two separate Audio and Key line circuits, one for USB and one for LSB.

4.2.1 Installation

The Remote Key Module is installed on the Modulator Assembly A7 by inserting the plug P4 in the connector J4 and fastening the module by four 3 mm screws.

4.2.2 Connection between SE4010 and TC4010

Depending on whether the Remote Key Module is used in an ISB or SSB system, one or two audio lines are used. If the Audio Module is used in an ISB system, both lines are used, and if used in an SSB system, only the USB line is used.

Figure 4.1 shows the ISB system and Figure 4.2 shows the SSB system.

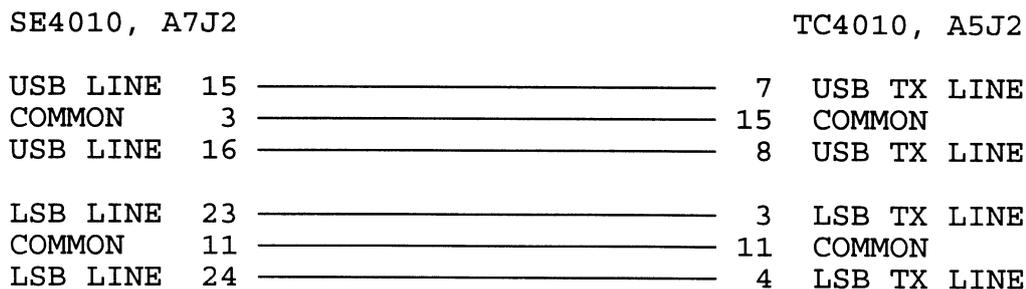


Figure 4.1 ISB interconnection

SE4010, A7J2

TC4010, A5J2

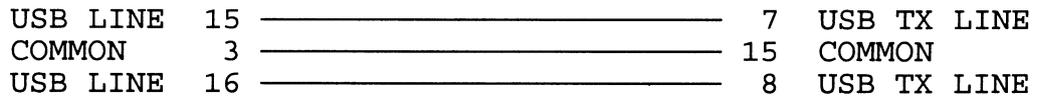


Figure 4.2 SSB interconnection

4.2.3 Strapping

In order to obtain proper performance from the Remote Key Module it is necessary to strap the module correctly. Location of the straps is shown on Figure 4.3.

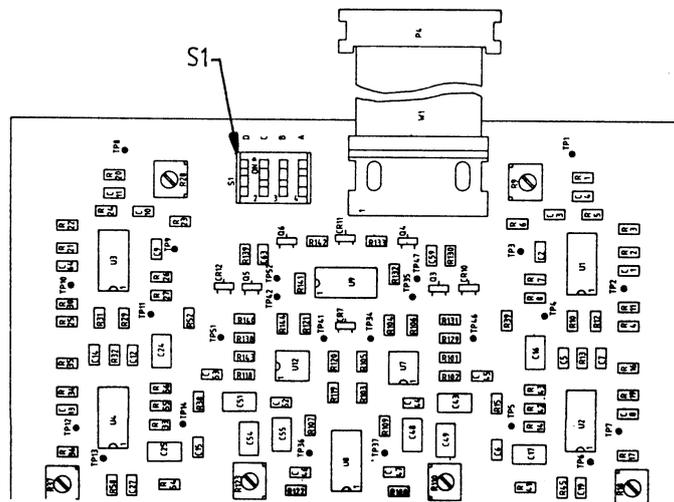


Figure 4.3 Location of straps

Strap No.		
S1a	on	LSB Audio
S1b	on	USB Audio select
S1c	on	LSB Audio select
S1d	on	USB Audio

Figure 4.4 Strapping of A7A2 module

The module must be strapped as shown in Figure 4.4. Both side bands are limited to a frequency range from 300 Hz to 2700 Hz in order to enable the use of the key tone.

If a full bandwidth is needed, this can be accomplished by setting the appropriate straps in the OFF position. By doing so the only keys available will be Cont and Vox.

Figure 4.5 show an example of strapping of the A7A2 module for reduced bandwidth in USB and full bandwidth in LSB

Strap No.		
S1a	off	LSB Audio
S1b	on	USB Audio select
S1c	off	LSB Audio select
S1d	on	USB Audio

Figure 4.5

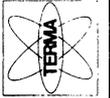
This strapping means full use of the keys in USB and only the Cont and Vox keys in LSB.

Parts List

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FIND NO.	QTY	RQD	U	M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000		ST	60	BR498629	SYNTHESIZER A1, FAST	1				A1	
2	1,000		ST	60	BR460354	STANDARD OCXO	1				A2	
3	1,000		ST	60	BR497290	WIDE BAND AMPLIFIER	1				A4	
4	1,000		ST	60	210892-001	INTERFACE A5	1				A5	
5	1,000		ST	60	BR496103	MODULATOR ASSY 3KHZ	1				A7	
6	1,000		ST	20	BR454052	FILTER,XTAL 1.4MHZ 2.7KHZ	3					
7	1,000		ST	41	BR475149	REAR PLATE JUMMY 1.5M	1					
8	1,000		ST	60	BR488534	FRONT PANEL SE4010	1				A11	
9	1,000		ST	60	BR490083	REMOTE UNIT SE4010	1				A7A2	
10	1,000		ST	60	BR490598	INTERF. RS232 422/485	1				A9	
11	1,000		ST	60	BR496014	KIT, SUB-D CONN 25P MALE	1					
12	1,000		ST	62	BR487899	IF MODULE A3	1					
13	1,000		ST	60	BR487740	MICROCOMPUTER ASSY A8	1					
14	1,000		ST	61	BR4941861	POWER SUP. ASSY A10	3					
15	1,000		ST	41	BR487147	CHASSIS ASSY A12	1					
16	4,000		ST	51	BR327301	SCREW M 5 X20 CHM CU SN	4					A2
17	4,000		ST	51	BR327263	SCREW M 4 X20 CHM CU SN	4					
18	40,000		ST	51	BR450561	SCREW SELF TAP. 4X3/8 PH-PL	4					
19	4,000		ST	53	BR336777	WASHER, FLAT Ø 4MM CU SN M	4					
20	4,000		ST	53	BR321966	WASHER, FLAT Ø 5MM CU SN M	4					
21	2,000		ST	37	BR457884	COAX CA ASSY SMB SMB 77MM	3					
22	1,000		ST	37	BR457868	COAX CA ASSY SMB SMB 120	3					
23	1,000		ST	37	BR457906	COAX CA ASSY SMB SMB 198	3					
27	1,000		ST	46	BR464872	LABEL, DRA TYPE/SER.NO	3					
28	0,200		ST	48	210757-001	LABELS FOR A10	2					
29	1,000		ST	60	BR496162	KIT, SPARES SE4010	1					
***** BILL OF DOCUMENTATION *****												
WORKMANSHIP												
PANEL SE4010 SYNTHEX												
INTERCONN. DIAGRAM SE4010												
SE 4010, HF SYNTHEX												
PANEL SE4010 SYNTHEX												
SE4010 SYNTHESIZER/EXCITE												
SE4010 SYNTHESIZER/EXCITE												

TITLE: SE4010												
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Parts List

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LINE REV	ITEM OR DOCUMENT NUMBER	QTY RQD	U M	CL NO.	NOMENCLATURE	PREP NO.	BIN	REFERENCE DESIGNATION
22	221721-027	9,000	SI	22	CAP. CER 10N / 100S			C38,C39,C41,C42,C52,C128, C132,C133,C139,C166,C174, C188,C197,C207,C209,C212
23	221721-010	42,000	SI	22	CAP. CER 1N0 / 100K			C4,C11,C19,C75,C77,C78, C121,C183,C193 C61,C68,C69,C76,C79,C93, C95,C98,C105,C107,C108, C109,C110,C112,C113,C116, C117,C118,C119,C120,C122, C135,C141,C143,C146,C149, C152,C154,C156,C158,C159, C161,C164,C165,C171,C173, C176,C177,C178,C179,C180, C186 C32,C124 C37,C111,C160 C40 C49 C50 C62,C65,C66,C87,C199,C208 C63 C67,C101 C71,C72 C73,C74,C82,C127,C192 C90 C96,C142 C99,C147,C169 C100,C148,C167 C126 C155 C168 C170 C181 C182 C198 C200,C201
24	216356-217	2,000	SI	22	CAP. CER 100P / 100K			
25	235170-041	3,000	SI	22	CAP. ELC 220U / 25M			
26	235012-019	1,000	SI	22	CAP. ELC 22U / 40I			
27	BR433721	1,000	SI	22	CAP. CER. 270P 100 K HI-K			
28	221721-006	1,000	SI	22	CAP. CER 470P / 100K			
29	221220-007	6,000	SI	22	CAP. PLAST 100N / 53K			
30	202542-012	1,000	SI	22	CAP. CER 33P / 100G			
31	BR385654	2,000	SI	22	CAP. SEM 10P TEFLON			
32	202542-017	2,000	SI	22	CAP. CER 82P / 100G			
33	202542-015	5,000	SI	22	CAP. CER 56P / 100G			
34	202542-016	1,000	SI	22	CAP. CER 68P / 100G			
35	202542-006	2,000	SI	22	CAP. CER 10P / 100G			
36	BR357472	3,000	SI	22	CAP. CER. 18P 100 G N150			
37	202542-014	3,000	SI	22	CAP. CER 47P / 100G			
39	221220-003	1,000	SI	22	CAP. PLAST 22N / 63K			
40	221220-002	1,000	SI	22	CAP. PLAST 15N / 63K			
41	202542-010	1,000	SI	22	CAP. CER 22P / 100G			
42	202542-020	1,000	SI	22	CAP. CER 150P / 100G			
43	202542-011	1,000	SI	22	CAP. CER 27P / 100G			
44	202542-008	1,000	SI	22	CAP. CER 15P / 100G			
45	202542-018	1,000	SI	22	CAP. CER 100P / 100G			
46	BR448923	2,000	SI	22	CAP. PLST 15N 63 F			



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Parts List

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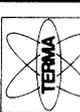
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47	1,000	ST	22	221220-011	CAP. PLAST 470N / 63K	4			C213	L
48	2,000	ST	22	202542-082	CAP. CER 2P2 / 100C	4			C103,C150	B
50	26,000	ST	23	200352-001	DIODE 1N4148	4			CR1,CR5,CR7,CR8,CR12,CR13,CR14,CR27,CR28,CR29,CR30,CR31,CR32,CR36,CR37,CR39,CR40,CR51,CR52,CR54,CR55,CR56,CR57,CR58,CR59,CR60	
51	2,000	ST	23	224539-001	DIODE 1N4448	4			CR3,CR4	
52	2,000	ST	23	BR451061	DIO CAP.88 405B SI 2-17PF	4			CR10,CR11	
53	3,000	ST	23	BR492566	DIO LED HLMPK150 RED Ø3	4			CR15,CR26,CR53	
54	8,000	ST	23	BR358614	DIO SWITCH BA 482 SI 100MA	4			CR21,CR22,CR23,CR24,CR46,CR47,CR48,CR49	
55	2,000	ST	23	BR405531	DIO CAP.882048 SI 37-42PF	4			CR25,CR50	
58	1,000	ST	31	200764-002	CONN SMB RECP 50R	4			J1	
59	1,000	ST	31	200764-003	CONN SMB RECP 50R	4			J2	
60	0,279	ST	31	208801-001	CONN MINI-JUMP 36 PIN	4			J3,J4,J5,J6	G1
62	1,000	ST	31	229828-220	CONN. PCB 2X12-SOCKET	4			J7	
65	5,000	ST	25	200730-003	COIL,RF	4			L1,L2,L3,L4,L5	
66	1,000	ST	25	232311-023	CHOKE, EMI 100UH	4			L7	
67	1,000	ST	25	BR394343	COIL,CHOKE 100 K	4			L8	
68	2,000	ST	25	210674-001	COIL VCO A1110,15	4			L10,L15	
69	5,000	ST	25	BR357820	COIL,CHOKE 2U2 K	4			L11,L12,L16,L17,L20	
70	1,000	ST	25	200413-015	COIL,RF 470N	4			L18	
71	1,000	ST	25	200413-019	COIL RF 0U15 38K	4			L19	
72	3,000	ST	25	232311-011	CHOKE, EMI 10UH	4			L21,L22,L23	
73	2,000	ST	31	208802-002	CONN B-JUMP	4			P4,P6	
78	1,000	ST	26	BR274070	TRANS.-JFETN BFM 11 IO-72	4			Q1	
79	2,000	ST	26	BR274097	TRANS.-LOPOW BC 547C SI-N	4			Q2,Q3	
80	6,000	ST	26	BR451274	TRANS.-LOPOW MPS2369 SI-N	4			Q4,Q6,Q8,Q15,Q37,Q38	
81	1,000	ST	26	BR399914	TRANS.-JFETN J 309 IO-92	4			Q7	
82	15,000	ST	26	BR455164	TRANS.-LOPOW 2N3904 SI-P T	4			Q10,Q11,Q12,Q13,Q16,Q21,Q22,Q23,Q24,Q26,Q29,Q30,Q31,Q32,Q41	
83	2,000	ST	26	BR455229	TRANS.-MFETN MFE131 2XG IO	4			Q14,Q33	
84	2,000	ST	26	BR389730	TRANS.-JFETN J-211-18	4			Q17,Q18	
85	5,000	ST	26	BR451320	TRANS.-LOPOW 2N3906 SI-P T	4			Q20,Q25,Q35,Q36,Q40	

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FIND NO.	QTY REQ	U M	GL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
86	1,000	ST	26	BR373575	TRANS.UHF BFR 96 SI-N SUI	4			Q34	
87	14,000	ST	21	235004-049	RES FILM 100R / 0.5 J	4			R1,R3,R31,R35,R36,R64,R65, R67,R72,R139,R140,R142, R145,R180 R2,R4,R52,R57,R127,R132 R5,R21,R47,R77,R82,R98, R113,R163,R188,R196,R197, R209 R6 R7 R8 R9,R169 R10,R75 R11,R14,R15,R39,R40,R41, R50,R55,R87,R88,R89,R104, R111,R115,R125,R130,R155, R156,R171,R195,R198 R16,R17,R51,R56,R90,R94, R107,R110,R126,R131,R175, R185,R200,R204,R213 R18,R19,R28,R164,R186 R20,R22,R26,R38,R43,R46, R74,R85,R102,R117,R120, R121,R172 R27,R191 R29,R32,R100,R147 R25 R30 R23,R33,R34,R44,R45,R69, R73,R83,R99,R108,R109, R114,R143,R146,R158,R206 R42,R48,R53,R54,R58,R59, R80,R81,R103,R112,R116, R118,R128,R129,R133,R134, R176,R177,R178,R181 R60,R61,R135,R136	F
88	6,000	ST	21	235004-059	RES FILM 270R / 0.5 J	4				
89	12,000	ST	21	235004-081	RES FILM 2K2 / 0.5 J	4				
90	1,000	ST	21	BR394602	RES CARB. 5R6 1/4J SFR25	4				
91	1,000	ST	21	208010-255	RES FILM 3K65 / 0.25F	4				
92	1,000	ST	21	208010-281	RES FILM 6K81 / 0.25F	4				
93	2,000	ST	21	235004-025	RES FILM 10R / 0.5 J	4				
94	2,000	ST	21	235004-061	RES FILM 330R / 0.5 J	4				
95	21,000	ST	21	235004-089	RES FILM 4K7 / 0.5 J	4				F
96	15,000	ST	21	235004-101	RES FILM 15K / 0.5 J	4				B
97	5,000	ST	21	235004-109	RES FILM 33K / 0.5 J	4				
98	13,000	ST	21	235004-097	RES FILM 10K / 0.5 J	4				
99	2,000	ST	21	235004-121	RES FILM 100K / 0.5 J	4				F
100	4,000	ST	21	235004-065	RES FILM 470R / 0.5 J	4				
101	1,000	ST	21	235004-133	RES FILM 330K / 0.5 J	4				
102	1,000	ST	21	235004-129	RES FILM 220K / 0.5 J	4				
103	16,000	ST	21	235004-073	RES FILM 1K0 / 0.5 J	4				
104	20,000	ST	21	235004-105	RES FILM 22K / 0.5 J	4				G
105	4,000	ST	21	208010-473	RES FILM 562K / 0.25F	4				

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FIND NO.	QTY RQD	U M	GL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
106	2,000	ST	21	208010-366	RES FILM 47K5 / 0.25F	4			R62,R137	
107	2,000	ST	21	208010-373	RES FILM 56K2 / 0.25F	4			R63,R138	
109	2,000	ST	21	235004-063	RES FILM 390K / 0.5 J	4			R68,R157	
110	3,000	ST	21	235004-051	RES FILM 120R / 0.5 J	4			R70,R148,R150	
111	1,000	ST	21	235004-045	RES FILM 68R / 0.5 J	4			R71	
112	1,000	ST	21	235004-135	RES FILM 390K / 0.5 J	4			R84	
113	3,000	ST	21	235004-093	RES FILM 6K8 / 0.5 J	4			R91,R201,R210	
114	3,000	ST	21	235004-099	RES FILM 12K / 0.5 J	4			R92,R105,R202	
115	2,000	ST	21	235004-102	RES FILM 16K / 0.5 J	4			R93,R203	
116	2,000	ST	21	235004-120	RES FILM 91K / 0.5 J	4			R95,R205	
117	4,000	ST	21	235004-086	RES FILM 3K6 / 0.5 J	4			R96,R97,R207,R208	
118	1,000	ST	21	235004-091	RES FILM 5K6 / 0.5 J	4			R78	G
119	1,000	ST	21	235004-103	RES FILM 18K / 0.5 J	4			R182	G
120	4,000	ST	21	235004-113	RES FILM 47K / 0.5 J	4			R119,R179,R183,R187	F
121	2,000	ST	21	235004-057	RES FILM 220R / 0.5 J	4			R144,R168	
122	5,000	ST	21	235004-042	RES FILM 51K / 0.5 J	4			R149,R161,R162,R166,R170	
123	1,000	ST	21	235004-037	RES FILM 33R / 0.5 J	4			R151	
124	1,000	ST	21	235004-055	RES FILM 180R / 0.5 J	4			R152	
125	1,000	ST	21	BR376310	RES SEMIV 200R 1/2K CERM	4			R153	
126	2,000	ST	21	235004-067	RES FILM 560R / 0.5 J	4			R165,R192	
127	3,000	ST	21	235004-095	RES FILM 8K2 / 0.5 J	4			R80,R106,R167	F
129	1,000	ST	21	235004-117	RES FILM 68K / 0.5 J	4			R190	
131	1,000	ST	21	235004-077	RES FILM 1K5 / 0.5 J	4			R193	
132	1,000	ST	21	235004-039	RES FILM 39R / 0.5 J	4			R194	
133	1,000	ST	21	235004-068	RES FILM 620R / 0.5 J	4			R211	
134	1,000	ST	21	235004-043	RES FILM 56R / 0.5 J	4			R212	
139	9,000	ST	31	232310-003	TERMINAL PIN WRAP	4			IP7,IP18,IP19,IP20,IP23, IP24,IP25,IP27,IP28	G
140	1,000	ST	25	235186-001	TRANSFORMER, WIDE BAND	4			T1	
141	1,000	ST	24	203520-017	IC, LM320T-12.0V	4			U1	
142	3,000	ST	24	BR375349	IC LIN 78L05 VOLT REGL.	4			U2,U3,U5	
143	1,000	ST	24	200518-003	IC, LM723CN	4			U4	
144	1,000	ST	24	235056-001	IC, DC-DC CONVERTER	4			U6	
145	1,000	ST	24	BR492167	IC LIN LM 317L VOLT REGL.	4			U7	
146	2,000	ST	24	206072-095	IC, --74HCT138	4			U9,U10	
147	1,000	ST	24	200470-075	IC, MM74HC30N	4			U11	

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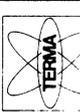
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148	1,000	ST	24	200464-095	IC, --74HCT04, HEX INVERT	4			U12	
149	4,000	ST	24	207437-095	IC, --74HCT1374	4			U13,U14,U15,U17	
150	1,000	ST	24	BR48755	IC DCTL 74HCT365 6XBUSDR1	4			U16	
151	1,000	ST	24	BR455113	IC LIN LM 308N OP.AMP.	4			U18	
152	1,000	ST	24	200888-066	IC, --74F74PC	4			U19	
153	1,000	ST	24	211625-075	IC, MC74HC4520	4			U20	
154	1,000	ST	24	200888-095	IC, --74HCT74	4			U21	
155	2,000	ST	24	BR454753	IC LIN LM 393N VOLT COMP.	4			U22,U35	
156	2,000	ST	24	BR450375	IC DCTL 10116P ECL BUFFER	4			U24,U31	
157	1,000	ST	24	216362-004	IC, PRESCALER 16/17,32/33	4			U25	
158	1,000	ST	24	235183-001	IC, FREQUENCY SYNTHESIZER	4			U26	
159	3,000	ST	24	222228-001	IC, OP-27G	4			U27,U28,U37	
160	1,000	ST	24	216361-003	IC, --358 OP.AMP. DUAL	4			U29	
161	1,000	ST	24	235181-001	IC, NE602A, MIXER	4			U32	
162	1,000	ST	24	211614-075	IC, --74HC4046	4			U33	
163	1,000	ST	24	206743-095	IC, --74HCT221	4			U36	
164	1,000	ST	24	235185-001	IC, SWITCH, SPST, QUAD	4			U38	
165	1,000	ST	24	235182-001	IC, NE5532A, OP. AMP.	4			U39	
166	1,000	ST	24	200463-095	IC, --74HCT02	4			U40	
167	1,000	ST	24	235184-001	IC, SWITCH, SPST, QUAD	4			U41	
170	1,000	ST	23	203527-011	DIODE ZENER 6V2/0.5W J	4			VR1	
171	4,000	ST	23	203527-019	DIODE ZENER 13V /0.5W J	4			VR2,VR4,VR10,VR12	
172	4,000	ST	23	203527-001	DIODE ZENER 2V4/0.5W J	4			VR3,VR5,VR11,VR13	
173	2,000	ST	23	203527-008	DIODE ZENER 4V7/0.5W J	4			VR6,VR14	
174	1,000	ST	23	203527-005	DIODE ZENER 3V6/0.5W J	4			VR7	
175	1,000	ST	23	203527-021	DIODE ZENER 16V0/0.5W J	4			VR8	
178	1,000	ST	37	210675-001	COAX CABLE ASSY AIM1	3			M1	
179	1,000	ST	37	210676-001	COAX CABLE ASSY AIM2	1			M2	
190	1,000	ST	20	204496-014	CRYSTAL, PAR. 20.97152MHZ	4			Y1	
191	1,000	ST	41	210706-001	SCREEN SHIELD A1	2				D
192	1,000	ST	41	210678-001	SHIELD A1A1	1				E
193	1,000	ST	48	214073-004	LABEL, ADHESIVE, ESD	2				H1
194	0,200	ML	76	205254-001	ADHESIVE SILICONE, RTV	4				J
***** BILL OF DOCUMENTATION *****										

DOCUMENT NO.: BR498629
 (498629)

REV: M

SHEET NO.: 6 OF 7

TITLE: SYNTHESIZER A1, FAST



TERMA Elektronik AS
 FSCM R0587
 Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

LINE REV	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	PREP NO.	BIN	REFERENCE DESIGNATION
1	210663-001	PWB, DDS A1A1			
3	202185-017	SCREW M 3 X 6 SLTD-CYL. BR3			
4	202218-008	NUT M 3 PLAIN HEX. BRASS			
5	200843-010	WIRE COP TIN-CTD Ø0.5 MM			C1, C2, C3, C4, C5, C6, C7, C8, C9, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C10
10	232300-034	CAP. SMD 100N / 50K			
11	BR209651	CAP. PLST 910P 400 F			
12	BR385360	CAP. PLST 220P 400 F			
13	BR359696	CAP. PLST 1N6 250 F			
14	BR359661	CAP. PLST 680P 400 F			
15	235010-001	CAP. ELC 1U0 / 25M			C14, C15
18	200352-001	DIODE 1N4148			CR1, CR2
20	235039-027	TUBE, FERRITE Ø6/Ø3X20MM			E1, E2, E3
22	200764-002	CONN SMB RECP 50R			J1
23	224533-124	CONN. DOUBLE ROW 2X12PIN			J2
25	200730-003	COIL, RF			L1, L2, L3, L6, L7
26	BR478423	COIL, CHOKE 1U8 J			L4, L5
27	200413-013	COIL, RT 6,8UH			L8
30	BR373575	TRANS. UHF BFR 96 SI-N SUT			Q1
32	235004-097	RES FILM 10K / 0.5 J			R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19
33	235004-105	RES FILM 22K / 0.5 J			R20, R21
34	235004-073	RES FILM 1K0 / 0.5 J			R22, R23, R27, R29
35	235004-039	RES FILM 39R / 0.5 J			R24
36	235004-077	RES FILM 1K5 / 0.5 J			R25, R26
37	235004-057	RES FILM 220R / 0.5 J			R28
38	235004-042	RES FILM 51R / 0.5 J			R30, R31, R32
39	235004-043	RES FILM 56R / 0.5 J			R33, R34, R35, R36
40	207435-105	IC, --74AC283, 48 ADDER			U1, U2, U3, U4, U5
41	207437-115	IC, --74ACT374, FLIP-FLOP			U6
42	207425-115	IC, --74ACT174, FLIP-FLOP			U7, U8, U11, U12
43	207443-055	IC, 16KX88 EPROM			U9, U10
44	235166-001	IC, DAC 12-BIT VIDEO			U13

TERMA Elektronik AS
 FSCM R0567
 Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE: DDS ASSY A1A1
 DOCUMENT NO: 210662-001
 REV: E
 SHEET NO: 1 OF 2

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

LINE REV	REFERENCE DESIGNATION	BIN	PREP NO.	NOMENCLATURE	ITEM OR DOCUMENT NUMBER	CL NO.	U M	QTY RQD	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
				IC, --74F74PC	200388-066	24	ST	1,000						U14	
				IC, LM320T- 5.0V	203520-016	24	ST	1,000						U15	
				DIODE ZENER 18V /0.5W J	203527-022	23	ST	1,000						VR1	
				DIODE ZENER 5V6/0.5W J	203527-010	23	ST	1,000						VR2	
				COAX CABLE ASSY A1A1W1	210677-001	37	ST	1,000						W1	
				LABEL, ADHESIVE, ESD	214073-004	48	ST	1,000							C
				***** BILL OF DOCUMENTATION *****											
				WORKMANSHIP		AS									
				DDS ASSY A1A1	201350										
				DDS ASSY A1A1	210662	PD									
				ESD, PROTECTION & MARKING	210662	EC									
				***** NEXT ASSY *****		AS									
				SYNTHESIZER A1, FAST	BR498629		ST	1,000							

TERMA Elektronik AS
 FSCM R0567
 Hovmarken 4, DK-8520 Lystrup, Denmark

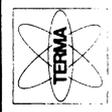
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TITLE: DDS ASSY A1A1
 DOCUMENT NO.: 210662-001
 REV: E
 SHEET NO.: 2 OF 2

Parts List

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PARTS LIST PER... 95/01/02

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	SI	31	BR492809	PWB, STANDARD USC A2	3			C1,C4,C6,C27,C30,C45,C47,C50,C52,C53,C54	
2	11,000	SI	22	BR450529	CAP. ELEC 6U8 25 M	4				
3	1,000	SI	22	BR450898	CAP. PLST 330N 63 J MET	4			C2	
4	1,000	SI	22	BR448850	CAP. PLST 2N2 160 H	4			C3	
5	2,000	SI	22	202542-102	CAP. CER 100P / 100G	4			C5,C11	E3
6	8,000	SI	22	BR358959	CAP. CER. 1N0 100 K	4			C7,C14,C15,C20,C22,C28,C38,C44	
7	1,000	SI	22	BR357480	CAP. CER. 22P 100 G N150	4			C35	A2
8	1,000	SI	22	BR357545	CAP. CER. 68P 100 C N150	4			C36	A2
9	1,000	SI	22	BR390224	CAP. CER. 470P 100 K HI-K	4			C10	
10	6,000	SI	22	BR357634	CAP. CER. 2N2 100 K HI-K	4			C12,C23,C24,C83,C84,C85	
11	27,000	SI	22	BR450510	CAP. CER. 100N 63 S	4			C17,C21,C26,C37,C46,C49,C55,C56,C57,C58,C59,C60,C61,C62,C63,C64,C65,C66,C67,C68,C69,C70,C71,C72,C73,C75,C76	
12	1,000	SI	22	BR451053	CAP. ELEC 68U 6,3 M	4			C18	
13	1,000	SI	22	BR357510	CAP. CER. 39P 100 G N150	4			C19	
14	2,000	SI	22	BR209570	CAP. PLST 47N 250 K	4			C25,C32	
15	1,000	SI	22	BR448885	CAP. PLST 4N7 160 H	4			C29	
16	1,000	SI	22	BR448877	CAP. PLST 3N3 160 H	4			C31	
17	1,000	SI	22	BR209554	CAP. PLST 10N 250 K	4			C33	
18	1,000	SI	22	BR450804	CAP. PLST 3N 160 F	4			C34	
19	3,000	SI	22	BR450812	CAP. PLST 1N 160 J	4			C39,C42,C43	
20	1,000	SI	22	BR450820	CAP. PLST 220P 630 J	4			C40	
21	1,000	SI	22	BR357650	CAP. CER. 22N 63 A HI-K	4			C41	
22	1,000	SI	22	BR450839	CAP. PLST 560P 160 J	4			C48	
23	1,000	SI	22	BR357596	CAP. CER. 150P 100 G N150	4			C51	
24	1,000	SI	22	BR357499	CAP. CER. 27P 100 G N150	4			C74	
25	1,000	SI	22	BR450359	CAP. ELEC 1U 25 M	4			C81	
26	1,000	SI	22	BR459410	CAP. ELEC 10U 10 M	4			C82	
27	1,000	SI	23	BR451061	DIO CAP. BB 405B SI 2-17PF	4			CRI	
28	9,000	SI	23	200352-001	DIODE 1N4148	4			CR4,CR5,CR6,CR7,CR10,CR11,CR12,CR13,CR14	E3
29	2,000	SI	23	BR405531	DIO CAP. BB204B SI 37-42PF	4			CR8,CR9	



TERMA Elektronik AS

FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE:
STANDARD OCXO

A2

DOCUMENT NO:

BR460354
(460354)

REV:

E5

SHEET NO:

1 OF 5

Parts List

PRINTED..... 95/01/03
PARTS LIST PER.. 95/01/02

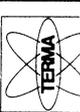
FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
30	5,000	SI	51	BR458694	SCREW M 2,5X 5 CHM CU SN	4			H1	
31	2,000	SI	25	BR450065	COIL, ACCESS SCREEN, CAN	4			H2	
32	2,000	SI	53	BR380105	WASHER, FLAT Ø 3MM CU SN M	4			H3	D
33	2,000	SI	52	BR327506	NUT M 3 M CU SN	4			H4	
34	2,000	SI	31	200764-002	CONN SMB RECP 50R	4			J1, J2	E5
35	1,000	SI	31	BR477052	CONN MOLEX 6P MALE	4			J3	
36	1,000	SI	25	BR454524	COIL M 3000 A2 L1	1			L1	
37	2,000	SI	25	BR450405	COIL, CHOKE OU68 K	4			L2, L3	
38	3,000	SI	25	BR334343	COIL, CHOKE 1U0 K	4			L4, L8, L9	
39	2,000	SI	25	BR363294	COIL, CHOKE 47U J	4			L5, L17	
40	2,000	SI	25	BR375330	COIL, CHOKE OU22 K	4			L6, L7	
41	6,000	SI	25	BR363944	COIL, CHOKE HF WIDE BAND	4			L10, L11, L12, L13, L14, L21	
42	1,000	SI	25	BR450413	COIL, CHOKE 1M0 K	4			L16	
43	1,000	SI	25	BR454532	COIL M 3000 A2 L18	1			L18	
44	1,000	SI	25	BR450774	COIL, CHOKE 33U K	4			L19	
45	1,000	SI	25	BR450782	COIL, CHOKE 82U K	4			L20	
46	1,000	SI	25	BR450766	COIL, CHOKE 27U J	4			L22	
47	1,000	SI	41	BR471143	REAR PLATE A 2	1			MP1	
48	1,000	SI	45	BR448095	RETAINER, PC 5X5X109 MM	3			MP2	E2
49	2,000	SI	41	210341-001	THUMBSCREW	3			MP3	A1
50	1,000	SI	31	BR459356	CONTACT SPRING 1 A2-3-4	1			MP5	A1
51	1,000	SI	31	BR459364	CONTACT SPRING 2 A1-2-3-4	1			MP4	
52	1,000	SI	31	BR493910	JUMPER 0,1" 2P FEMALE	4			P2	
53	1,000	SI	26	BR399914	TRANS. JFEIN J 309 IO-92	4			Q1	
54	2,000	SI	26	BR359157	TRANS. LOPOW BC307B SI-P I	4			Q2, Q13	
55	6,000	SI	26	BR451274	TRANS. LOPOW MPS2369 SI-N	4			Q3, Q7, Q15, Q16, Q18, Q19	
56	2,000	SI	26	BR451320	TRANS. LOPOW 2N3906 SI-P I	4			Q4, Q5	
57	5,000	SI	26	BR273899	TRANS. LOPOW BC 547B SI-N	4			Q6, Q10, Q12, Q14, Q17	
58	1,000	SI	26	BR451290	TRANS. JFEIP 2N5460 IO-92	4			Q8	
59	1,000	SI	26	BR389730	TRANS. JFEIN J-211-18	4			Q9	
60	1,000	SI	26	BR451312	TRANS. LOPOW BF 199 SI-N I	4			Q11	
61	16,000	SI	21	BR240400	RES CARB. 1K0 1/4J SFR25	4			R1, R2, R30, R46, R50, R73, R79, R80, R84, R90, R91, R92, R99, R100, R105, R107	C
62	2,000	SI	21	BR240451	RES CARB. 2K2 1/4J SFR25	4			R3, R108	
63	3,000	SI	21	BR240125	RES CARB. 22K 1/4J SFR25	4			R4, R31, R88	

TITLE: STANDARD OCXO A2

DOCUMENT NO: BR460354

REV: E5

SHEET NO: 2 OF 5

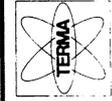


TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

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PARTS LIST PER... 95/01/02

FIND NO.	QTY REQ	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
64	1,000	ST	21	BR376515	RES FILM 3K65 0,6F	MRS25			R5	
65	3,000	ST	21	BR349569	RES FILM 6K81 0,6F	MRS25			R6,R66,R67	
66	3,000	ST	21	BR349526	RES FILM 4K75 0,6F	MRS25			R7,R9,R10	
67	2,000	ST	21	BR349623	RES FILM 10K0 0,6F	MRS25			R8,R13	
68	1,000	ST	21	BR488283	RES FILM 53K6 0,6F	MRS25			R11	
69	1,000	ST	21	BR349518	RES FILM 39K2 0,6F	MRS25			R12	
70	1,000	ST	21	BR349496	RES FILM 100K 0,6F	MRS25			R14	
71	1,000	ST	21	BR240281	RES CARB. 270R 1/4J	SFR25			R15	
72	2,000	ST	21	BR444871	RES FILM 27K4 0,6F	MRS25			R16,R18	
73	1,000	ST	21	BR349666	RES FILM 1K00 0,6F	MRS25			R19	
74	7,000	ST	21	BR328545	RES CARB. 220R 1/4J	SFR25			R20,R23,R32,R33,R37,R87, R89	
75	4,000	ST	21	BR240338	RES CARB. 390R 1/4J	SFR25			R21,R22,R35,R36	
76	3,000	ST	21	BR240516	RES CARB. 4K7 1/4J	SFR25			R24,R106,R110	
77	2,000	ST	21	BR240494	RES CARB. 3K9 1/4J	SFR25			R25,R86	
78	1,000	ST	21	BR240273	RES CARB. 240R 1/4J	SFR25			R26	
79	1,000	ST	21	BR363251	RES CARB. 39R 1/4J	SFR25			R27	
80	1,000	ST	21	BR359572	RES CARB. 110R 1/4J	SFR25			R28	
81	5,000	ST	21	BR240362	RES CARB. 560R 1/4J	SFR25			R29,R34,R39,R76,R83	
82	1,000	ST	21	BR240257	RES CARB. 180R 1/4J	SFR25			R38	
83	13,000	ST	21	BR240567	RES CARB. 10K 1/4J	SFR25			R40,R42,R44,R54,R64,R78, R82,R95,R97,R98,R101,R102, R104	
84	3,000	ST	21	BR240540	RES CARB. 6K8 1/4J	SFR25			R41,R51,R96	
85	2,000	ST	21	BR240605	RES CARB. 15K 1/4J	SFR25			R43,R74	
86	1,000	ST	21	BR372137	RES CARB. 20K 1/4J	SFR25			R45	
87	5,000	ST	21	BR240478	RES CARB. 2K7 1/4J	SFR25			R47,R48,R75,R77,R93	
88	8,000	ST	21	BR451096	RES FILM 4K75 1/4D	MPR24			R52,R53,R55,R56,R57,R58, R60,R70	
89	1,000	ST	21	BR349593	RES FILM 2K74 0,6F	MRS25			R59	
90	1,000	ST	21	BR451118	RES FILM 560R 1/4D				R61	
91	1,000	ST	21	BR451126	RES FILM 10K0 1/4D				R62	
92	1,000	ST	21	BR240583	RES CARB. 12K 1/4J	SFR25			R63	
93	1,000	ST	21	BR349607	RES FILM 18K2 0,6F	MRS25			R65	
94	1,000	ST	21	BR365831	RES CARB. 680K 1/4J	SFR25			R68	
95	1,000	ST	21	223813-310	RES FILM 12K4 / 0.25B				R69	E4



TERMA Elektronik AS

FSCM R0567
Hovmarken 4, DK-8520 Lysstrup, Denmark

TITLE:
STANDARD OCXO

A2

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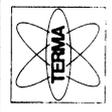
REV:
E5

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Parts List

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PARTS LIST PER... 95/01/02

FIND NO.	QTY REQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
96	1,000	ST	21	BR372110	RES FILM 19K6 0.6F MRS25	4			R71	
97	1,000	ST	21	BR436879	RES SEMIV 20K 3/4K GERM	4			R72	
98	1,000	ST	21	BR240222	RES CARB. 100R 1/4J SFR25	4			R81	
99	1,000	ST	21	BR240214	RES CARB. 82R 1/4J SFR25	4			R85	
100	1,000	ST	21	BR240346	RES CARB. 470R 1/4J SFR25	4			R94	
101	1,000	ST	21	BR240656	RES CARB. 33K 1/4J SFR25	4			R109	
102	1,000	ST	21	BR368598	RES SEMIV 500R 1/2K GERM	4			R111	A1
103	3,000	ST	31	BR231304	TERMINAL STUD 2.5X7 Ø1.3	4			TP	E
104	4,000	ST	24	BR488143	IC DGTL 74HC163 BIN.COUN	4			U1,U2,U13,U14	
105	4,000	ST	24	BR488089	IC DGTL 74HCT 74 2X D-FF	4			U3,U15,U18,U36	
106	1,000	ST	24	BR451231	IC LIN LM 723C VOLT REGL.	4			U5	
107	3,000	ST	24	203809-003	IC, LF 356N	4			U6,U19,U20	E3
108	1,000	ST	24	BR488763	IC DGTL 74HC1393 2XBIN.CO	4			U7	
109	1,000	ST	24	BR488003	IC DGTL 74HCT 00 4X2IN NA	4			U9	
110	1,000	ST	24	BR450375	IC DGTL 10116P ECL BUFFER	4			U10	
111	1,000	ST	24	BR357898	IC DGTL 74S112 2X JK-FF	4			U11	
112	1,000	ST	24	BR451177	IC DGTL 74LS290N DEC.COUN	4			U12	
113	1,000	ST	24	BR433535	IC DGTL 74LS04 6XINVERTER	4			U16	
114	1,000	ST	24	BR451258	IC LIN LM 2901N VOLT COMP	4			U17	
115	1,000	ST	24	BR451266	IC LIN LM 301A OP.AMP.	4			U21	
116	1,000	ST	24	BR451215	IC LIN DAC-08EN D/A CONV.	4			U22	
117	1,000	ST	24	BR451304	IC LIN LM 3046N TRANS.ARR	4			U23	
118	1,000	ST	24	BR488127	IC DGTL 74HCT138 3-8 DECO	4			U24	
119	1,000	ST	24	BR488011	IC DGTL 74HCT 02 4X2IN ND	4			U25	
120	1,000	ST	24	BR488755	IC DGTL 74HCT365 6XBUSDRI	4			U27	
121	2,000	ST	24	BR488224	IC DGTL 74HCT377 8X D-FF	4			U28,U29	
122	3,000	ST	24	BR488704	IC DGTL 74HCT175 4X D-FF	4			U30,U31,U34	
123	3,000	ST	24	BR490156	IC DGTL 74HCT283 4BIT ADD	4			U32,U33,U35	
124	2,000	ST	24	BR451150	IC DGTL 74LS669N U/D CJUN	4			U37,U38	
125	1,000	ST	24	BR375349	IC LIN 78L05 VOLT REGL.	4			U39	
126	1,000	ST	23	BR451223	DIO ZEN. 8ZX792V4 2.4V	4			VR2	E3
127	2,000	ST	23	203527-010	DIODE ZENER 5V6/0.5W J	4			VR3,VR4	A3
128	0,030	M	32	200843-010	WIRE COP TIN-CID Ø0.5 MM	4			W1	
129	1,000	ST	33	BR216070	FUSE ACCESS CLIPS	4			XY1	
130	2,000	ST	31	BR486825	CONN 1P FEMALE	4			XY1	
131	1,000	ST	20	BR496189	CRYSTAL 73.60000MHZ HC42-	3			Y1	



TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE:
STANDARD DCXO A2

DOCUMENT NO.: BR 460354
REV: E5

SHEET NO.: 4 OF 5

Parts List

PRINTED..... 95/01/03
PARTS LIST PER., 95/01/02

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	SI	37	BR487880	PWB, IF MODULE SE4010 A3	3			C1, C60, C78, C80	E2
2	4,000	SI	22	202542-102	CAP. CER 100P / 100G	4			C2, C3, C4, C9, C10, C15, C18,	
3	23,000	SI	22	BR357642	CAP. CER. 10N 100 S HI-K	4			C20, C22, C24, C31, C32, C33,	
									C34, C35, C36, C37, C38, C39,	
									C42, C89, C102, C104	
4	6,000	SI	22	BR358959	CAP. CER. 1N0 100 K	4			C5, C40, C41, C43, C44, C85	
5	8,000	SI	22	BR450359	CAP. ELEC 1U 25 M	4			C6, C7, C8, C29, C30, C86, C87,	
									C88	
6	7,000	SI	22	BR357510	CAP. CER. 39P 100 G N150	4			C11, C12, C13, C14, C52, C57,	
									C79	
8	2,000	SI	22	BR385654	CAP. SEM 10P TEFLON	4			C17, C21	
9	1,000	SI	22	BR351356	CAP. CER. 2P2 500 C N750	4			C19	
10	1,000	SI	22	BR357383	CAP. CER. 3P9 100 C N150	4			C23	
11	1,000	SI	22	BR436968	CAP. CER. 100P 100 G N750	4			C25	
12	1,000	SI	22	BR357553	CAP. CER. 82P 100 C N150	4			C26	
13	7,000	SI	22	BR357480	CAP. CER. 22P 100 G N150	4			C27, C50, C54, C55, C65, C76,	
									C81	
14	5,000	SI	22	BR459410	CAP. ELEC 10U 10 M	4			C28, C95, C98, C99, C100	
15	1,000	SI	22	BR357421	CAP. CER. 8P2 100 C N150	4			C45	
16	1,000	SI	22	BR357502	CAP. CER. 33P 100 G N150	4			C46	
17	1,000	SI	22	BR488895	CAP. CER 1P8 100 C NPO	4			C47	
18	2,000	SI	22	BR366617	CAP. CER. 15P 100 G NPO	4			C48, C64	
19	1,000	SI	22	BR484946	CAP. CER. 4P7 100C N750	4			C49	
20	1,000	SI	22	BR385646	CAP. CER. 2P7 100 C P100	4			C51	
21	3,000	SI	22	BR202797	CAP. SEM 18P PLST.FOIL	4			C53, C56, C63	
22	2,000	SI	22	BR357537	CAP. CER. 56P 100 C N150	4			C58, C59	
23	1,000	SI	22	BR357588	CAP. CER. 120P 100 G N150	4			C61	
24	1,000	SI	22	BR357545	CAP. CER. 68P 100 C N150	4			C62	
25	14,000	SI	22	BR488909	CAP. PLST 220N 63 K	4			C66, C67, C68, C69, C71, C72,	
									C73, C74, C75, C82, C83, C84,	
									C101, C103	
									C70	
26	1,000	SI	22	BR450529	CAP. ELEC 6U8 25 M	4			C77	
27	1,000	SI	22	BR357499	CAP. CER. 27P 100 G N150	4			C90, C91, C92	
28	3,000	SI	22	BR459534	CAP. PLST 100N 63 M	4			C93, C94, C96, C97	
29	4,000	SI	22	BR491381	CAP. ELEC 10U 25 M	4				

TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE: IF MODULE A3

DOCUMENT NO: BR487899

REV: F1

SHEET NO: 1 OF 5

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

FIND NO.	QTY REQ	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
30	6,000	SI	23	BR 430681	DIO SCHOT BAT 83 SI 60V	4			CR1,CR2,CR18,CR19,CR22,CR23	
31	2,000	SI	23	BR 358614	DIO SWITCH BA 482 SI 100MA	4			CR3,CR4	
32	2,000	SI	23	BR 387649	DIO PIN BA 389 SORTERET	1			CR5,CR6	E2
33	11,000	SI	23	200352-001	DIODE 1N4148	4			CR7,CR8,CR9,CR10,CR11,CR12,CR13,CR14,CR15,CR20,CR21	
34	2,000	SI	23	BR 358592	DIO PIN BA 389 FRASORT.	1			CR16,CR17	
35	7,000	SI	25	BR 375314	COIL, ACCESS FERRITCORE	4			E1,E2,E3,E4,E5,E6,E7	
36	1,000	SI	20	BR 489263	FILTER, XTAL 75MHZ 20KHZ-2	3			FL1	
37	5,000	SI	51	BR 458694	SCREW M 2,5X 5 CHM CU SN	4			H1	
38	4,000	SI	31	200764-002	CONN SMB RECP 50R	4			J1,J2,J3,J4	F1
39	2,000	SI	25	BR 389609	COIL, CHOKE 47U K	4			L1,L34	
40	5,000	SI	25	BR 488887	COIL, CHOKE 22U K	4			L2,L3,L14,L15,L16	
41	9,000	SI	25	BR 394335	COIL, CHOKE 0U1 K	4			L4,L5,L6,L7,L21,L22,L23,L26,L27	
43	2,000	SI	25	BR 484636	COIL, CHOKE 68U K	4			L9,L10	
44	1,000	SI	25	200413-015	COIL, RF 470N	4			L11	F
45	1,000	SI	25	BR 488976	COIL SE4010 A3 L12	1			L12	
46	3,000	SI	25	BR 394343	COIL, CHOKE 1U0 K	4			L13,L17,L18	
47	1,000	SI	25	BR 478717	COIL, CHOKE 0U18 J	4			L19	
48	6,000	SI	25	BR 393967	COIL, CHOKE 0U15 K	4			L20,L24,L25,L30,L33,L44	
49	2,000	SI	25	BR 375330	COIL, CHOKE 0U22 K	4			L28,L35	
50	5,000	SI	25	BR 450405	COIL, CHOKE 0U68 K	4			L8,L29,L32,L38,L42	C
51	2,000	SI	25	BR 463523	COIL, CHOKE 1U5 K	4			L31,L40	
52	4,000	SI	25	BR 450790	COIL, CHOKE U56 K	4			L36,L37,L39,L41	
53	3,000	SI	25	BR 482935	COIL, CHOKE 100U K	4			L45,L46,L48	
54	1,000	SI	25	BR 364231	COIL, CHOKE 22U K	4			L47	
55	1,000	SI	25	BR 448950	COIL, CHOKE 100U K	4			L49	
56	1,000	SI	35	BR 489328	SHIELD CAN SE4010 A3	1			MP1	
57	1,000	SI	35	BR 489336	SHIELD CAN SE4010 A3	1			MP2	E1
58	2,000	SI	41	210841-001	THUMBSCREW	3			MP3	
59	1,000	SI	45	BR 448095	RETAINER, PC 5X5X109 MM	3			MP4	
60	2,000	SI	31	BR 459356	CONTACT SPRING 1 A2-3-4	1			MP5	D
61	1,000	SI	31	BR 459364	CONTACT SPRING 2 A1-2-3-4	1			MP6	
62	1,000	SI	41	BR 489352	REAR PLATE A 3 SE4010	1			MP7	

TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark



TITLE: IF MODULE A3
DOCUMENT NO.: BR 487899
REV: F1
SHEET NO.: 2 OF 5

Parts List

PRINTED..... 95/01/03
 PARTS LIST PER... 95/01/02

LINE REV	REFERENCE DESIGNATION	BIN	PREP NO.	T	NOMENCLATURE	ITEM OR DOCUMENT NUMBER	CL NO.	U M	QTY RQD
	MP8			1	SCREEN SE4010 A3	BR496855	48	SI	1,000
	MP9			1	SCREEN SE4010 A3	BR496863	48	SI	1,000
	MP10			1	SCREEN SE4010 A3	BR496871	48	SI	1,000
	MP11			1	SCREEN CAN SE4010 A3	BR496898	48	SI	1,000
	Q1,Q4,Q5			4	TRANS.JFETN J 309 TO-92	BR399914	26	SI	3,000
	Q2,Q3,Q7,Q8,Q10,Q16,Q18,			4	TRANS.LOPOH BC 547B SI-N	BR273899	26	SI	11,000
	Q19,Q20,Q22,Q23			4	TRANS.UHF BFR 96 SI-N SUT	BR373575	26	SI	4,000
	Q6,Q12,Q14,Q17			4	TRANS.LOPOH BC307B SI-P I	BR359157	26	SI	6,000
	Q9,Q11,Q13,Q15,Q24,Q25			4	TRANS.LOPOH BC 337 SI-N I	BR385921	26	SI	1,000
	Q21			4	RES CARB. 510K 1/4J SFR25	BR240354	21	SI	2,000
	R1,R59			4	RES CARB. 100K 1/4J SFR25	BR240745	21	SI	8,000
	R2,R5,R6,R32,R34,R35,R104,			4	RES CARB. 2K2 1/4J SFR25	BR240451	21	SI	4,000
	R105			4	RES CARB. 1K0 1/4J SFR25	BR240400	21	SI	1,000
	R3,R117,R121,R122			4	RES CARB. 22K 1/4J SFR25	BR240621	21	SI	6,000
	R4			4	RES CARB. 56K 1/4J SFR25	BR240702	21	SI	5,000
	R7,R16,R41,R82,R96,R106			4	RES FILM 27K4 0,6F MRS25	BR444871	21	SI	3,000
	R8,R15,R40,R83,R108			4	RES FILM 750R 0,6F MRS25	BR390232	21	SI	1,000
	R9,R56,R109			4	RES CARB. 100R 1/4J SFR25	BR240222	21	SI	10,000
	R10			4	RES CARB. 10K 1/4J SFR25	BR240567	21	SI	7,000
	R11,R36,R37,R38,R42,R50,			4	RES CARB. 1K5 1/4J SFR25	BR240427	21	SI	2,000
	R107,R110,R114,R126			4	RES CARB. 51R 1/4J SFR25	BR240192	21	SI	6,000
	R12,R13,R39,R101,R112,			4	RES CARB. 300R 1/4J SFR25	BR240303	21	SI	4,000
	R113,R120			4	RES CARB. 18R 1/4J SFR25	BR240117	21	SI	2,000
	R14,R119			4	RES FILM 147R 0,6F MRS25	BR393401	21	SI	1,000
	R17,R18,R22,R23,R74,R75			4	RES CARB. 330R 1/4J SFR25	BR240311	21	SI	2,000
	R19,R21,R79,R88			4	RES CARB. 82R 1/4J SFR25	BR240214	21	SI	1,000
	R20,R118			4	RES CARB. 1K1 1/4J SFR25	BR359580	21	SI	3,000
	R24			4	RES CARB. 12R 1/4J SFR25	BR363030	21	SI	3,000
	R25,R28			4	RES CARB. 200R 1/4J SFR25	BR240265	21	SI	4,000
	R26			4	RES CARB. 680R 1/4J SFR25	BR240389	21	SI	1,000
	R27,R71,R72			4	RES FILM 68K1 0,6F MRS25	BR366501	21	SI	1,000
	R29,R30,R73			4	RES FILM 11K3 0,6F MRS25	BR488836	21	SI	1,000
	R31,R70,R80,R93			4					
	R33			4					
	R43			4					
	R44			4					

TERMA Elektronik AS
 FSCM R0567
 Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE: IF MODULE A3
 DOCUMENT NO: BR487899
 REV: F1
 SHEET NO: 3 OF 5

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

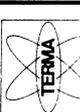
FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
131	1,000	ST	21	BR479284	RES FILM 2K61 0,6F MRS25	4			R127	
132	1,000	ST	21	BR371432	RES FILM 9K09 0,6F MRS25	4			R128	
133	1,000	ST	25	BR488984	TRAFO A3T1 SE4010	1			T1	
134	1,000	ST	25	BR488992	TRAFO A3T2-A4T1 SE4010	1			T2	E
135	9,000	ST	31	BR231304	TERMINAL STUD 2,5X7 Ø1,3	4			TP	
136	2,000	ST	24	BR479543	IC LIN LM 358N OP.AMP.	4			U1,U5	
137	2,000	ST	24	BR488828	IC HYBRID HPF 505 BAL.MIX	4			U2,U4	
138	1,000	ST	24	BR450294	IC LIN TL 082CP OP.AMP.	4			U3	
139	1,000	ST	24	BR488216	IC DGIL 74HCI374 8X D-FF	4			U7	
140	1,000	ST	24	BR488194	IC DGIL 74HCI367 6XBUSDRI	4			U8	
141	2,000	ST	24	BR488127	IC DGIL 74HCI138 3-8 DECO	4			U9,U10	
142	1,000	ST	23	203527-010	DIODE ZENER 5V670,5W J	4			VR1	E2
143	0,100	M	32	200843-010	WIRE COP TIN-CID Ø0,5 MM	4			W	B1
144	1,000	ST	37	BR488933	COAX CA ASSY - - 164MM	3			W1	
145	1,000	ST	37	BR488941	COAX CA ASSY - - 106MM	3			W2	
146	1,000	ST	37	BR488968	COAX CA ASSY - - 164MM	3			W3	
147	0,004	M	32	BR220140	FLEX SILICONE 0,5/1 TRAN	4			C105	A1
148	1,000	ST	22	BR385530	CAP. CER. 3P3 100 C NPO	4			R129	B
149	1,000	ST	21	BR490504	RES FILM 10R0 0,5JSFR16T	4			C106	C
150	1,000	ST	22	BR357472	CAP. CER. 18P 100 G N150	4				D1
151	0,016	ST	35	221545-001	SHIELD, STICKY FINGER	4				D2
152	1,000	ST	48	214073-004	LABEL, ADHESIVE, ESD	2				E3
153	0,100	ML	76	205254-001	ADHESIVE SILICONE, RTV	4				
***** BILL OF DOCUMENTATION *****										
WORKMANSHIP										
IF MODULE A3										
IF MODULE A3										
IF-MODUL A3 SE4010										
***** NEXT ASSY *****										
SE4010										
1										

DOCUMENT NO.: BR487899 (487899)

REV: F1

SHEET NO.: 5 OF 5

TITLE: IF MODULE A3



TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

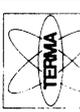
Parts List

PRINTED..... 95/01/03
PARIS LIST PER... 95/01/02

FIND NO.	QTY REQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	ST	37	BR489506	PWB,WIDE BAND AMPL. SE401	3				
2	8,000	ST	22	BR488909	CAP. PLST 220N 63 K	4			C1,C2,C5,C6,C7,C8,C9,C10	
3	5,000	ST	22	BR357642	CAP. CER. 10N 100 S HI-K	4			C3,C4,C12,C13,C15	
4	1,000	ST	22	BR450863	CAP. PLST 10N 400 J	4			C11	
5	1,000	ST	22	BR489379	CAP. ELEC 470U 40M	4			C14	
6	1,000	ST	22	BR479330	CAP. ELEC 4U7 25 M	4			C16	
7	1,000	ST	22	BR450359	CAP. ELEC 1U 25 M	4			C17	
8	1,000	ST	22	BR358959	CAP. CER. 1N0 100 K	4			C18	
9	2,000	SI	23	BR480681	DIO SCHOTI BAT 83 SI 60V	4			CR1,CR2	
10	2,000	SI	56	BR364266	TRANS.ACCESS F/BC177B	4			H1	
11	5,000	SI	56	BR200379	SPACER Ø3/5X4MM	3			H2	
12	5,000	SI	51	BR327174	SCREW M 3 X12 CHM CU SN	4			H3	
15	2,000	SI	51	BR276758	SCREW M 2 X 6 CHM CU SN	4			H6	D
16	1,000	SI	45	201197-049	STRAP, CABLE, NAT Ø20X2.5	4			H7	F1
17	5,000	SI	51	BR321494	SCREW M 3 X 5 CHM CU SN	4			H8	E1
18	4,000	SI	51	BR276804	SCREW M 3 X 8 CHM CU SN	4			H9	
19	1,000	SI	31	BR368296	COAX CGNN BNC FEM-GH-ISO	4			J1	
20	1,000	SI	25	BR438887	COIL,CHOKE 22U K	4			L1	
21	2,000	SI	25	BR364231	COIL,CHOKE 22U K	4			L2,L3	
22	1,000	SI	46	BR489441	BRACKET F-CUNN SE4010 A4	1			MPI	
23	1,000	SI	56	BR439468	HEATSINK SE4010 A4	2			MP2	
24	1,000	SI	41	BR489476	SCREEN CAN SE4010 A4	1			MP3	
25	1,000	SI	56	BR497304	BACK-SPACE RETRO SE4010 A	1			MP4	
26	1,000	SI	46	BR497312	BRACKET RETRO SE4010 A4	1			MP5	
27	2,000	SI	26	BR273899	TRANS-LOPOW BC 547B SI-N	4			Q1,Q2	
28	2,000	SI	26	BR273910	TRANS-LOPOW BC 177 SI-P T	4			Q3,Q5	
29	1,000	SI	26	BR361291	TRANS-HIPOW BLY 91A SI-N	4			Q4	
30	1,000	SI	26	BR361305	TRANS-HIPOW BLY 92A SI-N	4			Q6	
31	3,000	SI	21	BR240222	RES CARB. 100R 1/4J SFR25	4			R1,R29,R32	
32	2,000	SI	21	BR240621	RES CARB. 22K 1/4J SFR25	4			R2,R34	
33	1,000	SI	21	BR324175	RES CARB. 36K 1/4J SFR25	4			R3	
34	1,000	SI	21	BR240567	RES CARB. 10K 1/4J SFR25	4			R4	
35	2,000	SI	21	BR240397	RES CARB. 820R 1/4J SFR25	4			R5,R6	
36	3,000	SI	21	BR324213	RES CARB. 3K0 1/4J SFR25	4			R7,R8,R9	
37	1,000	SI	21	BR240214	RES CARB. 82R 1/4J SFR25	4			R10	
38	2,000	SI	21	BR361992	RES CARB. 68R 1/4J SFR25	4			R11,R12	

DOCUMENT NO: BR497290
REV: F3
SHEET NO: 1 OF 3

TITLE: WIDE BAND AMPLIFIER A4



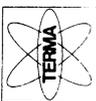
TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTET..... 95/01/03
PARTS LIST PER.. 95/01/02

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
39	2,000	ST	21	BR489387	RES CARB. 36R 0,4J SFR25	4			R13,R14	
40	6,000	ST	21	BR324221	RES CARB. 2K4 1/4J SFR25	4			R15,R16,R17,R18,R19,R36	
41	1,000	ST	21	BR240206	RES CARB. 56R 1/4J SFR25	4			R20	
42	1,000	ST	21	BR240419	RES CARB. 1K2 1/4J SFR25	4			R21,R22,R23	
43	5,000	ST	21	BR240125	RES CARB. 22R 1/4J SFR25	4			R24,R25,R26,R27,R28	
44	1,000	ST	21	BR366501	RES FILM 68K1 0,6F MRS25	4			R30	
45	1,000	ST	21	BR349518	RES FILM 39K2 0,6F MRS25	4			R31	
46	1,000	ST	21	BR240702	RES CARB. 56K 1/4J SFR25	4			R33	
47	1,000	ST	21	BR240745	RES CARB. 100K 1/4J SFR25	4			R35	
48	1,000	ST	25	BR488992	TRAF0 A3T2-A4T1 SE4010	1			T1	
49	1,000	ST	25	BR489409	TRAF0 A4T2 SE4010	1			T2	
50	1,000	ST	25	BR489417	TRAF0 A4T3 SE4010	1			T3	
51	1,000	ST	31	BR231304	TERMINAL STUD 2,5X7 Ø1,3	4			TP	E
52	1,000	ST	24	BR479543	IC LIN LM 358N OP-AMP.	4			U1	
53	1,000	ST	24	BR367753	IC LIN LM 311N VOLT COMP.	4			U2	
54	1,000	ST	30	BR489425-001	COAX CABLE	3			W1	F
55	1,000	ST	37	BR489433	MULTICAB ASS W2 SE4010 A4	1			W2	A1
56	0,090	M	32	200843-010	WIRE COP TIN-CTD Ø0.5 MM	4			W3	B
57	1,000	G	78	200799-001	COMPOUND.THERMAL,SILICONE	4				B
58	1,000	ML	76	205254-001	ADHESIVE SILICONE, RTV	4				B
59	1,000	ST	48	214073-004	LABEL, ADHESIVE, ESD	2				B2
60	1,000	ST	21	BR240400	RES CARB. 1K0 1/4J SFR25	4			R37	C
61	5,000	ST	53	BR380105	WASHER,FLAT Ø 3MM CU SN M	4				D
62	1,000	ST	48	234328-002	LABEL, BERYLLIUMOXID	3				F3
***** BILL OF DOCUMENTATION *****										
1001			AS	201350	WORKMANSHIP					
1002			PD	BR497290	WIDE BAND AMPLIFIER A4 RE					
1003			EC	BR497290	WIDE BAND AMPLIFIER A4 RE					
1004			EB	BR497290	WIDE BAND AMPLIFIER A4 RE					
1005			TP	BRJA4540	WIDE BAND AMP A4 SE4010					
1006			AS	206460	ESD, PROTECTION & MARKING					
1006			AS	201350	WORKMANSHIP					
***** NEXT ASSY *****										
***** DOCUMENT NO.: BR497290 (497290) *****										
***** REV: F3 *****										
***** SHEET NO.: 2 OF 3 *****										

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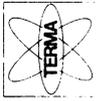


Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

FIND NO.	QTY REQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	SI	37	240733-001	PWB, A5 SE4010	3				H
2	1,000	SI	45	BR448095	RETAINER, PC 5X5X109 MM	3				H2
3	1,000	SI	41	210645-001	REAR PLATE INTERFACE A5	2				
4	5,000	SI	51	202185-003	SCREW M2.5X 5SLTD. CYL. BR5	4				H
5	2,000	SI	41	210841-001	THUMBSCREW	3				G2
6	2,000	S4	31	222836-140	CONN FEMALE SCREW 4-40	4				G1
7	0,040	M	32	200843-009	WIRE COP TIN-CTD Ø0.6 MM	4				
8	3,000	SI	31	206802-002	CONN B-JUMP	4				H
9	2,000	SI	31	232310-003	TERMINAL PIN WRAP	4				H
10	58,000	SI	22	221220-007	CAP. PLAST 100N / 63K	4			C7, C26, C50, C62, C4-5, C12-16, C20-24, C29-32, C37-39, C45-46, C48-49, C52-56, C65-66, C70-76, C82-83, C88-90, C95-100, C102-103, C105-106, C117-118	H
11	1,000	SI	22	202542-011	CAP. CER 27P / 100G	4				F1
12	2,000	SI	22	235010-001	CAP. ELC 1U0 / 25M	4			C19, C77, C101	H
13	20,000	SI	22	221220-003	CAP. PLAST 22N / 63K	4			C1, C2, C3, C6, C9, C33, C34, C43, C47, C51, C57, C59, C61, C63, C64, C69, C78, C85, C86, C91	H
14	4,000	SI	22	235010-006	CAP. ELC 6U8 / 25M	4			C68, C84, C92, C93	
17	1,000	SI	22	221220-005	CAP. PLAST 47N / 63K	4			C87	
18	3,000	SI	22	BR494844	CAP PLST 2N2 M	4			C10, C11, C110	
19	2,000	SI	22	235010-007	CAP. ELC 10U / 25M	4			C108, C109	H
20	4,000	SI	22	221220-001	CAP. PLAST 10N / 63K	4			C104, C120, C35-36	H
21	35,000	SI	23	200352-001	DIODE IN4148	4			CR10, CR12, CR17, CR29, CR31, CR50, CR57, CR59, CR1-2, CR4-8, CR14-15, CR19-20, CR22-25, CR34-35, CR39-40, CR42-45, CR47-48, CR53-54, CR49, CR58, CR62, CR63, CR64, CR65, CR66	H
22	7,000	SI	23	230973-001	DIODE SCHOTTKY 60V/400MA	4				
23	2,000	SI	23	BR228079	DIO SIGN. BAV 10 SI 600MA	4			CR55, CR56	
24	1,000	SI	31	212554-023	CONN D-TYPE 25S/ANGLE	4			J2	G1

TITLE: INTERFACE A5
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TERMA Elektronik AS

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Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTET..... 95/01/03
 PARTS LIST PER... 95/01/02

FIND NO.	QTY REQ	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
25	1,000	ST	31	212654-021	CONN D-TYPE 9S/ANGLE	4			J1	G1
26	3,000	ST	25	200730-003	COIL,RF	4			L1,L2,L3	
27	13,000	ST	26	235036-001	TRANSISTOR, FET BSI70A	4			Q19,Q24,Q30,Q37,Q41,Q1-3, Q26-28,Q32-33	H
28	5,000	ST	26	235032-003	TRANSISTOR, PNP, BC327-25	4			Q4,Q11,Q31,Q38,Q40	H
29	5,000	ST	26	235031-003	TRANSISTOR, NPN, BC547B	4			Q29,Q36,Q5-7	H
30	2,000	ST	26	BR451274	TRANS. LOPOW MPS2369 SI-N	4			Q16,Q18	
31	1,000	ST	26	BR355704	TRANS. DARLN BD 679 SI-N I	4			Q39	
32	14,000	ST	21	235004-121	RES FILM 100K / 0.5 J	4			R3,R6,R10,R15,K42,R44,R46, R51,R69,R74,R78,R94,R144, R152	H
33	36,000	ST	21	235004-097	RES FILM 10K / 0.5 J	4			R4,R11,R14,R66,R92,R104, R106,R123,R126,R150,R155, R183,R190,R196,R199,R7-9, R16-17,R28-29,R36-40, R59-61,R137-138,R227-228, R230-231	H
34	5,000	ST	21	235005-269	RES FILM 5K11 / 0.4 F	4			R12,R55,R160,R164,R166	H
35	9,000	ST	21	235005-301	RES FILM 10K0 / 0.4 F	4			R13,R19,R91,R98,R101,R113, R136,R178,R194	H
36	3,000	ST	21	235005-112	RES FILM 130R / 0.4 F	4			R26,R186,R192	H
37	11,000	ST	21	235004-089	RES FILM 4K7 / 0.5 J	4			R20,R86,R99,R105,R111, R120,R131,R135,R139,R161, R200	
38	2,000	ST	21	235004-091	RES FILM 5K6 / 0.5 J	4			R21,R121	
39	1,000	ST	21	207730-008	RES VAR 5K0 / 0.50K	4			R22	
40	15,000	ST	21	235004-025	RES FILM 10R / 0.5 J	4			R23,R56,R163,R229,R232, R212-214,R218-221, R224-226	H
42	17,000	ST	21	235004-049	RES FILM 100R / 0.5 J	4			R63,R97,R100,R141,R159, R173,R182,R187,R191,R201, R202,R206,R215,R216,R217, R222,R223	H
44	5,000	ST	21	235004-081	RES FILM 2K2 / 0.5 J	4			R89,R90,R115,R133,R169	H
46	14,000	ST	21	235004-073	RES FILM 1K0 / 0.5 J	4			R18,R41,R45,R47,R48,R49, R189,R205,R207,R208,R209,	D

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Parts List

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PARTS LIST PER... 95/01/02

FIND NO.	QTY REQ	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
47	8,000	SI	21	235004-139	RES FILM 560K / 0.5 J	4			R210,R211,R250 R50,R52,R53,R71,R73,R79, R80,R82	
48	1,000	SI	21	235005-285	RES FILM 7K50 / 0.4 F	4			R54	H
49	1,000	SI	21	235004-105	RES FILM 22K / 0.5 J	4			R75	H
51	1,000	SI	21	235005-338	RES FILM 24K3 / 0.4 F	4			R65	H
52	1,000	SI	21	235004-113	RES FILM 47K / 0.5 J	4			R27	H
53	1,000	SI	21	BR457647	RES NETW 9X10K 1/5G	4			R70	H
54	2,000	SI	21	235004-101	RES FILM 15K / 0.5 J	4			R81,R153	
56	2,000	SI	21	235004-057	RES FILM 220R / 0.5 J	4			R125,R203	H
58	1,000	SI	21	235004-117	RES FILM 68K / 0.5 J	4			R30	H
59	1,000	SI	21	235005-325	RES FILM 17K8 / 0.4 F	4			R68	H1
60	1,000	SI	21	235004-129	RES FILM 220K / 0.5 J	4			R188	H1
61	1,000	SI	21	235004-093	RES FILM 6K8 / 0.5 J	4			R195	H1
62	1,000	SI	21	235004-051	RES FILM 120R / 0.5 J	4			R204	H
64	2,000	SI	21	235005-330	BMBRFILM 20K0 / 0.4 F	4			R142,R148	H
65	1,000	SI	21	235005-389	RES FILM 82K5 / 0.4 F	4			R149	H
66	1,000	SI	21	235004-039	RES FILM 39R / 0.5 J	4			R154	G
67	5,000	SI	21	235004-067	RES FILM 560R / 0.5 J	4			R85,R88,R112,R114,R157	
69	2,000	SI	21	235005-309	RES FILM 12K1 / 0.4 F	4			R165,R167	H
70	7,000	SI	21	235005-369	RES FILM 51K1 / 0.4 F	4			R1,R25,R170,R174,R181, R184,R193	H
71	1,000	SI	21	235005-189	RES FILM 825R / 0.4 F	4			R176	H
72	1,000	SI	21	235005-347	RES FILM 30K1 / 0.4 F	4			R177	H
73	2,000	SI	21	235004-107	RES FILM 27K / 0.5 J	4			R31,R179	H
75	1,000	SI	21	235004-069	RES FILM 680R / 0.5 J	4			R33	H
76	4,000	SI	24	BR488747	IC DGTL 74HCT273 8X D-FF	4			U1,U34,U35,U36	
77	1,000	SI	24	221579-001	IC, --75176B, TRANSCEIVER	4			U2	
78	1,000	SI	24	BR462489	IC DGTL 8251A USART	4			U3	
79	1,000	SI	24	213541-095	IC, CD74HC1161E	4			U4	
80	1,000	SI	24	BR404780	IC DGTL 74LS90N DEC.COUNT	4			U5	
81	1,000	SI	24	200464-026	IC, SN74LS04N	4			U6	
82	1,000	SI	24	BR488224	IC DGTL 74HCT377 8X D-FF	4			U7	
83	1,000	SI	24	BR451215	IC LIN DAC-08EN D/A CONV.	4			U8	
84	1,000	SI	24	BR450294	IC LIN TL 082CP OP.AMP.	4			U9	
85	3,000	SI	24	215176-003	IC, --339, COMPARATOR	4			U10,U14,U15	

TITLE:

INTERFACE A5

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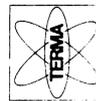
210892-001

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TERMA Elektronik AS

FSCM R0567

Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

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PARTS LIST PER... 95/01/02

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
86	3,000	SI	24	206072-095	IC, --74HCT138	4			U12,U20,U21	
87	1,000	SI	24	207432-026	IC, --74LS245N	4			U13	
88	2,000	SI	24	213289-095	IC, CD74HCT373E	4			U16,U23	
89	1,000	SI	24	BR371076	IC DGTL 74SL33N 13INP.NAN	4			U17	
90	4,000	SI	24	BR488089	IC DGTL 74HCT 74 2X D-FF	4			U18,U27,U39,U40	
91	1,000	SI	24	200463-095	IC, --74HCT02	4			U19	
92	1,000	SI	24	207431-026	IC, SN74LS244N	4			U22	
93	1,000	SI	24	BR478156	IC LIN 0844 A/D CONV.	4			U24	
94	4,000	SI	24	236675-002	IC, TL084, OP. AMP. QUAD	4			U25,U33,U44,U45	
95	1,000	SI	24	BR482676	IC LIN 79L05 VOLT REGL.	4			U26	G3
96	2,000	SI	24	BR488003	IC DGTL 74HCT 00 4X2IN NA	4			U28,U31	
97	1,000	SI	24	BR488038	IC DGTL 74HCT 04 6XINVERT	4			U29	
98	1,000	SI	24	BR488097	IC DGTL 74HCT 86 4X2IN EX	4			U30	
99	1,000	SI	24	BR488070	IC DGTL 74HCT 32 4X2IN UR	4			U32	
100	1,000	SI	24	211620-002	IC, CD4066BC	4			U37	
101	1,000	SI	24	235025-001	IC, --8211, VOLT. DETECT.	4			U38	
102	1,000	SI	24	200469-095	IC, --74HCT20, NAND GATE	4			U41	
103	1,000	SI	24	BR492167	IC LIN LM 317L VOLT REGL.	4			U42	
104	1,000	SI	24	235056-001	IC, DC-DC CONVERTER	4			U43	
105	1,000	SI	24	211924-005	IC, LF353N	4			U46	
106	1,000	SI	24	236677-002	IC, TL431I, JEDEC IO-92	4			U47	H
107	1,000	SI	23	BR451223	DIO ZEN. BZX792V4 2.4V	4			VR1	
108	1,000	SI	20	BR433853	CRYSTAL 6.14400MHZ HC49-U	4			X1	
109	1,000	SI	22	221220-006	CAP. PLAST 68N / 53K	4			C18	
110	1,000	SI	23	BR492566	DIO LED HLMFK150 RED Ø3	4			CR46	H
113	5,000	SI	22	202542-016	CAP. CER 68P / 100G	4			C112,C113,C114,C115,C116	F1
115	1,000	SI	22	235170-041	CAP. ELC 220U / 25M	4			C94	
116	3,000	SI	22	235012-019	CAP. ELC 22U / 40T	4			C79,C80,C81	
117	15,000	MM	34	222837-004	TAPE, DOUBLE-SIDED 1.6MM	4			P2,P3,P4	H
118	0,195	SI	31	224533-172	CUNN DOUBLE ROW 2X36PIN	4			C40,C42,C44,C58,C107	
119	5,000	SI	22	235003-001	CAP. PLAST 1N0 / 100K	4			R168	H
120	1,000	SI	48	214073-004	LABEL, ADHESIVE, ESD	2			R156	H
122	1,000	SI	21	235005-341	RES FILM 26K1 / 0.4 F	4			R32	
123	1,000	SI	21	235004-099	RES FILM 12K / 0.5 J	4			R64,R103	H
124	1,000	SI	21	235004-063	RES FILM 390R / 0.5 J	4				
125	2,000	SI	21	235005-305	RES FILM 11K0 / 0.4 F	4				

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Parts List

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 PARIS LIST PER.. 95/01/02

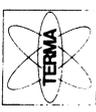
FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	SI	37	BR490474	PMB, MODULATOR ASSY A7	3			A1	
2	1,000	SI	60	BR496111	MODULATOR SUBAS A7A1 SSB	1			C40,C43,C51,C64,C65,C66,	
3	42,000	SI	22	BR488909	CAP. PLST 220N 63 K	4			C67,C68,C70,C80,C81,C82, C83,C84,C85,C86,C87,C89, C91,C92,C93,C94,C95,C98, C99,C100,C101,C102,C103, C104,C105,C106,C107,C108, C109,C110,C111,C112,C121, C122,C127,C132 C41,C113 C42,C52,C56	
4	2,000	SI	22	BR491357	CAP. PLST 10N 63 K	4			C53	D
5	3,000	SI	22	BR359246	CAP. TAN. 10U 35 S	4			C54	
6	1,000	SI	22	BR492841	CAP. ELEC 15U 16 M	4			C55,C96	D
7	1,000	SI	22	BR450359	CAP. ELEC 1U 25 M	4			C57,C123,C124,C125,C126, C128,C129,C130,C131,C133 C69,C79	
8	2,000	SI	22	BR491373	CAP. ELEC 10U 16 M	4			C88	
9	10,000	SI	22	BR491381	CAP. ELEC 10U 25 M	4			C90	
10	2,000	SI	22	BR366617	CAP. CER. 15P 100 G NPO	4			C97	E3
11	1,000	SI	22	BR359718	CAP. PLST 1N3 250 F	4			CR7,CR8,CR9,CR10,CR11, CR12,CR13,CR14,CR15,CR16, CR18,CR26,CR27,CR28,CR29, CR30,CR34 CR32,CR33,CR35,STRP	
12	1,000	SI	22	BR357650	CAP. CER. 22N 63 A HI-K	4			H1	
13	1,000	SI	22	202542-102	CAP. CER. 100P / 100G	4			H2	
14	17,000	SI	23	200352-001	DIODE 1N4148	4			J1,J3 J4	F1
15	7,000	SI	23	BR480681	DIO SCHOT BAT 83 SI 60V	4			J5	
16	5,000	SI	51	BR458694	SCREW M 2.5X 5 CHM CU SN	4			K1	
17	8,000	SI	51	BR275506	SCREW M 3 X 5 CHJ GULCR	4			L2,L5,L6	
18	2,000	SI	31	200764-002	CUNN SMB RECP 50R	4			L3	
19	1,000	SI	31	BR491527	CONN FLATCABLE 14P MALE	4			L4	
20	1,000	SI	31	BR491519	CONN FLATCABLE 34P MALE	4			L7,L8,L9	
21	1,000	SI	33	BR491470	RELAY DIP 5VDC 36 2XCHG.	4				
22	3,000	SI	25	BR394270	COIL,CHOKE 220U K	4				
23	1,000	SI	25	BR392294	COIL,CHOKE 10U K	4				
24	1,000	SI	25	BR450413	COIL,CHOKE 1M0 K	4				
25	3,000	SI	25	BR364231	COIL,CHOKE 22U K	4				

TITLE: MODULATOR ASSY 3KHZ A7SSB

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 Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTEI..... 95/01/03
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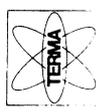
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	3			MP2
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	3			MP4
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	4			Q8,Q19,Q20,Q21,Q22,Q35,
	4			Q36,Q37
	4			Q9,Q28
	4			Q10,Q17,Q18,Q23,Q24,Q25,
	4			Q26,Q27,Q29,Q30,Q31,Q32,
	4			Q33,Q34,Q45
	4			Q38
	4			R87,R197,R236,R238,R258
	4			R88
	4			R89,R161,R229
	4			R90,R93,R145,R146,R167,
	4			R168,R226
	4			R91,R137
	4			R92
	4			R99,R126
	4			R121
	4			R122,R139,R162,R163,R164,
	4			R165,R171,R173,R175,R195,
	4			R254,R256
	4			R123
	4			R124
	4			R125
	4			R127,R134
	4			R128
	4			R129,R131
	4			R130,R206,R207,R208,R209,
	4			R228,R232,R243,R266,R267,
	4			R268
	4			R132
	4			R133,R265

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(496103)

REV: F1

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TITLE: MODULATOR ASSY 3KHZ A7SSB



TERMA Elektronik AS
FSCM R0567
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Parts List

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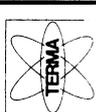
FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
54	6,000	SI	21	BR490571	RES FILM 100K 0,5JSFR16T	4			R135,R138,R142,R143,R290,R291	
55	2,000	SI	21	BR490547	RES FILM 33R0 0,5JSFR16T	4			R136,R253	
56	3,000	SI	21	BR490032	RES FILM 100R 0,5JSFR16T	4			R140,R141,R144	
57	6,000	SI	21	BR490555	RES FILM 51R0 0,5JSFR16T	4			R166,R169,R223,R244,R246,R247	B
58	1,000	SI	21	BR368601	RES SEMIV 50K 1K CERM	4			R170	
59	2,000	SI	21	BR490695	RES FILM 820R 0,5JSFR16T	4			R172,R264	B
60	4,000	SI	21	BR491160	RES FILM 1K00 0,4FMRS16T	4			R174,R193,R210,R212	
61	2,000	SI	21	BR357715	RES SEMIV 1K 1/2K CERM	4			R194,R255	
62	2,000	SI	21	BR490938	RES FILM 36K0 0,5JSFR16T	4			R196,R257	
63	1,000	SI	21	BR490989	RES FILM 56K0 0,5JSFR16T	4			R198	
64	1,000	SI	21	BR490814	RES FILM 5K10 0,5JSFR16T	4			R199	
65	1,000	SI	21	BR491152	RES FILM 1K87 0,4FMRS16T	4			R200	
66	1,000	SI	21	BR491047	RES FILM 95R3 0,4FMRS16T	4			R201	
67	3,000	SI	21	BR490784	RES FILM 150K 0,5JSFR16T	4			R202,R263,R271	D
68	1,000	SI	21	BR491195	RES FILM 4K02 0,4FMRS16T	4			R203	
69	1,000	SI	21	BR491128	RES FILM 562R 0,4FMRS16T	4			R204	
70	1,000	SI	21	BR491098	RES FILM 487R 0,4FMRS16T	4			R205	
71	4,000	SI	21	BR490660	RES FILM 510R 0,5JSFR16T	4			R213,R214,R218,R220	
72	2,000	SI	21	BR490873	RES FILM 18K0 0,5JSFR16T	4			R215,R241	
73	1,000	SI	21	BR490865	RES FILM 11K0 0,5JSFR16T	4			R216	
74	4,000	SI	21	BR490741	RES FILM 1K80 0,5JSFR16T	4			R217,R231,R234,R245	
75	4,000	SI	21	BR490504	RES FILM 10R0 0,5JSFR16T	4			R219,R237,R296,R297	
76	1,000	SI	21	BR490792	RES FILM 3K90 0,5JSFR16T	4			R221	
77	1,000	SI	21	BR490822	RES FILM 6K20 0,5JSFR16T	4			R222	
78	1,000	SI	21	BR490636	RES FILM 300R 0,5JSFR16T	4			R224	
79	1,000	SI	21	BR490539	RES FILM 22K0 0,5JSFR16T	4			R225	
80	1,000	SI	21	BR490628	RES FILM 220R 0,5JSFR16T	4			R230	
81	1,000	SI	21	BR490768	RES FILM 1K10 0,5JSFR16T	4			R233	
82	1,000	SI	21	BR489956	RES FILM 3K30 0,5JSFR16T	4			R235	
83	1,000	SI	21	BR391093	RES SEMIV 20K 1/2K CERM	4			R239	
84	1,000	SI	21	BR490997	RES FILM 62K0 0,5JSFR16T	4			R240	
85	1,000	SI	21	BR490954	RES FILM 43K0 0,5JSFR16T	4			R242	
86	4,000	SI	21	BR492531	RES FILM 390R 0,5JSFR16T	4			R248,R249,R250,R251	
87	1,000	SI	21	BR490520	RES FILM 18R0 0,5JSFR16T	4			R252	

TITLE: MODULATOR ASSY 3KHZ A7SSB

DOCUMENT NO: BR496103 (496103)

REV: F1

SHEET NO: 3 OF 5

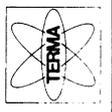


TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

FIND NO.	QTY REQ	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
88	6,000	ST	21	BR490962	RES FILM 47K0 0,5JSFR16I	4			R259,R293,R294,R295,R299, R302 R260	C
89	1,000	ST	21	BR490830	RES FILM 8K20 0,5JSFR16I	4				
90	1,000	ST	21	BR491144	RES FILM 1K69 0,4FMRS16I	4			R261	
91	1,000	ST	21	BR491071	RES FILM 316R 0,4FMRS16I	4			R262	
93	3,000	ST	21	BR490806	RES FILM 4K70 0,5JSFR16I	4			R269,R270,R292	
95	7,000	ST	31	BR231304	TERMINAL STUD 2,5X7 Ø1,3	4			TP	E
96	1,000	ST	24	BR367753	IC LIN LM 311N VOLI COMP.	4			U11	
97	1,000	ST	24	BR488119	IC DCTL 74HCT123 2XMONUST	4			U12	
98	1,000	ST	24	BR450294	IC LIN TL 082CP OP.AMP.	4			U15	
99	1,000	ST	24	236675-002	IC, TL084, OP. AMP. QUAD	4			U16	E3
100	1,000	ST	24	203809-003	IC, LF 356N	4			U17	E3
101	1,000	ST	24	BR431446	IC LIN MC 1496P MOD-DEMUD	4			U19	
102	1,000	ST	24	BR451231	IC LIN LM 723C VOLT REGL.	4			U20	
103	1,000	ST	24	BR450613	IC LIN T8A 120S FM-ZF-AMP	4			U21	
104	2,000	ST	24	BR488216	IC DCTL 74HCT173 8 X D-FF	4			U22,U23	
105	1,000	ST	24	BR491454	IC DCTL 74HCT173 8 X D-FF	4			U24	
106	1,000	ST	24	BR488127	IC DCTL 74HCT138 3-8 DECO	4			U25	
107	1,000	ST	24	BR488038	IC DCTL 74HCT 04 6XINVERT	4			U26	
108	1,000	ST	24	BR357707	IC LIN MC 1458P OP.AMPL.	4			U27	
109	1,000	ST	24	BR488070	IC DCTL 74HCT 32 4X2IN OR	4			U28	
110	1,000	ST	24	BR488046	IC DCTL 74HCT 08 4X2IN AN	4			U29	
111	2,000	ST	24	BR488135	IC DCTL 74HCT139 2X2-4 DE	4			U30,U31	
112	1,000	ST	24	BR431462	IC DCTL 74HCT151 8XINP.MU	4			U33	
113	2,000	ST	24	BR488062	IC DCTL 74HCT 14 6XINV.ST	4			U34,U36	
114	1,000	ST	24	BR488003	IC DCTL 74HCT 00 4X2IN NA	4			U35	
115	1,000	ST	23	203527-008	DIODE ZENER 4V7/0.5W J	4			VR5	E3
116	1,000	ST	23	BR443646	DIO ZEN ZPD 8.2 8.2V 0.5W	4			VR6	
117	1,000	ST	23	203527-006	DIODE ZENER 3V9/0.5W J	4			VR14	E3
118	1,000	ST	37	BR491535	COAX CA ASSY - - 209MM	3			W1	
119	1,000	ST	21	BR492132	RES FILM 27K0 0,5JSFR16I	4			R300	B
120	1,000	ST	22	BR459534	CAP. PLST 100N 63 M	4			C134	B
121	1,000	ST	31	212654-023	CONN D-TYPE 25S/ANGLE	4			J2	E1
122	1,000	ST	48	214073-004	LABEL, ADHESIVE, ESD	2				D5
123	2,000	ST	53	200556-003	WASHER FLAT 3-2X0.54M	4				D6
124	1,000	ST	41	BR496537	REAR PLATE A 7 SE4010 SSB	1				D7



TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE:
MODULATOR ASSY 3KHZ A7SSB

DOCUMENT NO:
BR496103
(496103)

REV: F1

SHEET NO: 4 OF 5

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

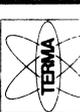
FIND NO.	QTY RQD	U M	GL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	ST	37	BR490482	PWB, MODULATOR SUBAS A7A1	3			C3, C4, C5, C6, C19	
2	5,000	ST	22	BR491365	CAP. PLST 22N 63 K	4			C7	
3	1,000	ST	22	BR491349	CAP. PLST 330N 63 K	4			C8	
4	1,000	ST	22	BR458708	CAP. ELEC 2U2 25 M	4			C11	
5	1,000	ST	22	BR491373	CAP. ELEC 10U 16 M	4			C12	
6	1,000	ST	22	BR361348	CAP. PLST 10N 63 F	4			C13, C14, C18, C32	
7	4,000	ST	22	BR450359	CAP. ELEC 1U 25 M	4			C15	
8	1,000	ST	22	BR491357	CAP. PLST 10N 63 K	4			C16, C17, C116, C117, C118,	
9	5,000	ST	22	BR488909	CAP. PLST 220N 63 K	4			C119	
10	2,000	ST	22	BR357877	CAP. PLST 30N 63 F	4			C26, C29	
11	2,000	ST	22	BR492272	CAP. PLST 3N9 160 F	4			C27, C28	
12	1,000	ST	22	BR359602	CAP. PLST 430P 400 F	4			C30	
13	1,000	ST	22	BR491403	CAP. PLST 51P 630 F	4			C31	
14	3,000	ST	22	BR491381	CAP. ELEC 10U 25 M	4			C33, C34, C35	
15	5,000	ST	23	200352-001	DIODE 1N4148	4			CR21, CR22, CR23, CR24, CR31	C5
19	1,000	ST	26	BR491438	TRANS. JFETN J 112 TO-92	4			Q1	
20	5,000	ST	26	BR273899	TRANS. LOPOW BC 547B SI-N	4			Q2, Q41, Q42, Q43, Q44	B
21	4,000	ST	21	BR490628	RES FILM 220R 0,5JSFR16T	4			R9, R14, R17, R22	
22	8,000	ST	21	BR490709	RES FILM 910R 0,5JSFR16T	4			R10, R11, R12, R13, R18, R19,	
23	2,000	ST	21	BR490687	RES FILM 1K50 0,5JSFR16T	4			R20, R21	
24	2,000	ST	21	BR362239	RES SEMIV 1K 1/2K CERM	4			R15, R23	
25	1,000	ST	21	BR490547	RES FILM 33R0 0,5JSFR16T	4			R16, R24	
26	2,000	ST	21	BR490024	RES FILM 470R 0,5JSFR16T	4			R25	
27	1,000	ST	21	BR362840	RES SEMIV 50K 1/2K CERM	4			R26, R33	
28	2,000	ST	21	BR490946	RES FILM 39K0 0,5JSFR16T	4			R27	
29	3,000	ST	21	BR491217	RES FILM 5K11 0,4FMRS16T	4			R28, R57	
30	1,000	ST	21	BR491292	RES FILM 23K7 0,4FMRS16T	4			R34, R35, R50	
31	1,000	ST	21	BR491314	RES FILM 121K 0,4F	4			R36	
32	1,000	ST	21	BR391093	RES SEMIV 20K 1/2K CERM	4			R37	
33	1,000	ST	21	BR394289	RES SEMIV 500R 1/2K CERM	4			R38	
34	4,000	ST	21	BR490016	RES FILM 10K0 0,5JSFR16T	4			R40	
35	2,000	ST	21	BR490830	RES FILM 8K20 0,5JSFR16T	4			R41, R44, R46, R54	
36	1,000	ST	21	BR492086	RES FILM 330R 0,5JSFR16T	4			R42, R43	
37	3,000	ST	21	BR490571	RES FILM 100K 0,5JSFR16T	4			R45	
						4			R47, R48, R73	

DOCUMENT NO.: BR496111 (496111)

REV: C6

SHEET NO.: 1 OF 3

TITLE: MODULATOR SUBAS A7A1 SSB



TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

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PARTS LIST PER... 95/01/02

LINE REV	ITEM OR DOCUMENT NUMBER	U M	CL NO.	QTY RQD	NOMENCLATURE	PREP NO.	BIN	REFERENCE DESIGNATION
	BR491268	ST	21	2,000	RES FILM 10K5 0,4FMRS16T			R49,R76
	BR490679	ST	21	1,000	RES FILM 560R 0,5JSFR16T			R51
	BR490989	ST	21	2,000	RES FILM 56K0 0,5JSFR16T			R52,R71
	BR490970	ST	21	1,000	RES FILM 51K0 0,5JSFR16T			R53
	BR491020	ST	21	2,000	RES FILM 470K 0,5JSFR16T			R56,R58
	BR491330	ST	21	1,000	RES FILM 511K 0,4F			R67
	BR491284	ST	21	1,000	RES FILM 16K2 0,4FMRS16T			R65
	BR491306	ST	21	1,000	RES FILM 59K0 0,4FMRS16T			R66
	BR491152	ST	21	1,000	RES FILM 1K87 0,4FMRS16T			R68
	BR491322	ST	21	2,000	RES FILM 261K 0,4F			R69,R70
	BR490032	ST	21	6,000	RES FILM 100R 0,5JSFR16T			R72,R74,R280,R283,R286, R289
	BR491241	ST	21	1,000	RES FILM 10K0 0,4FMRS16T			R75
	BR490962	ST	21	9,000	RES FILM 47K0 0,5JSFR16T			R77,R78,R79,R227,R279, R282,R285,R288,R301
	BR490776	ST	21	1,000	RES FILM 2K20 0,5JSFR16T			R80
	BR490806	ST	21	4,000	RES FILM 4K70 0,5JSFR16T			R278,R281,R284,R287
	BR495050	ST	21	1,000	RES OR0 SFR25			R298
	BR491497	ST	25	2,000	TRAF0,LINE 600:600R MOULD			T2,T3
	BR231304	ST	31	2,000	TERMINAL STUD 2,5X7 Ø1,3			TP
	BR473758	ST	24	1,000	IC DGT1 4051B 8CH-MUX.			U2
	236675-002	ST	24	3,000	IC, TL084, OP. AMP. QUAD			U3,U5,U6
	BR475122	ST	24	1,000	IC LIN XR 2206 FUNC-GEN.			U4
	BR367753	ST	24	1,000	IC LIN LM 311N VOLT COMP.			U7
	BR357707	ST	24	1,000	IC LIN MC 1458P OP-AMPL.			U8
	BR491489	ST	24	1,000	IC DGT1 74HCT4316 4XANA.S			U9
	BR363324	ST	23	1,000	DIO ZEN ZPD 5.1 5.1V 0.5W			VR1
	203527-008	ST	23	5,000	DIODE ZENER 4V770.5W J			VR3,VR9,VR10,VR11,VR12
	BR491411	ST	37	1,000	FLCABL-ASSY W2 A7 SE4010			W2
	BR496626	ST	26	1,000	TRANS-D-MOS BST 76A IO-92			Q46
	235004-059	ST	21	1,000	RES FILM 270R / 0.5 J			R305
	235004-123	ST	21	1,000	RES FILM 120K / 0.5 J			R306
	214073-004	ST	48	1,000	LABEL, ADHESIVE, ESD			
*****	*****	*****	*****	*****	***** BILL OF DOCUMENTATION *****	*****	*****	*****



TERMA Elektronik AS

FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE:
MODULATOR SUBAS A7A1 SSB

DOCUMENT NO.:
BR496111
(496111)

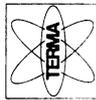
REV: C6

SHEET NO.: 2 OF 3

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

LINE REV	REFERENCE DESIGNATION	BIN	I T	PREP NO.	NOMENCLATURE	ITEM OR DOCUMENT NUMBER	CL NO.	U M	QTY RQD
	C1,C2,C6,C8,C9,C13,C15,C34,C36,C39,C41,C44,C45,C46,C47,C52,C53,C57,C58,C59,C61,C62,C63,C64		3		PMB,REM. UNIT SE4010A7A2	BR493091	37	SI	1,000
	C3,C7,C10,C14		4		CAPSMD CER. 100N 63 K X7R	BR493538	22	SI	24,000
	C4,C5,C11,C12		4		CAPSMD CER. 470P 63 J NPO	BR493465	22	SI	4,000
	C16,C21,C24,C29,C48,C54		4		CAPSMD CER. 820P 63 J NPO	BR493473	22	SI	4,000
	C17,C22,C25,C30		4		CAPSMD CER. 5N6 63 J NPO	BR493511	22	SI	6,000
	C18,C20,C26,C28		4		CAPSMD CER. 3N9 63 J NPO	BR493481	22	SI	4,000
	C19,C23,C27,C31		4		CAPSMD CER. 270P 63 J NPO	BR493457	22	SI	4,000
	C32,C33,C37,C38,C42,C50,C56,C60		4		CAPSMD CER. 33P 63 J NPO	BR493449	22	SI	4,000
	C35,C40		4		CAP. SMD 1U5 / 50M	235200-008	22	SI	8,000
	C43,C51		4		CAPSMD CER. 330N 63 K X7R	BR493554	22	SI	2,000
	C49,C55		4		CAPSMD CER. 220N 63 K X7R	BR493546	22	SI	2,000
	CR1,CR2,CR3,CR4,CR5,CR6,CR8,CR9,CR10,CR12		4		CAPSMD CER. 4N7 63 J NPO	BR493503	22	SI	2,000
	CR7,CR11		4		DIO SMD BAS 16 SIGN SOT23	BR493570	23	SI	10,000
	Q1,Q2		4		DIO SMD LUS25000 LED SOT2	BR493589	23	SI	2,000
	Q3,Q4,Q5,Q6		4		TRANS.SMD SST 309 FEI SOT	BR493600	26	SI	2,000
	R1,R3,R10,R12,R20,R22,R29,R31,R43,R44,R45,R49,R50,R51,R56,R57,R58,R62,R63,R64,R67,R82,R95,R97,R98,R99,R100,R103,R112,R114,R115,R116,R117,R119		4		TRANS.SMD BC 847B SI-N S0	BR493597	26	SI	4,000
	R2,R11,R21,R30,R75,R90,R126,R135		4		RES.SMD 10K0 1/8F RC02	BR493309	21	SI	34,000
	R4,R6,R15,R19,R23,R25,R34,R38,R71,R79,R86,R94,R107,R109,R127,R128,R130,R136,R137,R139		4		RES.SMD 4K75 1/8F RC02	BR493260	21	SI	8,000
	R5,R8,R13,R17,R24,R27,R32,R36,R48,R61		4		RES.SMD 100R 1/4J RC01	BR493171	21	SI	20,000
	R7,R16,R26,R35		4		RES.SMD 11K0 1/8F RC02	BR493317	21	SI	10,000
			4		RES.SMD 562K 1/8F RC02	BR493392	21	SI	4,000


TERMA Elektronik AS
 FSCM R0567
 Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE: **REMOTE UNIT SE4010 A7A2**
 DOCUMENT NO.: **3R490083**
 (490083)

REV: **C1** SHEET NO.: **1 OF 3**

Parts List

PRINTED..... 95/01/03
PARTS LIST PER.. 95/01/02

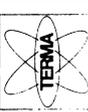
FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
22	4,000	ST	21	BR493430	RES.SMD SEMIV 200K 1/4M	4			R9,R18,R28,R37	
23	12,000	ST	21	BR493163	RES.SMD ORO 1/4 RC01	4			R14,R33,R42,R55,R70,R78, R85,R93,R101,R106,R143, R144	
24	2,000	ST	21	BR493384	RES.SMD 178K 1/8F RC02	4			R39,R52	
25	4,000	ST	21	BR493414	RES.SMD SEMIV 2K 1/4M	4			R40,R47,R53,R60	
26	2,000	ST	21	BR493678	RES.SMD 11K5 1/8F RC02	4			R41,R54	
27	2,000	ST	21	BR493406	RES.SMD 750K 1/8F RC02	4			R46,R59	
28	2,000	ST	21	BR493244	RES.SMD 1K62 1/8F RC02	4			R65,R80	
29	2,000	ST	21	BR493252	RES.SMD 3K92 1/8F RC02	4			R66,R81	
30	4,000	ST	21	BR493341	RES.SMD 82K5 1/8F RC02	4			R68,R83,R108,R122	
31	2,000	ST	21	BR493228	RES.SMD 1M0 1/4J RC01	4			R69,R84	
32	4,000	ST	21	BR493236	RES.SMD 1K21 1/8F RC02	4			R72,R76,R87,R91	
33	6,000	ST	21	BR493368	RES.SMD 100K 1/8F RC02	4			R73,R74,R88,R89,R105,R120	
35	4,000	ST	21	BR493333	RES.SMD 68K1 1/8F RC02	4			R77,R92,R102,R118	
36	2,000	ST	21	BR493279	RES.SMD 5K11 1/8F RC02	4			R96,R113	
37	4,000	ST	21	BR493198	RES.SMD 1K0 1/4J RC01	4			R104,R121,R133,R142	
38	2,000	ST	21	BR493422	RES.SMD SEMIV 50K 1/4M	4			R110,R123	
39	2,000	ST	21	BR493376	RES.SMD 154K 1/8F RC02	4			R111,R124	
40	2,000	ST	21	BR493295	RES.SMD 9K09 1/8F RC02	4			R125,R134	
41	6,000	ST	21	BR493201	RES.SMD 43K0 1/4J RC01	4			R129,R131,R132,R138,R140, R141	
42	1,000	ST	33	BR493643	SW-SMD,DIP 4PST 8 PIN DIP	4			S1	
43	9,000	ST	24	BR493627	IC SMD LIN TL 084 4X OP.A	4			U1,U2,U3,U4,U5,U6,U8,U10, U11	
44	2,000	ST	24	BR493635	IC SMD LIN NE 567 PLL DEC	4			U7,U12	
45	1,000	ST	24	BR493619	IC SMD DIG 74HCT 02 4X2IN	4			U9	
46	1,000	ST	37	BR493864	FLATCABL.ASSY W1 SE4010A7	3			W1	A2
47	4,000	ST	56	224537-009	SPACER, THREADED M3 X15MM	4				A2
48	8,000	ST	51	BR275506	SCREW M 3 X 5 CHJ GULCR	4				A2
***** BILL OF DOCUMENTATION *****										
WORKMANSHIP										
REMOTE UNIT SE4010 A7A2										
REMOTE UNIT SE4010 A7A2										

TITLE: REMOTE UNIT SE4010 A7A2

DOCUMENT NO.: BR490083 (490083)

REV: C1

SHEET NO.: 2 OF 3



TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

FIND NO.	QTY REQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	SI	37	BR487848	PWB, MICROCOMP. RTC A8	3				
2	1,000	SI	20	BR331921	BATTERY 3V LITHIUM	4			BT1	
3	2,000	SI	22	BR459410	CAP. ELEC 10U 10 M	4			C1, C47	
4	1,000	SI	22	BR451339	CAP. ELEC 15U 10 M	4			C2	
5	1,000	SI	22	BR357650	CAP. CER. 22N 63 A HI-K	4			C3	
6	1,000	SI	22	BR437395	CAP. CER. 220P 100 G N750	4			C4	
7	6,000	SI	22	BR450510	CAP. CER. 100N 63 S	4			C5, C6, C7, C28, C52, C54	D3
8	3,000	SI	22	BR357642	CAP. CER. 10N 100 S HI-K	4			C9, C11, C15	
9	1,000	SI	22	BR492795	CAP. PLST 33N 63 K	4			C10	
10	1,000	SI	22	BR349070	CAP. PLST 680N 100 K	4			C12	
11	1,000	SI	22	BR202991	CAP. PLST 220N 100 K	4			C13	
12	1,000	SI	22	BR454117	CAP. PLST 68N 250 K	4			C14	
13	3,000	SI	22	BR450529	CAP. ELEC 6U8 25 M	4			C16, C17, C18	
14	1,000	SI	22	BR357634	CAP. CER. 2N2 100 K HI-K	4			C42	
15	3,000	SI	23	BR228001	DIO SCHOT BAT 85 SI 200MA	4			CR1, CR11, CR19	
16	9,000	SI	23	200352-001	DIODE IN4148	4			CR4, CR5, CR6, CR7, CR8, CR9, CR10, CR12, CR14	J4
17	10,000	MM	34	222837-004	TAPE, DOUBLE-SIDED 1.6MM	4				J6
18	1,000	SI	23	BR328324	DIO SIGN. AAZ 15 GE 140MA	4			CR23	
19	5,000	SI	51	BR458694	SCREW M 2,5X 5 CHM CU SN	4			H1	
20	4,000	SE	31	222836-140	CONN FEMALE SCREW 4-40	4			H2	J1
21	5,000	SI	26	BR392707	TRANS. ACCESS PAD IO-18	4			H3	D6
23	1,000	SI	45	201197-049	STRAP, CABLE, NAT #20X2.5	4			H6	J3
24	1,000	SI	31	212654-022	CONN D-TYPE 15S/ANGLE	4			J1	J1
25	3,000	SI	25	BR363944	COIL, CHOKE HF WIDE BAND	4			L1, L2, L3	
26	1,000	SI	41	BR489808	REAR PLATE A 8 MICROC. RTC	1			MPI	
27	1,000	SI	45	BR448095	RETAINER, PC 5X5X109 MM	3			MP2	
28	2,000	SI	41	210841-001	THUMBSCREW	3			MP3	J2
29	3,000	SI	26	BR392820	TRANS. LOPOM 2N2222A SI-N	4			Q1, Q2, Q3	
30	1,000	SI	26	BR273899	TRANS. LOPOM BC 547B SI-N	4			Q8	
31	1,000	SI	26	BR273910	TRANS. LOPOM BC 177 SI-P I	4			Q9	
32	1,000	SI	26	BR392839	TRANS. LOPOM 2N2907A SI-P	4			Q11	
33	1,000	SI	21	BR240451	RES CARB. 2K2 1/4J SFR25	4			R1	
34	3,000	SI	21	BR240745	RES CARB. 100K 1/4J SFR25	4			R2, R3, R78	
35	1,000	SI	21	BR357693	RES CARB. 150K 1/4J SFR25	4			R4	
36	29,000	SI	21	BR240400	RES CARB. 1K0 1/4J SFR25	4			R5, R7, R10, R11, R12, R13, R19, D	

TITLE:

MICROCOMPUTER ASSY A8 RTC

DOCUMENT NO.:

BR487740
(487740)

REV:

J8

SHEET NO.:

1 OF 4



TERMA Elektronik AS

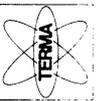
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

FIND NO.	QTY REQ	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
37	3,000	SI	21	BR372137	RES CARB. 20K 1/4J SFR25	4			R21,R25,R27,R33,R34,R35,	
38	2,000	SI	21	BR240699	RES CARB. 51K 1/4J SFR25	4			R36,R39,R40,R41,R42,R47,	
39	3,000	SI	21	BR240516	RES CARB. 4K7 1/4J SFR25	4			R48,R49,R51,R82,R88,R89,	
40	6,000	SI	21	BR241458	RES CARB. 1K0 1/2JSFR25H	4			R97,R98,R99,R103	B
41	3,000	SI	21	BR240257	RES CARB. 180R 1/4J SFR25	4			R6,R59,R62	D
42	3,000	SI	21	BR240494	RES CARB. 3K9 1/4J SFR25	4			R8,R9	
44	2,000	SI	21	BR324205	RES CARB. 5K1 1/4J SFR25	4			R14,R15,R102	
45	6,000	SI	21	BR240567	RES CARB. 10K 1/4J SFR25	4			R16,R17,R22,R23,R28,R29	
46	1,000	SI	21	BR391093	RES SEMIV 20K 1/2K CERM	4			R18,R24,R30	
47	7,000	SI	21	BR240702	RES CARB. 56K 1/4J SFR25	4			R20,R26,R32	D4
48	1,000	SI	21	BR240869	RES CARB. 1M0 1/4J SFR25	4			R64,R66	
49	1,000	SI	21	BR240583	RES CARB. 12K 1/4J SFR25	4			R65,R77,R79,R81,R83,R96	
50	1,000	SI	21	BR240532	RES CARB. 6K2 1/4J SFR25	4			R67	
51	2,000	SI	21	BR240338	RES CARB. 390K 1/4J SFR25	4			R68,R72,R73,R84,R86,R87,	
52	1,000	SI	21	BR240605	RES CARB. 15K 1/4J SFR25	4			R93	
53	2,000	SI	21	BR240443	RES CARB. 2K0 1/4J SFR25	4			R69	
54	1,000	SI	21	BR380393	RES CARB. 270K 1/4J SFR25	4			R70	
55	1,000	SI	21	BR240508	RES CARB. 4K3 1/4J SFR25	4			R71	
57	1,000	SI	24	230988-002	IC, --80C85	4			R75,R95	D4
58	1,000	SI	24	BR488119	IC DGTL 74HCT123 2XMONDST	4			R80	
59	3,000	SI	24	BR488038	IC DGTL 74HCT 04 6XINVERT	4			R85,R90	
60	1,000	SI	24	BR488062	IC DGTL 74HCT 14 6XINV.SI	4			R100	
61	4,000	SI	24	BR362131	IC DGTL 74 06N 6X INV-BUF	4			R101	
62	1,000	SI	24	BR438046	IC DGTL 74HCT 08 4X2IN AN	4			U1	J
63	2,000	SI	24	BR488003	IC DGTL 74HCT 00 4X2IN NA	4			U2	
64	4,000	SI	24	BR438682	IC DGTL 74HCT161 BIN CUUN	4			U3,U5,U10	
65	2,000	SI	24	BR488070	IC DGTL 74HCT 32 4X2IN OR	4			U4	
66	1,000	SI	24	BR451614	IC DGTL 74LS373N 8X D LAI	4			U6,U37,U47,U56	B
67	1,000	SI	24	BR451169	IC DGTL 74LS365N 6X BUSDR	4			U7	
68	2,000	SI	24	BR488089	IC DGTL 74HCT 74 2X D-FF	4			U8,U15	
69	2,000	SI	24	BR451592	IC DGTL 74LS240N 8X BUF. I	4			U9,U38,U39,U40	

TITLE: MICROCOMPUTER ASSY A8 ATC



TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

DOCUMENT NO: BR487740
(487740)

REV: J8

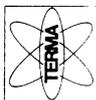
SHEET NO: 2 OF 4

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

LINE REV	REFERENCE DESIGNATION	BIN	PREP NO.	I T	NOMENCLATURE	ITEM OR DOCUMENT NUMBER	CL NO.	U M	QTY RQD	CL NO.	DOCUMENT NUMBER
	U17,U27			4	IC DGTL 74LS245N 8 BIT TR	BR451606	24	SI	2,000	24	BR451606
	U18			4	IC DGTL 74HCT 11 3X3IN AN	BR488054	24	SI	1,000	24	BR488054
	U19,U21			4	IC DGTL 74HCT138 3-8 DECO	BR488127	24	SI	2,000	24	BR488127
	U22,U48			4	IC DGTL 74HCT 21 4X2IN AN	BR488674	24	SI	2,000	24	BR488674
	U26			4	IC DGTL 62421B RT CLOCK	BR487503	24	SI	1,000	24	BR487503
D	U29,U30,U31			4	IC DGTL 74 37N 4X2IN NAND	BR404551	24	SI	3,000	24	BR404551
	U32			4	IC DGTL 1488L 4XLINEDRIV	BR390909	24	SI	1,000	24	BR390909
	U33			4	IC DGTL 1489A 4XLIN RCVR	BR390917	24	SI	1,000	24	BR390917
	U34,U35,U36			4	IC LIN MCA 255 OPTO ISOL	BR433632	24	SI	3,000	24	BR433632
	U42			4	IC DGTL 74HCT259 8X LATCH	BR488739	24	SI	1,000	24	BR488739
B	U43			4	IC DGTL 74HCT374 8X D-FF	BR488216	24	SI	1,000	24	BR488216
	U44			4	IC DGTL 74LS145N BCD-DEC	BR451568	24	SI	1,000	24	BR451568
G	U46			4	IC DGTL 6264 8KX8 SRAM	BR487511	24	SI	1,000	24	BR487511
	U49			4	IC DGTL 4049B 6X INV-BJF	BR355003	24	SI	1,000	24	BR355003
	U50			4	IC DGTL 4027A 2X JK FF	BR354899	24	SI	1,000	24	BR354899
	U51			4	IC DGTL 4071B 4X2 INP JR	BR355046	24	SI	1,000	24	BR355046
	U52			4	IC DGTL 74LS377N 8X D-FF	BR451029	24	SI	1,000	24	BR451029
	U53			4	IC LIN DAC-08EN D/A CONV.	BR451215	24	SI	1,000	24	BR451215
	U54,U55			4	IC LIN TL 082CP OP.AMP.	BR450294	24	SI	2,000	24	BR450294
	U57,U58			4	IC DGTL 4066B 4X ANA-SW.	BR354821	24	SI	2,000	24	BR354821
	U59			4	IC LIN LM 3302N VOLT COMP	BR455474	24	SI	1,000	24	BR455474
J4	VR1,VR2			4	DIO ZEN ZPD 5-1 5.1V 0.5W	BR363324	23	SI	2,000	23	BR363324
	VR3			4	DIODE ZENER 4V7/0.5W J	203527-008	23	SI	1,000	23	203527-008
	XU1			4	IC ACCESS 40 PIN SOCKET	BR451452	31	SI	1,000	31	BR451452
J8	XU23,XU24,XU25,XU45			4	IC ACCESS 28 PIN SOCKET	BR435120	31	SI	4,000	31	BR435120
D	Y1			4	CRYSTAL 6,14400MHZ HC49-U	BR433853	20	SI	1,000	20	BR433853
	R104			4	RES NETW 9X4K7 1/5G	BR451398	21	SI	1,000	21	BR451398
D3	C19,C20,C21,C22,C23,C24, C25,C26,C27,C29,C30,C31, C32,C34,C35,C36,C37,C38, C39,C40,C48,C49,C50,C51, C53,C57,C58,C59			4	CAP. PLST 100N 63 M	BR459534	22	SI	28,000	22	BR459534
J1	J2			4	CONN D-TYPE 9S/ANGLE	212654-021	31	SI	1,000	31	212654-021
J8	S1-S7,TP1-14,TP16-29			4	CONN MINI-JUMP 36 PIN	208801-001	31	SI	1,620	31	208801-001
D7				2	LABEL, ADHESIVE, ESD	214073-004	48	SI	1,000	48	214073-004
F				4	WIRE COP TIN-CID Ø0.6 MM	200843-009	32	M	0,080	32	200843-009

TITLE: MICROCOMPUTER ASSY A8 RTC
DOCUMENT NO.: BR487740
REV: J8
SHEET NO.: 3 OF 4



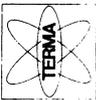
TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

FIND NO.	QTY REQ	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
110	7,000	ST	31	208802-002	CJNN B-JUMP	4				H
					***** BILL OF DOCUMENTATION *****					
			AS	201350	WORKMANSHIP					
			AS	206460	ESD, PROTECTION & MARKING					
			EB	BR487740	MICROCOMPUTER ASSY A8					
			EC	BR487740	MICROCOMPUTER ASSY A8 -RT					
			ND	BR487740	MICROCOMP. A8, LOG POINT					
			PD	BR487740	MICROCOMPUTER ASSY A8 -RT					
			TP	BR487740	MICROCOMPUTER A8 RTC					
					***** NEXT ASSY *****					
	1,000	ST		BR488100-031	SE4010	1				

TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark



TITLE: MICROCOMPUTER ASSY A8 RTC
DOCUMENT NO.: BR487740
REV: J8
SHEET NO.: 4 OF 4

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

FIND NO.	QTY REQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	SI	37	BR430563	PWB, INTERFACE RS232 422/4	3			C1,C33	
2	2,000	SI	22	BR454117	CAP. PLST 68N 250 K	4			C2,C3,C4,C5,C6,C7,C8	
3	7,000	SI	22	BR477176	CAP. CER. 330P 100 K	4			C9,C11,C13	
4	3,000	SI	22	BR450529	CAP. ELEC 6U8 25 M	4			C10,C12,C14,C15,C16,C17,	
5	19,000	SI	22	BR450510	CAP. CER. 100N 63 S	4			C18,C19,C20,C21,C22,C23,	
6	1,000	SI	22	BR437395	CAP. CER. 220P 100 G N750	4			C24,C25,C26,C27,C28,C29,	
7	3,000	SI	22	BR357529	CAP. CER. 47P 100 C N150	4			C30	
8	1,000	SI	22	BR451053	CAP. ELEC 68J 6,3 M	4			C31,C34,C35	
9	1,000	SI	23	200352-001	DIODE 1N4148	4			C32	
10	4,000	SI	51	BR458694	SCREW M 2,5X 5 CHM CU SN	4			C31	D3
11	1,000	SA	31	222836-140	CONN FEMALE SCREW 4-40	4			H1	D1
12	1,000	SI	31	212654-023	CONN D-TYPE 25S/ANGLE	4			H2	D1
13	3,000	SI	25	BR363944	COIL,CHOKE HF WIDE BAND	4			J1	
14	1,000	SI	41	BR491829	REAR PLATE A 9 INTERFACE	1			L1,L2,L3	
15	1,000	SI	45	BR448095	RETAINER,PC 5X5X109 MM	3			MP1	
16	2,000	SI	41	210841-001	THUMBSCREW	3			MP2	
17	1,000	SI	26	BR274097	TRANS. LOPOW BC 547C SI-N	4			MP3	D2
18	1,000	SI	26	BR359157	TRANS. LOPOW BC307B SI-P T	4			Q2	
19	2,000	SI	21	BR240354	RES CARB. 510R 1/4J SFR25	4			Q3	
20	1,000	SI	21	BR240400	RES CARB. 1K0 1/4J SFR25	4			R1,R10	
21	2,000	SI	21	BR240397	RES CARB. 820R 1/4J SFR25	4			R2	
22	1,000	SI	21	BR240648	RES CARB. 27K 1/4J SFR25	4			R7,R8	
23	1,000	SI	21	BR359165	RES SEMIV 10K 1/2K CERM	4			R11	
24	1,000	SI	21	BR240419	RES CARB. 1K2 1/4J SFR25	4			R12	
25	1,000	SI	21	BR240621	RES CARB. 22K 1/4J SFR25	4			R13	
26	2,000	SI	21	BR240125	RES CARB. 22R 1/4J SFR25	4			R14	D3
27	2,000	SI	21	206088-001	RES NETW 7X 10K / 0.18G	4			R15,R16	
28	1,000	SI	25	BR362859	TRAF0,LINE 600:600R	4			R17,R18	
29	1,000	SI	24	BR433535	IC DGTL 74LS04 6X INVERTER	4			T1	
30	1,000	SI	24	BR404780	IC DGTL 74LS90N DEC. COUNT	4			U1	
31	2,000	SI	24	BR488682	IC DGTL 74HC161 BIN CJUN	4			U2	
32	1,000	SI	24	BR488186	IC DGTL 74HC1245 8BIT IRC	4			U3,U4	
33	1,000	SI	24	BR488127	IC DGTL 74HC138 3-8 DECO	4			U5	
34									U6	
35										

TITLE: INTERF. RS232 422/485 A9

DOCUMENT NO: BR490598 (490598)

REV: D4

SHEET NO: 1 OF 2



TERMA Elektronik AS

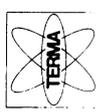
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

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 PARTS LIST PER.. 95/01/02

LINE REV	ITEM OR DOCUMENT NUMBER	QTY RQD	U M	CL NO.	NOMENCLATURE	PREP NO.	BIN	REFERENCE DESIGNATION
36	BR 488038	1,000	SI	24	IC DGTL 74HCT 04 6XINVERT			U7
37	BR 488070	1,000	SI	24	IC DGTL 74HCT 32 4X2IN OR			U8
38	BR 302131	1,000	SI	24	IC DGTL 74 06N 6X INV-BUF			U9
39	BR 462489	1,000	SI	24	IC DGTL 8251A USART			U10
40	BR 390909	1,000	SI	24	IC DGTL 1488L 4XLINEDRIV			U11
41	BR 390917	1,000	SI	24	IC DGTL 1489A 4XLIN RCVR			U12
42	BR 357707	1,000	SI	24	IC LIN MC 1458P OP-AMPL.			U13
43	BR 488755	1,000	SI	24	IC DGTL 74HCT365 6XBUSDRI			U14
44	BR 491837	2,000	SI	24	IC DGTL 75176 BUS TRCV.			U15, U16
45	BR 362727	2,000	SI	23	DIO ZEN ZPD13 13V 0.5W			VR2, VR3
46	BR 433853	1,000	SI	20	CRYSTAL 6.14400MHZ HC49-U			Y1
47	222837-004	15,000	MM	34	TAPE, DOUBLE-SIDED 1.6MM			
48	200843-009	0,015	M	32	WIRE COP TIN-GTD Ø0.6 MM			
49	208801-001	1,500	SI	31	CONN MINI-JUMP 36 PIN			E1-E10
50	208802-002	16,000	SI	31	CONN B-JUMP			
***** BILL OF DOCUMENTATION *****								
	AS 201350				WORKMANSHIP			
	EB BR 490598				INTERF ACE RS232 422/485			
	EC BR 490598				INTERF ACE RS232 422/485			
	PD BR 490598				INTERF ACE RS232 422/485			
	TP BRQA4492				REMOTE CONTROL A9			
***** NEXT ASSY *****								
	BR 488100-031	1,000	SI		SE4010			

TERMA Elektronik AS
 FSCM R0567
 Hovmarken 4, DK-8520 Lysterup, Denmark



TITLE: INTERF - RS232 422/485 A9

DOCUMENT NO.: BR 490598
 (490598)

REV: D4
 SHEET NO.: 2 OF 2

**PARTS LIST
for
externally produced items**

ASSY 494186I, POWER SUPPLY ASSEMBLY A10

Supplier : powerlab
Type No. : PL0761
Issue : October 1991
No. of sheets: 27

PARTS LIST

Type no. : PL0761
 PCB: 96
 Issue: 1.1
 Sign. : OCT
 Sheet: 2 /27

REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
R101	1k8 5% 0.4W METALF.	SFR25	PHI	11018010	
R102	8k2 1% 1/4W METALF.	MBA0204	TRA	11182010	
R103	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R104	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R105	150k 1% 1/4W METALF.	MBA0204	TRA	11115030	
R106	NOT USED	MBA0204	TRA		
R107	24k 1% 1/4W METALF.	MBA0204	TRA	11124020	
R108	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R109	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R110	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R111	270k 1% 1/4W METALF.	MBA0204	TRA	11127030	
R112	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R113	51k 1% 1/4W METALF.	MBA0204	TRA	11151020	
R114	910k 1% 1/4W METALF.	MBA0204	TRA	11191030	
R115	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R116	910k 1% 1/4W METALF.	MBA0204	TRA	11191030	
R117	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R118	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R119	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R120	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R121	150k 1% 1/4W METALF.	MBA0204	TRA	11115030	
R122	11k 1% 1/4W METALF.	MBA0204	TRA	11111020	
R123	S05K275 VARISTOR	Q69-X3034		11090005	

PARTS LIST

Type no. : PL0761

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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
CR101	KBPC 2506	KBPC 2506	NE	12025060	
Q102	BC547	BC547	PHI	12054700	
VR103	BZX79C12	BZX79C12	PHI	12001200	
CR104	1N4448	1N4448	PHI	12044480	
CR105	1N4448	1N4448	PHI	12044480	
CR106	TL431	uA431AWC	DAN	12043100	
CR107	1N4448	1N448	PHI	12044480	
U101	LM2901	LM2901	DAN	12029010	
U102	4069UB	HEF4069UBP	PHI	12040690	
U103	4017B	HEF4017BP	PHI	12040170	
L101	2x6.8mH/2A	B82724-J2202-N	SIE	14020680	
L102	15uH/4A	B82111-B-C23	SIE	14001501	
T101	2x110V/31V	5914A	TRE	14010427	
X101	1.8432MHz	HC-33US 1843.2	PIE	140XXXXX	
S1	AFBRYDER	T20/1/A/X	TOP	15092000	
J2	STIK	MO. 22-12-1062	FØL	15000096	
J1	NETBRØND	4301.0503/1403	MUL	15000454	

PARTS LIST

Type no.: PL0761

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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
R201	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R202	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R203	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R204	1k5 1% 1/4W METALF.	MBA0204	TRA	11115010	
R205	4k7 1% 1/4W METALF.	MBA0204	TRA	11157010	
R206	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R207	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R208	1R0 1% 1/4W METALF.	MBA0204	TRA	11100100	
R209	10R 1% 1/4W METALF.	MBA0204	TRA	11101000	
R210	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R211	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R212	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R213	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R214	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R215	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R216	51R 1% 1/4W METALF.	MBA0204	TRA	11105100	
R217	20k 1% 1/4W METALF.	MBA0204	TRA	11120020	
R218	15k 1% 1/4W METALF.	MBA0204	TRA	11115020	
R219	150k 1% 1/4W METALF.	MBA0204	TRA	11115030	
R220	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R221	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R222	22R 1% 1/4W METALF.	MBA0204	TRA	11102200	
R223	100R 1% 1/4W METALF.	MBA0204	TRA	11110000	
R224	0R47 5% 1/4W METALF.	R20J	PP	11100047	
R225	0R47 5% 1/4W METALF.	R20J	PP	11100047	
R226	22R 5% 0.4W METALF.	SFR25	PHI	11002200	

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Type no. : PL0761

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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
CR201	TL431	UA431AWC	DAN	12043100	
CR202	1N4448	1N4448	PHI	12044480	
Q203	BC557	BC557	PHI	12055700	
Q204	2N5061	2N5061	DIS	12025061	
CR205	BYV27-200	BYV27-200	PHI	12027000	
CR206	1N4448	1N4448	PHI	12044480	
Q207	BC557	BC557	PHI	12055700	
Q208	BC557	BC557	PHI	12055700	
Q209	BC547	BC547	PHI	12054700	
CR210	BYV10-30	BYV10-30	PHI	12010300	
CR211	1N4448	1N4448	PHI	12044480	
VR212	RZX79C15	RZX79C15	PHI	12001500	
Q213	IRF640	IRF640	IR	12064002	
CR214	BYW29-150	BYW29-150	PHI	12080000	
Q215	BC547	BC547	PHI	12054700	
Q216	BC547	BC547	PHI	12054700	
CR217	1N4448	1N4448	PHI	12044480	
U201	UC2844A	UC2844A	DEL	12028440	
L201	1.8uH/4A	15191004	FLU	15191004	
T201	FLYBACK TRAFD	14210026-2	FLU	14210026	

PARTS LIST

Type no.: PL0761
 PCB: 96
 Issue: 1.1
 Sign.: OCT
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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
R301	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R302	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R303	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R304	1k8 1% 1/4W METALF.	MBA0204	TRA	11118010	
R305	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R306	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R307	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R308	1R0 1% 1/4W METALF.	MBA0204	TRA	11100100	
R309	10R 1% 1/4W METALF.	MBA0204	TRA	11101000	
R310	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R311	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R312	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R313	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R314	2K2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R315	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R316	51R 1% 1/4W METALF.	MBA0204	TRA	11105100	
R317	20k 1% 1/4W METALF.	MBA0204	TRA	11120020	
R318	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R319	510k 1% 1/4W METALF.	MBA0204	TRA	11151030	
R320	2k0 1% 1/4W METALF.	MBA0204	TRA	11120010	
R321	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R322	22R 1% 1/4W METALF.	MBA0204	TRA	11102200	
R323	100R 1% 1/4W METALF.	MBA0204	TRA	11110000	
R324	0R47 1% 1/4W METALF.	R20J	PPA	11100047	
R325	0R47 5% 1/4W METALF.	R20J	PP	11100047	
R326	10R 5% 0.4W METALF.	SER25	PHI	11001000	

PARTS LIST

Type no.: PL0761
 PCB: 96
 Issue: 1.1
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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
CR301	TL431	UA431AWC	DAN	12043100	
CR302	1N4448	1N4448	PHI	12044480	
Q303	BC557	BC557	PHI	12055700	
Q304	2N5061	2N5061	DIS	12025061	
CR305	BYV27-200	BYV27-200	PHI	12027000	
CR306	1N4448	1N4448	PHI	12044480	
Q307	BC557	BC557	PHI	12055700	
Q308	BC557	BC557	PHI	12055700	
Q309	BC547	BC547	PHI	12054700	
CR310	BYV10-30	BYV10-30	PHI	12010300	
CR311	1N4448	1N4448	PHI	12044480	
VR312	BZX79C15	BZX79C15	PHI	12001500	
Q313	IRF640	IRF640	IR	12064002	
CR314	BYW29-150	BYW29-150	PHI	12080000	
CR315	1N4448	1N4448	PHI	12044480	
U301	UC2844A	UC2844A	DEL	12028440	
L301	1.8uH/4A	15191004	ELU	15191004	
T301	FLYBACK TRANS	14210024-3	ELU	14210024	

PARTS LIST

Type no. : FL0761

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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
R401	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R402	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R403	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R404	7k5 1% 1/4W METALF.	MBA0204	TRA	11175010	
R405	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R406	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R407	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R408	1R0 1% 1/4W METALF.	MBA0204	TRA	11100100	
R409	10R 1% 1/4W METALF.	MBA0204	TRA	11101000	
R410	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R411	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R412	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R413	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R414	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R415	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R416	51R 1% 1/4W METALF.	MBA0204	TRA	11105100	
R417	20k 1% 1/4W METALF.	MBA0204	TRA	11120020	
R418	8k2 1% 1/4W METALF.	MBA0204	TRA	11182010	
R419	150k 1% 1/4W METALF.	MBA0204	TRA	11115030	
R420	15k 1% 1/4W METALF.	MBA0204	TRA	11115020	
R421	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R422	22R 1% 1/4W METALF.	MBA0204	TRA	11102200	
R423	100R 1% 1/4W METALF.	MBA0204	TRA	11110000	
R424	0R47 1% 1/4W METALF.	R20J	PPA	11100047	
R425	0R47 5% 1/4W METALF.	R20J	PP	11100047	
R426	10R 5% 0.4W METALF.	SER25	PHI	11001000	

PARTS LIST

Type no. : PL0761
 PCB: 96
 Issue: 1.1
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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
CR401	TL431	uA431AWC	DAN	12043100	
CR402	1N4448	1N4448	PHI	12044480	
Q403	BC557	BC557	PHI	12055700	
Q404	2N5061	2N5061	DIS	12025061	
CR405	BYV27-200	BYV27-200	PHI	12027000	
CR406	1N4448	1N4448	PHI	12044480	
Q407	BC557	BC557	PHI	12055700	
Q408	BC557	BC557	PHI	12055700	
Q409	BC547	BC547	PHI	12054700	
CR410	BYV10-30	BYV10-30	PHI	12010300	
CR411	1N4448	1N4448	PHI	12044480	
VR412	BZX79C15	BZX79C15	PHI	12001500	
Q413	IRF640	IRF640	IR	12064002	
CR414	BYW29-150	BYW29-150	PHI	12080000	
CR415	1N4448	1N4448	PHI	12044480	
U401	UC2844A	UC2844A	DEL	12028440	
L401	1.8uH/4A	15191004	FLU	15191004	
T401	FLYBACK TRAFD	14210025-2	FLU	14210025	

PARTS LIST

Type no. : PL0761
 PCB: 96
 Issue: 1.1
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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
R501	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R502	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R503	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R504	1k8 1% 1/4W METALF.	MBA0204	TRA	11118010	
R505	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R506	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R507	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R508	1R0 1% 1/4W METALF.	MBA0204	TRA	11100100	
R509	10R 1% 1/4W METALF.	MBA0204	TRA	11101000	
R510	NOT USED				
R511	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R512	NOT USED				
R513	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R514	2K2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R515	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R516	51R 1% 1/4W METALF.	MBA0204	TRA	11105100	
R517	20k 1% 1/4W METALF.	MBA0204	TRA	11120020	
R518	7k5 1% 1/4W METALF.	MBA0204	TRA	11175010	
R519	510k 1% 1/4W METALF.	MBA0204	TRA	11151030	
R520	2k0 1% 1/4W METALF.	MBA0204	TRA	11120010	
R521	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R522	22R 1% 1/4W METALF.	MBA0204	TRA	11102200	
R523	100R 1% 1/4W METALF.	MBA0204	TRA	11110000	
R524	OR47 1% 1/4W METALF.	R20J	PPA	11100047	
R525	OR47 5% 1/4W METALF.	R20J	PP	11100047	
R526	22R 5% 0.4W METALF.	SFR25	PHI	11002200	

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Type no. : PL0761

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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
R601	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R602	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R603	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R604	7k5 1% 1/4W METALF.	MBA0204	TRA	11175010	
R605	22k 1% 1/4W METALF.	MBA0204	TRA	11122020	
R606	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R607	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R608	1R0 1% 1/4W METALF.	MBA0204	TRA	11100100	
R609	10R 1% 1/4W METALF.	MBA0204	TRA	11101000	
R610	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R611	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R612	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R613	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R614	2K2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R615	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R616	51R 1% 1/4W METALF.	MBA0204	TRA	11105100	
R617	20k 1% 1/4W METALF.	MBA0204	TRA	11120020	
R618	15k 1% 1/4W METALF.	MBA0204	TRA	11115020	
R619	150k 1% 1/4W METALF.	MBA0204	TRA	11115030	
R620	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R621	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R622	22R 1% 1/4W METALF.	MBA0204	TRA	11102200	
R623	100R 1% 1/4W METALF.	MBA0204	TRA	11110000	
R624	1R0 1% 1/4W METALF.	MBA0204	TRA	11100100	
R625	0R47 5% 1/4W METALF.	R20J	PP	11100047	
R626	22R 5% 0.4W METALF.	SFR25	PHI	11002200	

PARTS LIST

Type no. : PL0761
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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
R701	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R702	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R703	10k 1% 1/4W METALF.	MBA0204	TRA	11110020	
R704	2k4 1% 1/4W METALF.	MBA0204	TRA	11124010	
R705	24k 1% 1/4W METALF.	MBA0204	TRA	11124020	
R706	5k1 1% 1/4W METALF.	MBA0204	TRA	11151010	
R707	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R708	1R0 1% 1/4W METALF.	MBA0204	TRA	11100100	
R709	10R 1% 1/4W METALF.	MBA0204	TRA	11101000	
R710	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R711	2k2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R712	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R713	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R714	2K2 1% 1/4W METALF.	MBA0204	TRA	11122010	
R715	510R 1% 1/4W METALF.	MBA0204	TRA	11151000	
R716	51R 1% 1/4W METALF.	MBA0204	TRA	11105100	
R717	20k 1% 1/4W METALF.	MBA0204	TRA	11120020	
R718	39k 1% 1/4W METALF.	MBA0204	TRA	11139020	
R719	510k 1% 1/4W METALF.	MBA0204	TRA	11151030	
R720	1k3 1% 1/4W METALF.	MBA0204	TRA	11113010	
R721	1k0 1% 1/4W METALF.	MBA0204	TRA	11110010	
R722	22R 1% 1/4W METALF.	MBA0204	TRA	11102200	
R723	100R 1% 1/4W METALF.	MBA0204	TRA	11110000	
R724	0R47 1% 1/4W METALF.	R20J	PPA	11100047	
R725	0R47 5% 1/4W METALF.	R20J	PP	11100047	
R726	10R 5% 0.4W METALF.	SFR25	PHI	11001000	

PARTS LIST

Type no. : FL0761

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REF	DESCRIPTION	MANUFAC. P/N	MAN	PL. P/N	QTY
CR701	TL431	UA431AWC	DAN	12043100	
CR702	1N4448	1N4448	PHI	12044480	
Q703	BC557	BC557	PHI	12055700	
Q704	2N5061	2N5061	DIS	12025061	
CR705	BYV27-200	BYV27-200	PHI	12027000	
CR706	1N4448	1N4448	PHI	12044480	
Q707	BC557	BC557	PHI	12055700	
Q708	BC557	BC557	PHI	12055700	
Q709	BC547	BC547	PHI	12054700	
CR710	BYV10-30	BYV10-30	PHI	12010300	
CR711	1N4448	1N4448	PHI	12044480	
VR712	BZX79C15	BZX79C15	PHI	12001500	
Q713	IRF640	IRF640	IR	12064002	
CR714	BYW29-150	BYW29-150	PHI	12080000	
U701	UC2844A	UC2844A	DEL	12028440	
L701	1.8uH/4A	15191004	FLU	15191004	
T701	FLYBACK TRAFD	14210026-2	FLU	14210026	

Parts List

PRINTED..... 95/01/03
 PARTS LIST PER... 95/01/02

LINE REV	1	T	PREP NO.	BIN	REFERENCE DESIGNATION
	1				A1
	4				H2
	4				H3
	4				H4
	4				H6
	4				H7
	4				H8
	3				MP1
	3				MP2
	2				MP3
	1				MP4
	1				MP5
	1				MP6
	3				MP7
	3				MP8
	1				MP9
	1				R4
	1				W2
	4				A2
	4				A4
	4				A6
	***** BILL OF DOCUMENTATION *****				
	WORKMANSHIP				
	FRONT PANEL SE4010 A11				
	FRONT PANEL SE4010 A11				
	***** NEXT ASSY *****				
	1				SE4010

TERMA Elektronik AS
 FSCM R0567
 Hovmarken 4, DK-8520 Lystrup, Denmark

TERMA

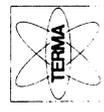
TITLE: FRONT PANEL SE4010 A11
 DOCUMENT NO.: BR488534 (488534)
 REV: A6
 SHEET NO.: 1 OF 1

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

LINE REV	1	T	PREP NO.	BIN	REFERENCE DESIGNATION
	1	000	ST 37	BR471437	PWB, FRONT PANEL CIR A1A1
	2	000	ST 60	BR488348	DSPL BD A1A1A1 SE/TC4010
B4	3	000	ST 22	235010-006	CAP. ELC 6U8 / 25M
	4	000	ST 22	BR333959	CAP. CER. 100N 50 M
	5	000	ST 22	BR450510	CAP. CER. 100N 63 S
	6	000	ST 22	BR451053	CAP. ELEC 68U 6,3 M
	7	000	ST 22	BR203378	CAP. TAN. 10U 16 S
	8	000	ST 22	BR357642	CAP. CER. 10N 100 S HI-K
	9	000	ST 23	BR450480	DIO LED HLMP1000 RED Ø3
	10	000	ST 23	200352-001	DIODE 1N4148
	11	000	ST 51	BR276790	SCREW M 3 X 5 CHM CU SN
	12	000	ST 51	BR276804	SCREW M 3 X 8 CHM CU SN
	13	000	ST 52	BR327506	NUT M 3 M CU SN
	15	000	ST 53	BR380105	WASHER, FLAT Ø 3MM CU SN M
	16	000	ST 51	BR494380	SCREW M 3 X 4 CHM CU SN
	17	000	ST 25	BR363944	COIL, CHOKE HF WIDE BAND
	18	000	ST 43	BR477974	KNOB, BLK, WHT, TEXT "0 D8"
	19	000	ST 43	BR488461	KNOB, BLACK, WHT, TEXT "A1A"
	20	000	ST 43	BR488429	KNOB, BLACK, WHT, TEXT "R3E"
	21	000	ST 43	BR488402	KNOB, BLACK, WHT, TEXT "KEY"
	22	000	ST 43	BR459011	KNOB, WHITE, BLK, TEXT "9"
	23	000	ST 43	BR459038	KNOB, WHITE, BLK, TEXT "6"
	24	000	ST 43	BR459046	KNOB, WHITE, BLK, TEXT "3"
	25	000	ST 43	BR474959	KNOB, WHITE, BLK, TEXT "C"
	26	000	ST 43	BR488526	KNOB, BLK, WHT, TEXT "18DB"
	27	000	ST 43	BR488496	KNOB, BLACK, WHT, TEXT "F1B"
	28	000	ST 43	BR488445	KNOB, BLK, WHT, TEXT "DUPLX"
	29	000	ST 43	BR471402	KNOB, BLK, WHT, TEXT "PROGR"
	30	000	ST 43	BR459100	KNOB, WHITE, BLK, TEXT "7"
	31	000	ST 43	BR459119	KNOB, WHITE, BLK, TEXT "4"
	32	000	ST 43	BR459127	KNOB, WHITE, BLK, TEXT "1"
	33	000	ST 43	BR459135	KNOB, WHITE, BLK, TEXT "0"
	34	000	ST 43	BR488518	KNOB, BLK, WHT, TEXT "TX ON"
	35	000	ST 43	BR488453	KNOB, BLACK, WHT, TEXT "ISB"

TITLE: FR PAN CKT A1A1 SE4010
DOCUMENT NO.: BR488356
REV: B4
SHEET NO.: 1 OF 4

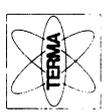


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Parts List

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PARIS LIST PER.. 95/01/02

FIND NO.	QTY REQ	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
36	1,000	ST	43	BR488410	KNOB,BLACK,WHT.TEXT #J3E#	3			MP19	
37	1,000	ST	43	BR459186	KNOB,BLACK,WHT.TEXT #RCL#	3			MP20	
38	1,000	ST	43	BR459194	KNOB,BLACK,WHT.TEXT #STD#	3			MP21	
39	1,000	ST	43	BR471410	KNOB,BLK,WHT.TEXT #LOCAL#	3			MP22	
40	1,000	ST	43	BR488372	KNOB,BLACK,WHT.TEXT #RS#	3			MP23	
41	1,000	ST	43	BR477990	KNOB,BLK,WHT.TEXT #6 DB#	3			MP24	
42	1,000	ST	43	BR488488	KNOB,BLACK,WHT.TEXT #H2A#	3			MP10	B1
43	1,000	ST	43	BR488437	KNOB,BLACK,WHT.TEXT #H3E#	3			MP26	
44	1,000	ST	43	BR459259	KNOB,BLK,WHT.TEXT #TUNE#	3			MP27	
45	1,000	ST	43	BR459267	KNOB,WHITE,BLK.TEXT #8#	3			MP28	
46	1,000	ST	43	BR459275	KNOB,WHITE,BLK.TEXT #5#	3			MP29	
47	1,000	ST	43	BR459283	KNOB,WHITE,BLK.TEXT #2#	3			MP30	
48	1,000	ST	43	BR459291	KNOB,WHITE,BLK.TEXT #.#	3			MP31	B1
49	1,000	ST	43	BR488399	KNOB,BLK,WHT.TEXT #METER#	3			MP4	
50	1,000	ST	46	BR448117	GUIDE SHEET 1 ALL	1			MP33	
51	1,000	ST	46	BR471461	GUIDE SHEET 2 ALL	1			MP34	
52	8,000	ST	52	BR453129	STAY NUT M3 X 7 N5	3			MP35	
53	6,000	ST	56	224537-009	SPACER, THREADED M3 X15MM	4			MP36	A3
54	7,000	ST	52	BR460338	STAY NUT M3 X13,3 N5	3			MP37	
55	9,000	ST	26	BR392839	TRANS-LOPOW 2N2907A SI-P	4			Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q10	
56	1,000	ST	26	BR362980	TRANS-HIPOW MJE3055 SI-N	4			Q9	
57	3,000	ST	26	BR369454	TRANS-DARLN MPSA13 SI-N I	4			Q11,Q12,Q13	
58	1,000	ST	26	BR399914	TRANS-JFETN J 309 IO-92	4			Q14	
59	1,000	ST	21	BR240400	RES CARB. 1K0 1/4J SFR25	4			R1	
60	1,000	ST	21	BR457663	RES NETW 8X1K5 1/4G	4			R2	
61	1,000	ST	21	BR457647	RES NETW 9X10K 1/5G	4			R3	
62	8,000	ST	21	BR241040	RES CARB. 15R 1/2JSFR25H	4			R4,R5,R6,R7,R8,R9,R10,R11	
63	1,000	ST	21	BR240419	RES CARB. 1K2 1/4J SFR25	4			R12	
64	1,000	ST	21	BR240613	RES CARB. 18K 1/4J SFR25	4			R13	
65	1,000	ST	21	BR324221	RES CARB. 2K4 1/4J SFR25	4			R14	
66	1,000	ST	21	BR240702	RES CARB. 56K 1/4J SFR25	4			R15	
67	3,000	ST	21	BR240516	RES CARB. 4K7 1/4J SFR25	4			R16,R17,R19	
68	1,000	ST	21	BR457639	RES NETW 7X4K7 1/5G	4			R18	
69	3,000	ST	21	BR240486	RES CARB. 3K3 1/4J SFR25	4			R20,R21,R22	
70	1,000	ST	21	BR451355	RES NETW 5X1K0 1/5G	4			R23	



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Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE:
FR PAN CKT ALL1A1 SE4010

DOCUMENT NO:
BR488356

REV: B4

SHEET NO: 2 OF 4

Parts List

PRINTED..... 95/01/03
PARTS LIST PER.. 95/01/02

FIND NO.	QTY REQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
71	1,000	SI	21	BR433470	RES NETW 9X1K0 1/5G	4			R24	
72	1,000	SI	21	BR457671	RES NETW 8X15K 1/4G	4			R25	
73	1,000	SI	21	BR349674	RES FILM 15K0 0,6F MRS25	4			R26	
74	3,000	SI	21	BR368539	RES FILM 7K50 0,6F MRS25	4			R27,R28,R29,R30,R31,R32, R33,R34	
75	1,000	SI	21	BR240745	RES CARB. 100K 1/4J SFR25	4			R35	
76	1,000	SI	21	BR240605	RES CARB. 15K 1/4J SFR25	4			R36	
77	1,000	SI	21	BR240338	RES CARB. 390R 1/4J SFR25	4			R37	
78	1,000	SI	21	BR240567	RES CARB. 10K 1/4J SFR25	4			R38	
79	1,000	SI	21	BR369578	RES FILM 5K11 0,6F MRS25	4			R39	
80	32,000	SI	33	BR450421	SW,PUSH BU.SPST NO	4			S1,S2,S3,S4,S5,S6,S7,S8, S9,S10,S11,S12,S13,S14, S15,S16,S17,S18,S19,S20, S21,S22,S23,S24,S25,S26, S27,S28,S29,S30,S31,S32	
81	1,000	SI	24	BR488127	IC DGTL 74HCT138 3-8 DECO	4			U1	
82	1,000	SI	24	BR488011	IC DGTL 74HCT 02 4X2IN NO	4			U2	
83	3,000	SI	24	BR362131	IC DGTL 74 06N 6X INV-BUF	4			U3,U10,U12	
84	1,000	SI	24	BR488062	IC DGTL 74HCT 14 6XINV-ST	4			U4	
85	1,000	SI	24	BR488208	IC DGTL 74HCT373 8XD-LATC	4			U5	
86	1,000	SI	24	BR450294	IC LIN TL 082CP OP-AMP.	4			U6	
87	2,000	SI	24	BR488151	IC DGTL 74HCT164 SHIFT RE	4			U7,U8	
88	1,000	SI	24	BR488178	IC DGTL 74HCT240 8XBUF.IN	4			U9	
89	1,000	SI	37	BR488364	FLCABL-ASSY W1 SE4010 A11 3	4			W1	
90	3,000	SI	31	BR451479	CONN AMP MODU2 IOP FEMALE	4			XP1,XP2,XP3	A2
91	1,000	SI	31	BR452688	TRANS-ACCESS TALLFJEDER	4				B
92	1,000	SI	48	214073-004	LABEL, ADHESIVE, ESD	2				B
93	1,000	G	78	200799-001	COMPOUND-THERMAL,SILICONE	4				B
94	0,260	M	32	BR220140	FLEX SILICONE 0,5/1 TRAN	4				B
***** BILL OF DOCUMENTATION *****										
WORKMANSHIP										
FRONT PANEL CKT A1A1										
FRONT PANEL CKT A1A1										

TITLE: FR PAN CKT A1A1 SE4010										
DOCUMENT NO.: BR488356										
(488356										
REV: B4										
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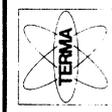
TERMA Elektronik AS

FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

Parts List

PRINTER..... 95/01/03
PARTS LIST PER... 95/01/02

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	SI	60	BR487139	MOTHERB ASSY A12A1 SE4010	1			A1	
2	12,000	SI	52	BR387681	STAY NUT M3 X10 N5	3			H1	
3	16,000	SI	52	BR450588	NUT M 3 SQUARE 3X7X2,2MM	4			H2	
4	12,000	SI	51	BR276723	SCREW M 3 X 8 UHM CU SN	4			H3	
5	4,000	SI	51	BR436909	SCREW UNBRK M 3X 8 UHR	4			H4	
6	40,000	SI	51	BR450561	SCREW SELFTAP.4X3/8 PH-PL	4			H5	
7	24,000	SI	51	BR276790	SCREW M 3 X 5 CHM CU SN	4			H6	
8	12,000	SI	51	BR495239	SCREW M 4 X 4 CHJ Z	4			H7	
9	1,000	SI	41	BR437104	PLATE, JUNCTION SE4010	1			MP1	
10	6,000	SI	41	BR445886	PROFILE,PC 1M	3			MP2	
11	1,000	SI	41	BR445894	PROFILE,PC 1M DRILL	3			MP3	
12	2,000	SI	41	BR445908	PROFILE,PC 1,5M	3			MP4	
13	2,000	SI	41	BR487112	PROFILE,SIDE DRILL.	3			MP5	
14	2,000	SI	41	BR458600	RAIL SECTION A12	1			MP6	
15	6,000	SI	41	BR495026	SPLICE-PIECE A12	1			MP7	
16	1,000	SI	41	BR487120	PROFILE,PC 1,5M DRL	3			MP8	
17	1,000	SI	48	BR494359	LABELS F/A2&A7 SE4010 A12	3			MP9	
18	16,000	SI	51	BR333417	SCREW M 4 X10 UHJ GULCR	4			H8	
19	5,000	SI	46	BR497266	BRACKET FOR 1M PROFILE	2			MP10	B
20	3,000	SI	46	BR497274	BRACKET FOR 1,5M PROFILE	2			MP11	B
21	8,000	SI	46	BR497282	FISHPLATE A12	2			MP12	B
22	12,000	SI	53	221387-135	WASHER LOCK 2.8X5.3X0.6MM	4				B1
24	12,000	SI	53	BR380105	WASHER,FLAT Ø 3MM CU SN M	4				D2
25	1,000	G	78	204729-001	GREASE, WHITE	4				E
***** BILL OF DOCUMENTATION *****										
***** WORKMANSHIP *****										
***** MOTHERBD ASSY A12A1 *****										
***** CHASSIS ASSY A12 *****										
***** NEXT ASSY *****										
***** SE4010 *****										
***** BR488100-031 *****										



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TITLE:
CHASSIS ASSY A12 SE4010

DOCUMENT NO.:
BR487147
(487147

REV: E

SHEET NO.: 1 OF 1

Parts List

PRINTED..... 95/01/03
PARTS LIST PER... 95/01/02

LINE REV	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	PREP NO.	BIN	REFERENCE DESIGNATION
1	37	PWB, MOTHERBD SE4010 A12			
2	22	CAP. CER. 100N 50 M			C1, C2
3	31	CONN PWB ACCES CODE PIN			H1
4	31	CUNN FLATCABLE 34P MALE			J1
5	21	RES CARB. 2K2 1/4J SFR25			R6
6	21	RES CARB. 1K0 1/4J SFR25			R7, R8, R9, R12, R13
7	21	RES NETW 9X2K2 1/5G			R10
8	21	RES NETW 5X2K2 1/5G			R11
9	24	IC DGTL 74HCT245 8BIT TRC			U1, U2
10	24	IC DGTL 74 37N 4X2IN NAND			U3
11	31	CONN PWB EDGE 36P FEMALE			XA1, XA2, XA3, XA4, XA6, XA7, XA8, XA9, XA10
***** BILL OF DOCUMENTATION *****					
WORKMANSHIP					
MOTHERBD ASSY A12A1					
MOTHERBD ASSY A12A1					
***** NEXT ASSY *****					
CHASSIS ASSY A12 SE4010					

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TITLE: MOTHERB ASSY A12A1 SE4010
 DOCUMENT NO.: BR487139 (487139)
 REV: A
 SHEET NO.: 1 OF 1

7 **MANUAL CHANGES**

7.1 **Introduction**

This section contains information for adapting this manual to equipment to which the contents do not directly apply.

8 SERVICE

8.1 Introduction

This section provides information for servicing the Synthex.

8.2 Theory of Operation

The overall theory of operation is explained in section 8.9. The Service Sheets at the end of this section explains with the aid of block diagrams the operation of functional assemblies.

Detailed theory of operation is located opposite the schematics at the end of this section.

8.3 Trouble Shooting

WARNING

Read the Safety Summary at the front of this manual before trouble shooting the Synthex.

By the use of front panel controls, note as many symptoms of the malfunction as possible. From these symptoms it can usually be determined which assembly is malfunctioning. The Self-Test Program and the Fault Analysis Table (table 8.3) can be used as a guide.

When a problem has been isolated to a particular assembly or circuit, the faulty component(s) may be located using the Service Sheets at the end of this section.

8.4 Self-Test Program Description

Program 48 and 49.

8.4.1 Introduction

The SE4010 contains two self-test programs, an automatic (program 49) and a manual step by step test (program 48).

The automatic test program runs through all test sequences without pressing any key, with one exception: when testing the keyboard. To continue the test, press the **[enter]** key.

The manual test runs through the same test sequences and test points as the automatic test. To run through the test, see section 8.4.3.

A test sequence consists of several tests. The self-test program runs through the test sequences listed in figure 8.1.

The left hand display displays the number of the test program running. Display "t49" indicates that the automatic self-test program is running, whereas display "t48" indicates that the manual self-test program is running.

The right hand display shows the status of the test. This status includes error messages, the number of the tests the test program has just been running through and the number of the next test sequence.

If an error occurs when running through a test, an error code message is displayed on the display. The Fault Analysis Table (Table 8.3), gives the most possible cause of the error.

A test is related to the assembly number of the module which has to be tested, and is displayed on the right hand display with an index (e.g. "t49 A2 2" which means the second test of the test sequence of the A2 module).

A test sequence is also related to the assembly number, and is displayed on the right hand display without any indexes, (e.g. "t49 A2" which means the headline of the A2 module test).

TEST SEQUENCES FOR THE SE4010 SELF-TEST PROGRAM

- a) If the remote module (A9) is present (option), the remote address of the SE4010 is displayed.
- b) Software version.
- c) Software options.
0000000 means no options.
- d) Key board test.
- e) LED and display test.
- f) (A8 module) Real Time Clock, DAC and SH circuit test.
- g) (A2 module) Standard Oscillator test.
- h) (A1 module) Synthesizer test.
- i) (A7A2 module) Remote Key test. (option)
- j) (A5 module) Interface module test.
- k) (ATU) Antenna Tuner test. (option)
- l) (A3 module) IF module test.
- m) (A7 module) Modulator module test.
- n) (A4 module) Wide Band Amplifier test.
- o) Assembly status.
- p) Test end. Return to setting displayed in the display when entering the self-test program.

Figure 8.1

8.4.2 Automatic Self-Test

To enter the automatic self-test program press the following keys: **[PROG]** **[4]** **[9]** and **[enter]** and the automatic self-test program starts with test sequence a).

Section 8.4.4 describes in more detail the test sequences, which the self-test program runs through.

During the automatic self-test of the SE4010, all keys of the keyboard are ignored (except when running the key board test). If the test program stops when

an error is found or a module is not present, the self-test program continues the test of the SE4010 when the **[enter]** key is pressed.

If the **[RS]** key is pressed instead of the **[enter]** key, the self-test program stops testing the SE4010 and gives the operator an assembly status before going back to the set-up displayed in the displays when entering the self-test program.

8.4.3 Manual Self-Test

To enter the manual self-test program press the following keys: **[progr]** **[4]** **[8]** and **[enter]** and the manual self-test program starts with test sequence a.

The next section describes in more detail the test sequences which the self-test program runs through.

During the manual self-test of the SE4010, the **[sto]**, **[rcl]**, **[enter]** and **[RS]** keys can be used to control the self-test procedure.

The **[sto]** key executes the next test which is displayed in the SE4010 display just after the **[sto]** key is pressed. After this the display will not change to another display if the test has not failed.

The **[rcl]** key repeats the previous test one more time. The display will not change to another display because the previous test status display is already displayed.

The **[enter]** key jumps forward to the next test sequence, without executing any of the tests of the test sequence which are displayed on the SE4010 display. Once entering into a test sequence using the **[sto]** key, the **[sto]** key has to be used until the next test sequence number is displayed on the SE4010 display.

The **[RS]** key stops the self-test program, gives the operator an assembly status and returns to the set-up displayed before entering the self-test program.

8.4.4 Description of the Test Sequences

The test sequences consist of several tests, each having a separate display showing the operator the test status. As the automatic self-test runs through the test program without pressing any key, (except when running the keyboard test) the display automatically shows the current test status.

The duration of a single test varies from approximately 1 msec. to approximately 5 sec. causing the duration of the test status display to vary, too.

When the microprocessor runs through a current test, a dot is lit just behind the assembly number which is being tested. As long as this dot is lit, any key on the keyboard is ignored.

If an error occurs when testing a module, the test stops at this test, and further test of the module is not possible. If a module fails, this failure can cause error messages when testing other modules. As the modules are interdependent the complete self-test program can only run from the beginning to the end when all modules in the SE4010 (except the options) are present and work without any errors.

When testing a module and more than one error is detected, only the first error is displayed on the SE4010 display.

The following is a description of each test sequence in the self-test program. The index refers to the index in figure 8.1.

Just for illustration the left hand display displays **t49**.

- a) If a Remote Module, A9 is present, the remote address of the SE4010 is displayed as shown in figure 8.2 for approx. 3 seconds.

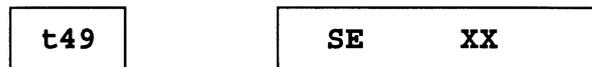


Figure 8.2

If a Remote Module, A9 is not present, figure 8.2 is not shown in the display, and the program automatically goes to the test sequence b (Both in automatic and in manual self-test).

- b) The software version is displayed as shown in figure 8.3.

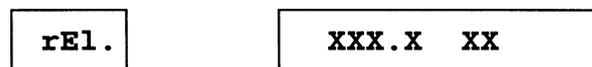


Figure 8.3

"XXX.X XX" can be letters and numbers.

- c) The software options are displayed as shown in figure 8.4.

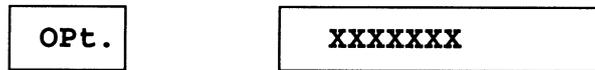


Figure 8.4

"XXXXXXXX" can be letters and numbers.

- d) KEY BOARD test. The right hand display on the SE4010 displays the hexadecimal value of the key which is activated, except the following keys: **[Tx on]**, **[local]**, **[RS]** and **[enter]**.

Only two hexadecimal values can be displayed on the display at the same time. Refer to table 8.2 for the hexadecimal values.

The **[enter]** key must be pressed to leave the keyboard test, both in the automatic test and in the manual test.

- e) LED and display test. All LEDs and segments in the two displays will be on. A dot moves from left to right on the bargraph meter in the right hand display within approx. 2 sec. When reaching the right end bar, all LEDs and segments turn off.
- f) (A8) MICROPROCESSOR test. The microprocessor tests the Real Time Clock circuit, the DAC circuit and the SH circuit.

During the Real Time Clock test, figure 8.5 is displayed. The microprocessor tests the interrupt from the Real Time Clock every one second to check proper operation. The test goes on for 3 seconds.



Figure 8.5

The DAC and the SH tests are tied together to check the strap on the A8 module. During the DAC test, figure 8.6 is displayed for approx. 3 seconds. The DAC test controls the adjustment of the DAC converter.



Figure 8.6

After a successful DAC test, the SE4010 shows figure 8.7 and continues to the SH circuit test. The SH circuit is tested for proper operation, and whether the strap S7 on the A8 module is present or not.

If the strap is not present, the self-test program stop testing the SE4010 and an error message "**Err A8 StrP**" is displayed. After approx. 5 sec. an assembly status is given and the display returns to the set up from before the self-test program was entered.



Figure 8.7

- g) (A2) STANDARD OSCILLATOR test. This test sequence goes through three tests, each having a corresponding display as shown in figure 8.8. The lock time of the oscillators must be within the limits of maximum lock time to pass the test. The 10.24 MHz oscillator is tested for oscillation.

Display	Comments		
t49	A2	1	10.24 Level test
t49	A2	2	73.6 MHz oscillator test
t49	A2	3	1.4 MHz oscillator test

Figure 8.8

- h) (A1) SYNTHESIZER test. This test sequence goes through 12 test each having a corresponding display as shown in figure 8.9. The lock time for every test frequency is tested, and must be within the limits of maximum lock time to pass the test.

Display			Test frequency
t49	A1	1	29999.99 kHz
t49	A1	2	25000.00 kHz
t49	A1	3	20000.01 kHz
t49	A1	4	19999.99 kHz
t49	A1	5	16000.00 kHz
t49	A1	6	12000.01 kHz
t49	A1	7	11999.99 kHz
t49	A1	8	9000.00 kHz
t49	A1	9	6000.01 kHz
t49	A1	10	5999.99 kHz
t49	A1	11	3000.00 kHz
t49	A1	12	1500.00 kHz

Figure 8.9

- i) (A7A2) REMOTE KEY test (optional). As the Remote Key Module is an optional module of the Modulator Module (A7) the program tests whether the Modulator Module is present or not before the test of the A7A2 module. During this test figure 8.10 is displayed. If the Modulator Module is not present, the test of the Remote Key Module is not performed and a message " no A7" is displayed.

t49	A7	1
-----	----	---

Figure 8.10

During test of the Remote Key Module figure 8.11 is displayed.

The Remote Key Module is tested for access and the status word read from the Remote Key Module is compared to the status word read from the assembly sequence for the SE4010.

t49	A7A2	1
-----	------	---

Figure 8.11

- j) (A5) INTERFACE MODULE test. During this test figure 8.12 is displayed. The Interface Module is tested for access.

t49	A5	1
-----	----	---

Figure 8.12

- k) (ATU) ANTENNA TUNER test (optional). As the Antenna Tuner is connected to the SE4010 via the Interface Module, A5 this test is not performed if the Interface Module is not present. When the Interface Module is present, and an antenna tuner is connected, the status word read from the antenna tuner is compared to the status word read from the assembly sequence of the SE4010. During the antenna tuner test figure 8.13 is displayed.

t49	ATU	1
-----	-----	---

Figure 8.13

- l) (A3) IF MODULE test. As the operation of the IF module depends on correct working modules A1, A2, A5 and A7, the test of the IF module starts with an examination of those modules. If one of the modules is not present or an error has occurred during the previous test of the concerned modules, the test of the IF module is stopped and an error message is displayed. During this initial test of the IF module figure 8.14 is displayed.

As the test program goes through this test automatically in manual test mode, too, the display automatically changes according to figure 8.14.

Display			Comments
t49	A3	1	A1 module examination
t49	A3	3	A2 module examination
t49	A3	5	A7 module examination
t49	A3	6	A5 module examination

Figure 8.14

When the init test has passed without any errors, the IF module is tested for correct operation. A test signal from the Modulator Module is connected to the input of the IF Module and the output is tested for correct operation. The attenuators and detectors are tested for correct level adjustment. During this test sequence, the tests are displayed as shown in figure 8.15.

Display			Comments
t49	A3	7	A1 module lock test on the test frequency. Data set ups to the A2, A5 and A7 modules. Test of A3 module. Interlock is reset.
t49	A3	11	Same test as above. Interlock is set.
t49	A3	13	Same test as above. Interlock is reset. ALC reset test.
t49	A3	15	Test of the variable attenuator of the A3 module.
t49	A3	18	Same test as A3 7. Interlock is set.
t49	A3	19	Same test as above. Interlock is reset.

Figure 8.15

- m) (A7) MODULATOR MODULE test. The operation of the Modulator Module depends on correct working modules A1, A2, A and A5, and the test of the Modulator Module starts with an examination of the those modules. If one of the modules is not present or an error has occurred during the previous test of the concerned modules, the test of the Modulator Module is stopped and an error

message is displayed.

After a successful init test of the Modulator Module, the upper side band channel is tested for proper operation. During this test figure 8.16 is displayed.



Figure 8.16

The final test of the Modulator Module is a test of the lower side band channel (this test is not performed in SSB versions). During this test, figure 8.17 is displayed.



Figure 8.17

- n) (A4) Wide Band Amplifier (WBA) test. The operation of the WBA module depends on correct working A1, A2, A3, A5 and A7 modules. Therefore the test of the WBA module starts with an examination of the those modules. If one of the modules is not present or an error has occurred during the previous test of the concerned modules, the test of the WBA Module is stopped and an error message is displayed. The test program automatically runs through this init test of the WBA Module, and the display changes the display as shown in figure 8.18.

Display	Comments
t49 A4 1	A1 module examination
t49 A4 3	A2 module examination
t49 A4 5	A3 module examination
t49 A4 7	A5 module examination
t49 A4 8	A7 module examination

Figure 8.18

After a successful init test of the WBA Module, the module is tested for detector error. If the detector is working, the gain of the WBA Module is controlled at three different test frequencies. The gain must be within certain

limits to pass the test. During this test, the display is as shown in figure 8.19.

Display			Comments
t49	A4	10	WBA detector test
t49	A4	11	Gain test at 1500 KHz
t49	A4	12	Gain test at 10000 KHz
t49	A4	13	Gain test at 29999.99 KHz

Figure 8.19

- o) ASSEMBLY TEST. This test tells the operator the assembly number of the modules which are **not** present. If strap S7 on the A8 Module is not present, the error message "**Err A8 StrP**" is also displayed. The "**ERR**" annunciator will switch on the strap on the A8 Module is mounted.
- p) TEST END. The program returns to the set-up displayed when the self-test program was entered.

8.5 Monitoring of Fault Conditions

The microprocessor on the Microprocessor Module, A8 monitors continuously the circuits of the Synthex and of a connected transmitter. If a fault occurs, an error code appears shortly on the display and the error code is stored in the Automatic Error Log (see section 3) together with the date and time. At the same time the "**Err**" annunciator on the front panel display turns on informing the operator that a fault is present or has been present. If a fault occurs more than one time during a day, only the first time will be logged. Later on the error code can be recalled from the log.

The error codes is shown in Table 8.4.

8.6 Preventive Maintenance

It is recommended to replace the built-in battery BT1 of the Microprocessor Module A8 approximately once a year; replacement intervals should not exceed two years. After replacement of the battery, the RAM must be cleared using the "clear all" function and a complete reprogramming of the programmed settings must be carried out.

8.7 Corrective Maintenance

The push button switches in this exciter have been designed for long, troublefree service. If one of these switches should become defective, replacement rather than repair is recommended.

8.8 General Maintenance Instructions

The following subsections contain general instructions for handling of the controller during maintenance and service.

8.8.1 Cleaning

Painted surfaces can be cleaned with a commercial, spray-type window cleaner or with a mild soap and water solution.

Avoid the use of chemical cleaning agents that might damage the plastics used in this exciter!

8.8.2 Front Panel Assembly Removal

To remove the front panel assembly proceed as follows:

- a) Remove the four screws holding the front panel. The four screws are located at the exterior side of the exciter side profiles.
- b) Carefully withdraw the front panel assembly and disconnect the ribbon cable connector from the mother-board.
- c) To reinstall the front panel assembly, reverse removal procedure.

8.8.3 PC-Board Assembly Removal

To remove a PC-board assembly, proceed as follows:

- a) Remove the WBA Assembly A4 by removing the four screws holding the panel on which the WBA is placed. The four screws are located on the exterior side of the exciter side profiles. Disconnect the coaxial cable and the DC cable from the WBA Assembly.
- b) Disconnect all cables running to the concerned assembly.

- c) Remove the six (eight) screws positioned at the edge of the concerned assembly rear panel and pull the assembly. If the assembly is stuck in the chassis frame, it may be necessary to carefully release the assembly by keying a screwdriver in between the rear panel and the main frame.
- d) To reinstall the assembly, reverse removal procedure. Due to the use of self tapping screws holding the assembly rear panel to the chassis frame, carefully reinsert the screws in the threads when reversing step c) above.

8.8.4 Servicing PC-Boards

All the PC-boards have plated-through component holes. This allows components to be removed or replaced by unsoldering or soldering from either side of the board. When removing integrated circuits, cut all pins and remove the pins afterwards with a soldering iron.

8.8.5 MOS Handling Precautions

All MOS devices are subject to damage from static charge build-up. The generation of static charges is not a problem, but the accumulation of static charges is. In general, any device not connected directly to ground can accumulate static charges. Electrical discharge can occur to ground or to any object or person having a lower potential. Therefore, handling precautions are recommended for all personnel coming into contact with MOS devices.

When handling or testing MOS devices, observe the following precautions.

- a) Ground test equipment and tools used in testing or handling MOS devices.
- b) In order to prevent accumulated static charges to discharge through MOS devices, establish electrical connection between ground and handling personnel which are handling the MOS devices.

WARNING

For safety reasons resistance of 1M ohms must be placed between handling personnel and hard electrical ground.

- c) Apply no power to board assembly while MOS device is being installed. This permits accumulated static charges on MOS device to be safely removed before power is applied.
- d) Avoid the use of plastics, rubber, and silk in MOS areas. Do not use any material susceptible to static charge accumulation. Use anti-electrostatic plastic for packing of assemblies containing MOS devices.
- e) Handle circuit boards and modules containing MOS devices in the same manner as individual MOS devices. Regardless of configuration, whenever leads of MOS devices are exposed, damage due to static charge build-up can occur.
- f) Use conductive, grounded table tops in MOS work area.
- g) Humidity in work area should be maintained above 50%. Static charge generation increases exponentially as relative humidity decreases.

8.9 Overall Operation

The overall functional block diagram of the exciter is shown in figure 8.20.

In the Modulator Assembly A7 the AF inputs are mixed with the first LO at 1.4 MHz. In this way the two side bands are generated. Finally the two side bands and the carrier are amplified, by controlled amplifiers, to the wanted amplitudes and then summed together.

On the IF Assembly A3, the 1.4 MHz signal from the Modulator Assembly is mixed with second LO signal at 73.6 MHz and the sum-frequency at 75.0 MHz is fed to a voltage controlled attenuator via a bandpass filter. This attenuator is, via the Interface Assembly A5 and the Microcomputer Assembly A8, controlled by the detected output power of the corresponding transmitter. In this way the output power is constantly held on the selected level.

After the controlled attenuator, the 75.0 MHz signal is mixed to the output frequency with the third LO at 76.5 MHz to 105 MHz. Finally the signal is amplified up to 1 W in the WBA Assembly A4.

The Standard Assembly A2 generates the first LO signal at 1.4 MHz, the second LO signal at 73.6 MHz and the Synthesizer Assembly reference signal.

The Synthesizer Assembly A1, generates the third LO signal tunable from 76.5 MHz to 105 MHz in 10 Hz increments.

The Microcomputer Assembly A8 performs the overall control of the exciter. Typical tasks handled by the assembly:

- Control of the individual assemblies
- Keyboard and step-tune reading
- Display refreshing
- ALC through multiplexed D/A-A/D conversion
- Power level set-up
- Programmable memory set-ups
- Remote control
- Diagnostic routines

Communication between the Microcomputer Assembly and the remaining assemblies is conducted over an internal bus running on the mother PC-board and the front panel ribbon cable.

The Interface Assembly A5 contains the necessary circuits to power reduction caused by increasing SWR, D/A conversion to set up power levels and A/D conversion to measuring of different analog voltages. It also contains the necessary interface to control an antenna tuner.

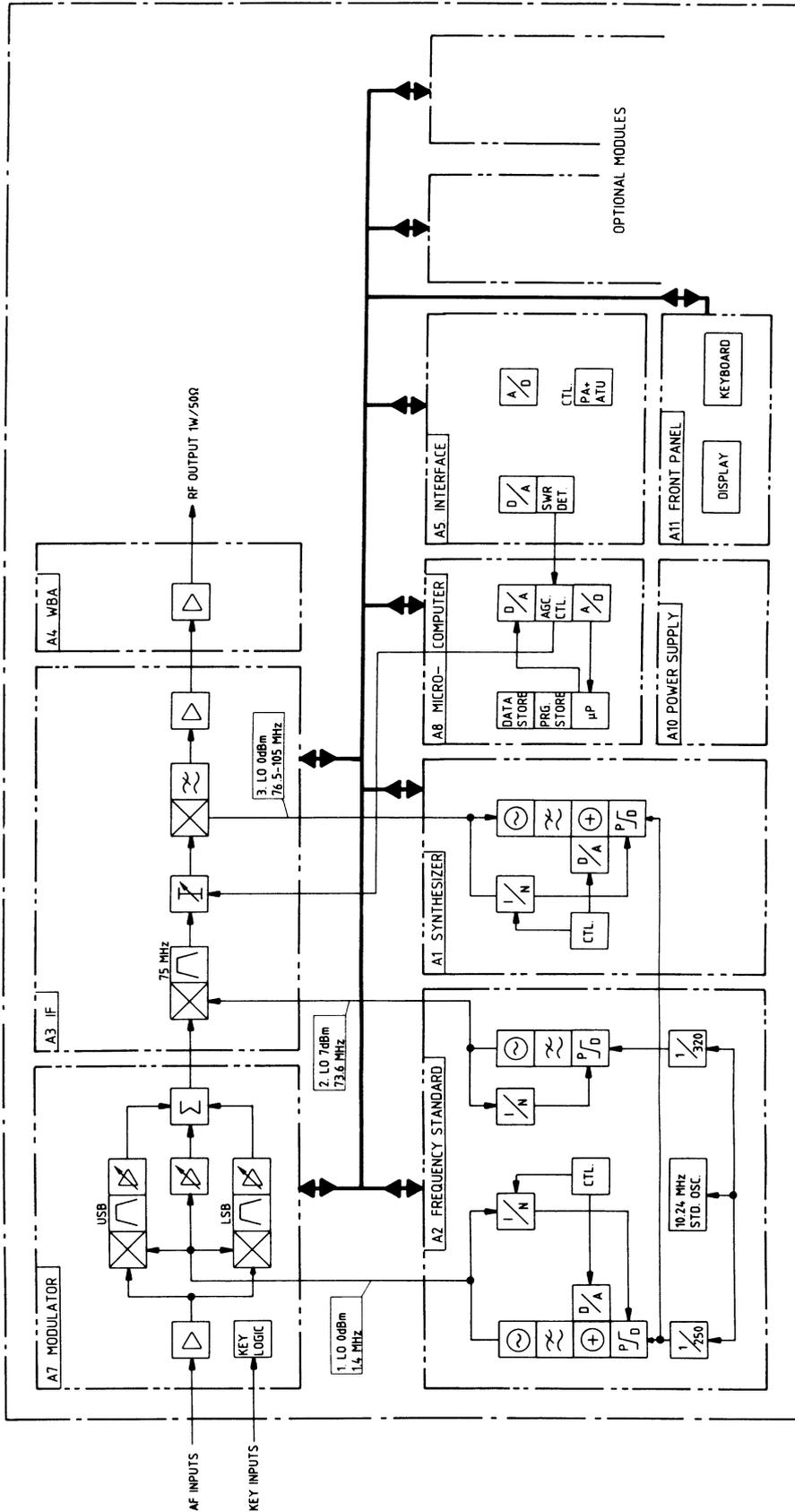


Figure 8.20 Overall functional block diagram

Table 8.2 Key values during self-test

KEY DEPRESSED	VALUE DISPLAYED
J3E	11
R3E	10
H3E	12
duplx	13
ISB	18
F1B	19
A1A	1A
H2A	1B
0dB	21
6dB	22
18dB	24
key	36
progr	38
meter	35
C	37
.	8A
0	80
1	81
2	82
3	83
4	84
5	85
6	86
7	87
8	88
9	89
rcl	31
sto	30

Table 8.3 Self-test fault analysis table

Error code			Fault Description
no	A1		A1 is not mounted.
Err	A1	1	A1 has not locked on 29999.99kHz: A1 or A2 defect.
Err	A1	2	A1 has not locked on 25000.00kHz: A1 or A2 defect.
Err	A1	3	A1 has not locked on 20000.01kHz: A1 or A2 defect.
Err	A1	4	A1 has not locked on 19999.99kHz: A1 or A2 defect.
Err	A1	5	A1 has not locked on 16000.00kHz: A1 or A2 defect.
Err	A1	6	A1 has not locked on 12000.01kHz: A1 or A2 defect.
Err	A1	7	A1 has not locked on 11999.99kHz: A1 or A2 defect.
Err	A1	8	A1 has not locked on 9000.00kHz: A1 or A2 defect.
Err	A1	9	A1 has not locked on 6000.01kHz: A1 or A2 defect.
Err	A1	10	A1 has not locked on 5999.99kHz: A1 or A2 defect.
Err	A1	11	A1 has not locked on 3000.00kHz: A1 or A2 defect.
Err	A1	12	A1 has not locked on 1500.00kHz: A1 or A2 defect.
Err	A1	13	A2 is not mounted.
no	A2		A2 is not mounted.
Err	A2	1	10.24MHz oscillator not oscillating: A2 defect.
Err	A2	2	73.6MHz loop has not locked: A2 defect.
Err	A2	3	1.4MHz loop has not locked: A2 defect.
no	A3		A3 is not mounted.
Err	A3	1	Test of A3 is not possible because A1 is missing.
Err	A3	2	Test of A3 is not possible because A1 has failed during test.
Err	A3	3	Test of A3 is not possible because A2 is missing.
Err	A3	4	Test of A3 is not possible because A2 has failed during test.
Err	A3	5	Test of A3 is not possible because A7 is missing.
Err	A3	6	Test of A3 is not possible because A5 is missing.
Err	A3	8	A1 has not locked: A1 is defect.
Err	A3	9	No input signal to A3: Cable between A7J1 and A3J4 defect or missing. A7 defect.

Table 8.3 Self-test fault analysis, continued

Err	A3	10	No output signal from A3: Missing oscillator signals, defect cables or A3 defect.
Err	A3	11	Input signal to A3 when exciter is interlocked: A5 or A7 defect.
Err	A3	12	Output signal from A3 when exciter is interlocked: A5 or A7 defect.
Err	A3	13	No input signal to A3 after interlock reset: A3, A5 or A7 defect.
Err	A3	14	No output signal from A3 after interlock reset: A3 defect.
Err	A3	15	The Voltage Controlled Attenuator is defect: A3 defect.
Err	A3	16	The Voltage Controlled Attenuator has too much attenuation: A3 defect.
Err	A3	17	The Voltage Controlled Attenuator has too little attenuation: A3 defect.
Err	A3	18	Same as "Err A3 9".
Err	A3	19	ALC Reset defect: A3 defect.
Err	A4	1	Test of A4 is not possible because A1 is missing.
Err	A4	2	Test of A4 is not possible because A1 has failed during test.
Err	A4	3	Test of A4 is not possible because A2 is missing.
Err	A4	4	Test of A4 is not possible because A2 has failed during test.
Err	A4	5	Test of A4 is not possible because A3 is missing.
Err	A4	6	Test of A4 is not possible because A3 has failed during test.
Err	A4	7	Test of A4 is not possible because A5 is missing.
Err	A4	8	Test of A4 is not possible because A7 is missing.
Err	A4	9	Test of A4 is not possible because A7 has failed during test.
Err	A4	13	A1 has not locked: A1 defect.
Err	A4	14	A4 defect or missing.
Err	A4	15	The gain of A4 is too small: A4 defect.
Err	A4	16	A4 defect or missing.
no	A5		A5 is not mounted.
no	A7		A7 is not mounted.
no	A7A2		The Remote Key (option) is not mounted.
Err	A7A2		Conflicting data read: A7J4 bad. A7 or A7A2 defect.
Err	A7	2	Signal from Morse tone Generator through USB not detected: A5 or A7 defect.
Err	A7	3	Signal from Check Circuit through USB not received by A8: A7 defect.

Table 8.3 Self-test fault analysis, continued

Err	A7	4	Signal from Morse tone Generator through LSB not detected: A5 or A7 defect.
Err	A7	5	Signal from Check Circuit through LSB not received by A8: A7 defect.
Err	A7	6	No USB output from A7: A7 defect. Cable between A7J1 and A3J4 defect or missing.
Err	A7	7	No LSB signal from A7: A7 defect. Cable between A7J1 and A3J4 defect or missing.
Err	A7	8	Test of A7 is not possible because A1 is missing.
Err	A7	9	Test of A7 is not possible because A1 has failed during test.
Err	A7	10	Test of A7 is not possible because A2 is missing.
Err	A7	11	Test of A7 is not possible because A2 has failed during test.
Err	A7	12	Test of A7 is not possible because A5 is missing.
Err	A8 clock		The Real Time Clock is defect: A8 defect.
Err	A8 dAC		D/A Converter defect: A8 defect.
Err	A8 SH		Sample and hold circuit defect: A8 defect.
Err	A8 StrP		Strap S7 on A8 is not correct mounted.
no	ATU		Antenna Tuner is not connected.
Err	ATU	1	Conflicting status read: Antenna Tuner or A5 defect.

Notes to the Error Table:

1. The table describes the most probable obliging faults. All fault possibilities is thus not listed.
2. If an error has been detected, it can be caused by an other detected error.
3. A "defect" assembly includes a missing assembly or an assembly which is not correct adjusted. A missing assembly is indicated by "no An", where "n" is a number between 1 and 9.

Table 8.4 Error codes

Error Codes	Remarks
Err. 1.4 LOC.	1.4 MHz loop on A2 out of lock
Err. 73.6 LOC.	73.6 MHz loop on A2 out of lock
Err. SYn. LOC.	76.5 - 105 MHz loop on A1 out of lock
Err. rEF. OSC.	Level from reference oscillator on A2 too low.
Err. PA. L.-1	Power Amplifier of upper PA drawer to the left switched off.
Err. PA. r.-1	Power Amplifier of upper PA drawer to the right switched off.
Err. PA. L.-2	Power Amplifier of lower PA drawer to the left switched off. (1 kW transmitter only).
Err. PA. r.-2	Power Amplifier of lower PA drawer to the right switched off. (1 kW transmitter only).
Err. PA. ALL	All Power Amplifiers switched off.
Err. Ant.rEF.	SWR greater than 5.
Err. A8 StrP	Strap S7 on A8 is not correct mounted.
Err. Atu.FAIL	Connected Antenna Tuner can not terminate tuning. Error message received from connected Antenna Tuner.
Err. Atu.dIS.	Antenna Tuner disconnected while mains is on.

ASSY 498629, FAST SYNTHESIZER

Service Sheet A1 and A1A1

The functional block diagram of the synthesizer is shown in the next figure.

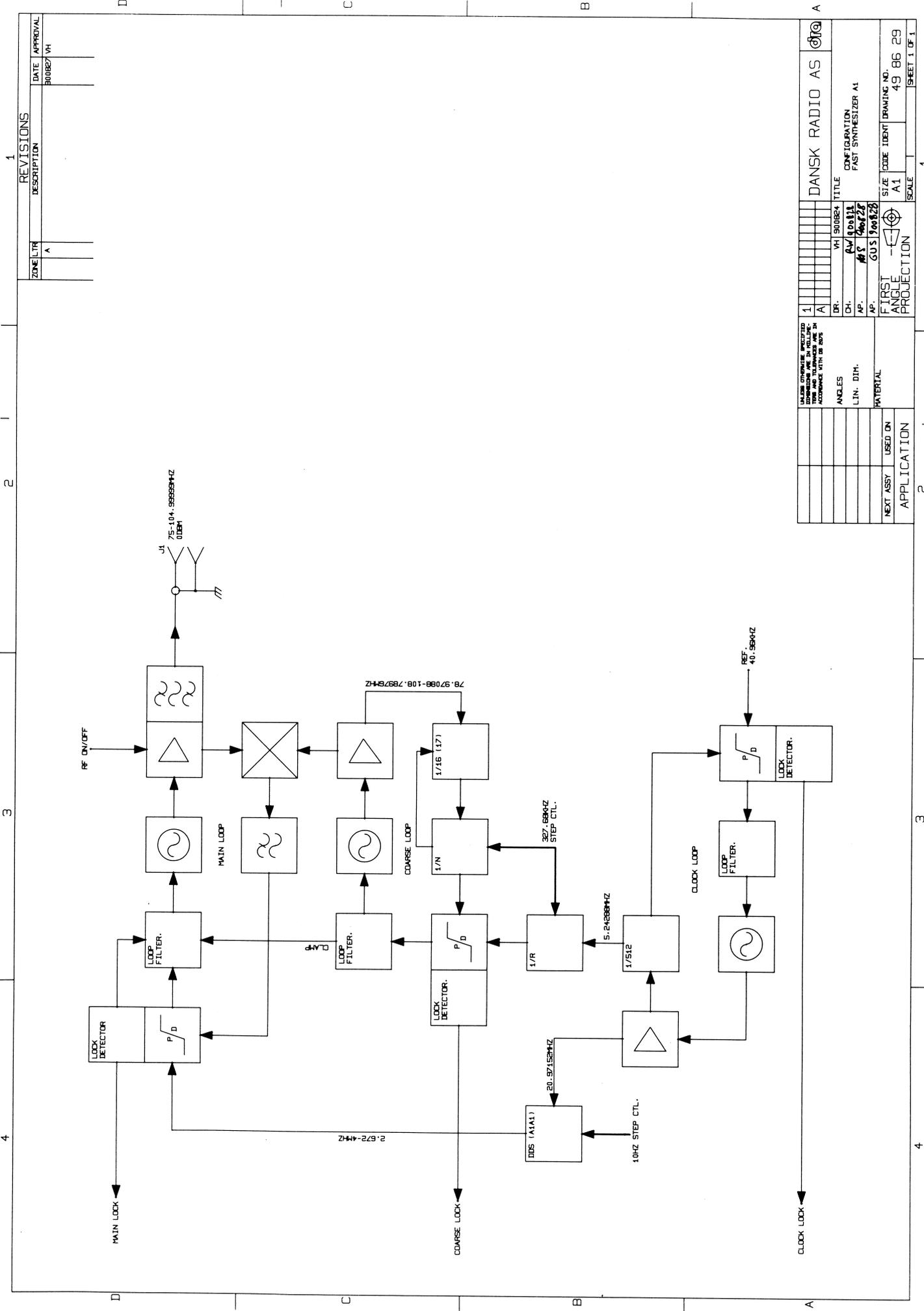
The assembly generates the 75 to 105 MHz local Oscillator (LO) signal for Assembly A3. The synthesizer is based on the Direct Digital Synthesis (DDS) technique, enabling fast frequency shift. The DDS submodule A1A1 generates a 2.672 to 4.0 MHz reference signal for the main loop, variable in 10 Hz steps. A clock signal for the DDS comes from the Clock Loop.

In the Clock Loop a 20.97152 MHz VCXO is locked to the 40.96 kHz reference signal from the master reference oscillator on Standard Assembly A2.

The Clock Loop also delivers a clock signal to the Coarse Loop, where this is divided down to a 327.68 kHz reference signal. The N divider of the Coarse Loop combined with the 16(17) prescaler has a division ratio between 241 and 332, resulting in a Coarse Loop output frequency that is 2.672 to 4.0 MHz higher than the LO output from the Main Loop.

In the Main Loop the output of the main oscillator is mixed down with the Coarse Loop output. The resulting signal is routed to a phase detector where it is compared with the DDS output. The frequencies of these two signals are the same when the loop is locked, resulting in a 75 to 104.99999 MHz LO output with 10 Hz resolution.

A clamping circuit prevents the Main Loop from exceeding its locking range and the loop has a variable loop filter, controlled by a lock detector timing circuit, to assure high switching speed.



REVISIONS

ZONE/LTR	DESCRIPTION	DATE	APPROVAL
A			

DANSK RADIO AS		DRAWING NO. 49 86 29	
TITLE: CONFIGURATION FAST SYNTHESIZER A1		SCALE: 1	
DR: VH 500824	CH: AW/908111	SIZE: A1	SHEET 1 OF 1
AP: AS	DATE: 2008/28	ANGLE: 0	
AP: GUS	PROJECTION: 1st Angle		
MATERIAL		APPLICATION	
NEXT ASSY USED ON			

Regulator Circuit

1. Supply Filtering

2. Negative Regulator

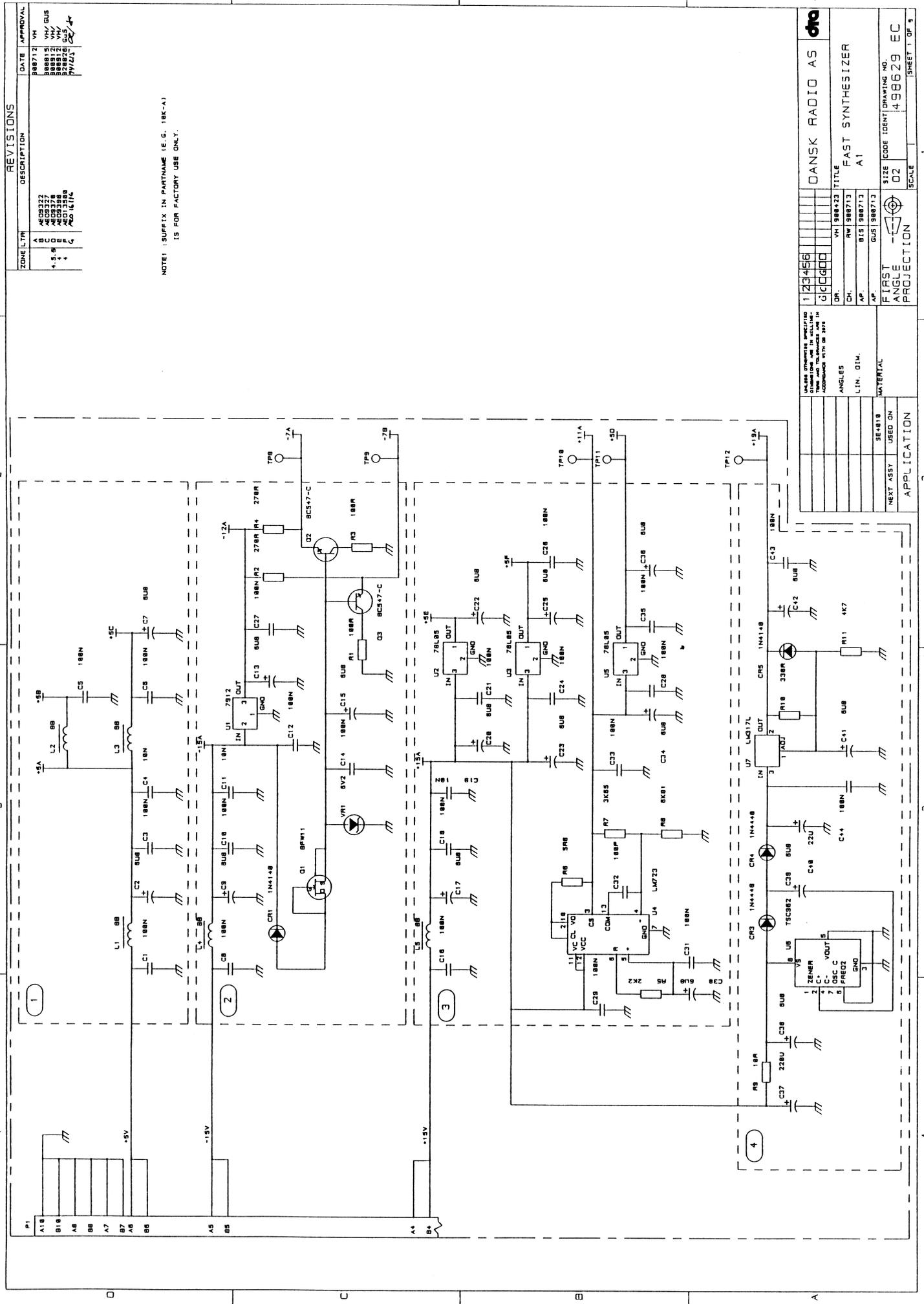
Q1 to Q3 form a low noise regulator that is dedicated to the VCO circuits in the Coarse and Main Loops. U1 regulates the VCO-band switch supplies.

3. Positive Regulator

U2 and U3 are regulators for the phase detectors and other sensitive circuits in the Coarse and Main Loops. U4 and 5 form a supply with very clean output for the Clock Loop.

4. High Voltage Regulator

U7 regulates the output from the voltage doubler U6 to 19V for the loop filters of the Coarse and Main Loops.



ZONE	UTM	DESCRIPTION	DATE	APPROVAL
A	4003172		080712	VH
+	4003172		080815	VH/GUS
+	4003172		080815	VH
+	4003172		080815	VH
+	4003172		080815	VH
+	4003172		080815	VH
+	4003172		080815	VH
+	4003172		080815	VH
+	4003172		080815	VH
+	4003172		080815	VH

NOTE: SUFFIX IN PARTNAME (E.G. 18K-A)
IS FOR FACTORY USE ONLY.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
123456																			
DR.	VH 3988-23	DANSK RADIO AS																	
CH.	RW 398713	TITLE FAST SYNTHESIZER																	
AP.	GUS 398713	A1																	
AP.	GUS 398713	MATERIAL																	
FIRST ANGLE PROJECTION		APPLICATION																	
SIZE CODE IDENTIFYING NO. 498629 EC		NEXT ASSY USED ON																	
SCALE 1:1		SE4818 USED ON																	
SHEET 1 OF 3		DRAWING NO. 498629 EC																	

Bus Interface5 Address Decoder

Write addresses are decoded by U9, read addresses by U10. U11 and Q4 produce an Acknowledge signal.

6 Pulse Shaper

U12 generates a 2 microsecond PE (program enable) pulse with a 1 microsecond delay for the Coarse Loop PLL-LSI.

7 Data Latches

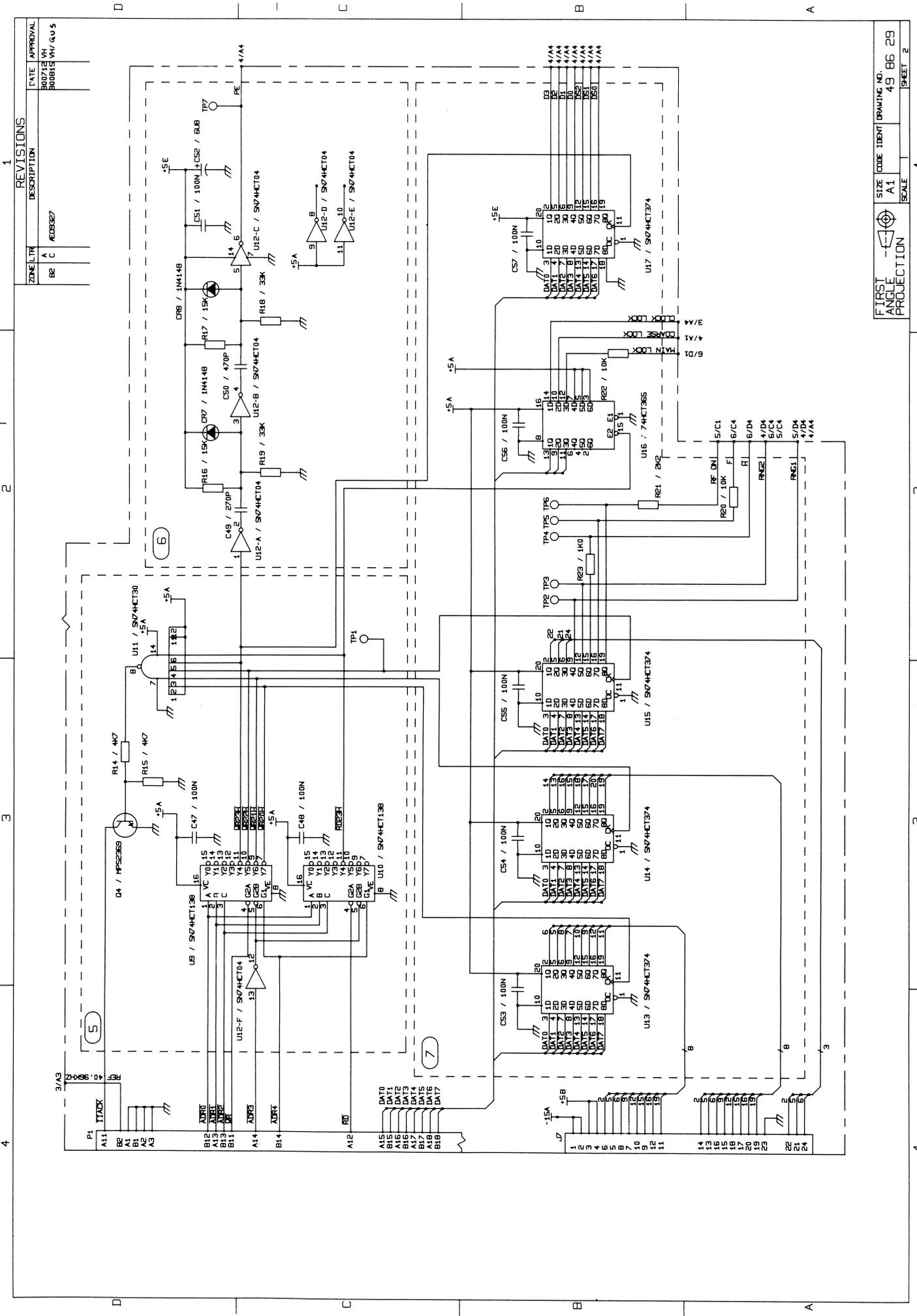
Frequency information for the DDS is latched by U13, 14, 15 and available at J7. Data at J7 is a binary word that equals the DDS output frequency in Hz if multiplied by 10; the bits are arranged as follows:

	DATA	J7 pin
LSB	0	6
	1	5
	2	8
	3	7
	4	10
	5	9
	6	12
	7	11
	8	14
	9	13
	10	16
	11	15
	12	18
	13	17
	14	20
	15	19
	16	22
	17	21
MSB	18	24
GND		23

Part of U15 is used for controlling RF ON (output muting), F and H (Main loop filter) and RNG 1,2 (VCO frequency range).

Frequency information for the Coarse Loop is latched by U17, in 8 4-bit words.

U16 reads the locking status of the different loops.



ZONE	DATE	APPROVAL
A		
B		
C		
D		

REVISIONS	DESCRIPTION
1	
2	
3	
4	

FIRST ANGLE PROJECTION
 SIZE CODE IDENT DRAWING NO. A1 49 86 29
 SCALE SHEET 2

Clock Loop

8 Loop Filter

U18 forms an integrator with additional filtering, giving the Clock Loop a bandwidth of approx. 10 Hz. The nominal DC voltage at TP14 should be 4.3V at room temperature.

9 VCXO

The frequency of the crystal oscillator with Y1 and Q6 can be pulled approx. ± 2 kHz by means of CR10 and CR11. The output of the oscillator is buffered with Q7 and Q8, U19b translates the signal into TTL level.

The signal at TP15 has a duty cycle of approx. 30% and the output at P2 (clock signal to DDS assy) is 0 dBm into 50R.

10 Phase Detector

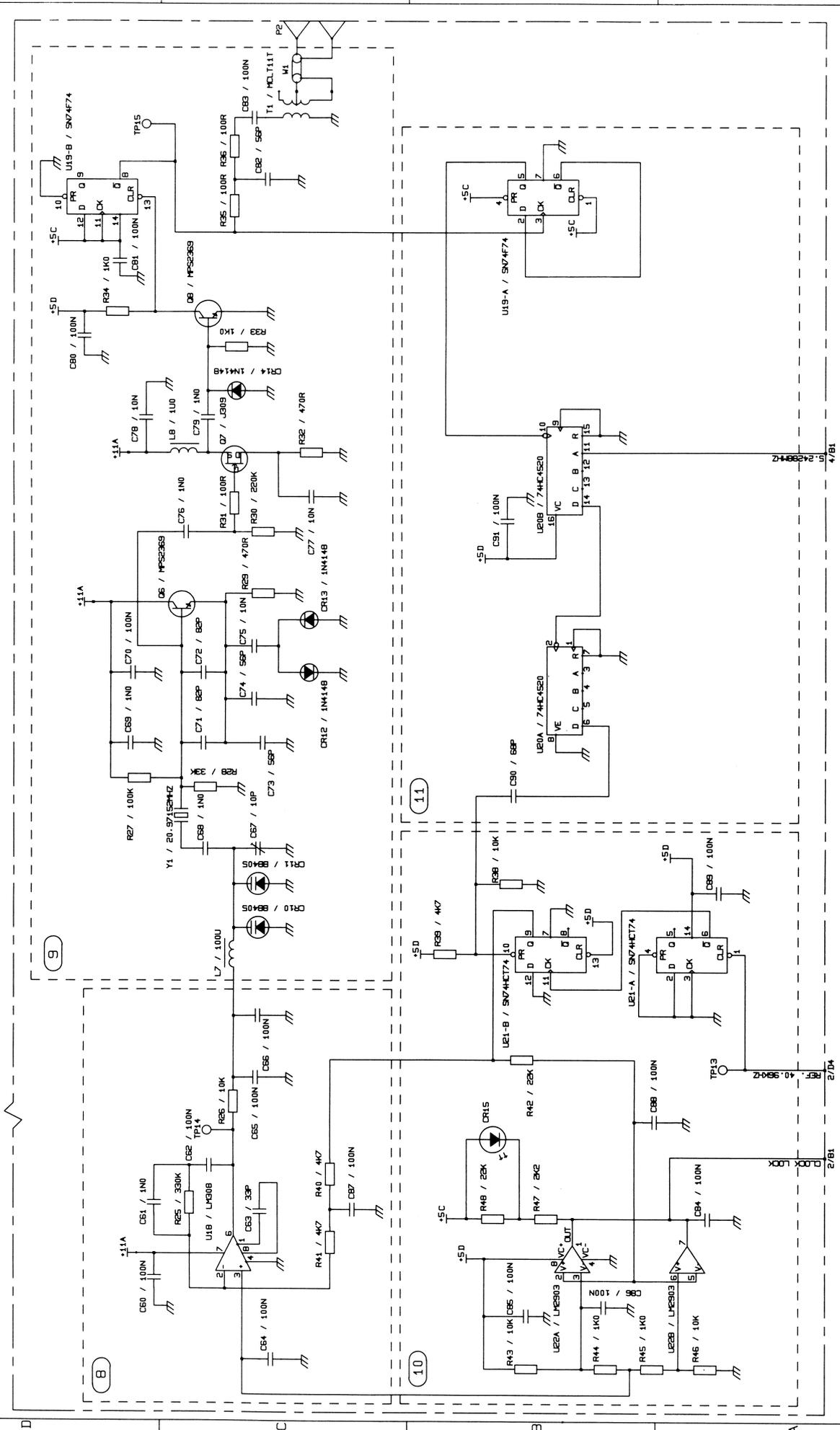
Phase comparison between the incoming 40.96kHz reference and the output of U20 is accomplished by U21. When the loop is locked the output of the phase detector is a 50% duty cycle TTL signal. U22 forms a window comparator and its output goes low when the loop is out of lock.

11 Loop Divider

U19a is a divide by 2 prescaler. Combined with U20 the total division ratio is 512. A divide by 4 output provides a clock for the Coarse Loop.

REVISIONS		DATE	APPROVAL
ZONE/LTR	DESCRIPTION		
B1 C	AC08327		800718 VH 800815 VH/G/S

1 2 3 4



FIRST ANGLE PROJECTION	SIZE A1	CODE IDENT	DRAWING NO. 49 86 29
	SCALE		SHEET 3

4/B1 2/B1 2/04 2/81 2/04 2/81

Coarse Loop12 Range Shift

Two identical switch circuits control the 4 frequency ranges of the VCO. The range shifts shall be in accordance with the following table :

Frequency kHz.	TP16 V.	TP17 V.
0-5999.99	-8.5	-8.5
6000-11999.99	+15	-8.5
12000-19999.99	-8.5	+15
20000-29999.99	+15	+15

13 VCO

The 78 to 109MHz VCO is controlled by a voltage between -5 and +16V. U24 buffers the VCO output and delivers -10dBm into 50R at J4. Q15 is an additional amplifier that feeds the following prescaler.

P4 connects the Coarse Loop output to the Main Loop mixer. J4 is used for test purposes.

L10 and C101 are adjusted for accurate tracking between Coarse-VCO and Main-VCO.

14 Clamping Circuit

U29a produces a voltage that is used to limit the positive frequency difference between the Main Loop and the Coarse Loop, by means of CR39. U29b produces a lower voltage that is used to limit the negative frequency difference by means of CR40.

15 Shaping Circuit

U28 with associated diodes and resistors linearizes the voltage frequency function of the VCO.

16 Loop Filter

The 2 phase detector outputs are combined in an integrator filter. Q17 and Q18 short R84 during locking.

17 Divider, Phase Detector

A PLL-LSI U26 comprises loop divider, reference divider and dual phase detector. U26 also controls the divide by 16/17 prescaler and has a lock detector output.

CR26 is lit when the loop is out of lock.

Main Loop18 Range Shift

Two identical switch circuits control the 4 frequency ranges of the VCO. The range shifts shall be in accordance with the following table:

Frequency kHz.	TP21 V.	TP22 V.
0-5999.99	-8.5	-8.5
6000-11999.99	+15	-8.5
12000-19999.99	-8.5	+15
20000-29999.99	+15	+15

19 VCO

The 75 to 105MHz VCO is controlled by a voltage between -6 and +12V. U31 buffers the VCO output and distributes the signal to the output amplifier and the loop mixer.

Q34 delivers 0dBm into 50R at J1 (adjustable with R153). U31b and Q34 can be turned OFF to give a 60 dB muting of the output signal.

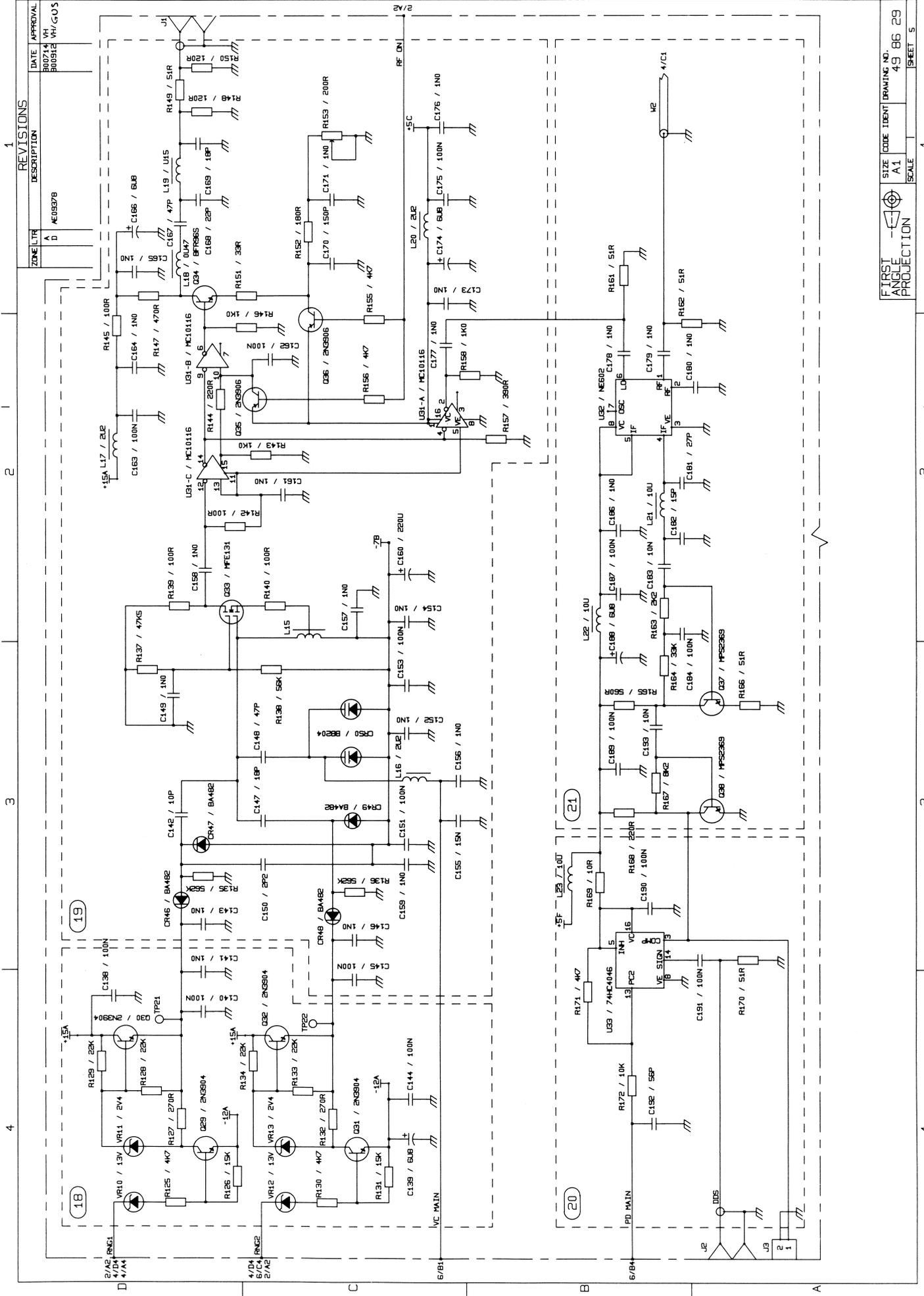
20 Phase Detector

With phase detector U33 the DDS-signal and the loop mixer output are compared, resulting in an error voltage that is filtered by C192 and routed to the Main Loop filter.

At J3 the IF of the loop can be monitored for test purposes.

21 Loop Mixer

The output signals from Main and Coarse Loops are the LO and RF signals for mixer U32. Only the lower side band passes the 14 MHz lowpass filter with L21 and is amplified to TTL level by Q37 and Q38.



DATE	APPROVAL
30/07/14	VH
30/08/14	VH/GOS

REVISIONS	DESCRIPTION
1	

ZONE/LTR	DESCRIPTION
D	ME09378

FIRST ANGLE PROJECTION

SIZE A1

CODE IDENT DRAWING NO. 49 86 29

SCALE 1

SHEET 5

Main Loop Filter22 Lock Detector

U36 forms a window detector that monitors the phase detector output voltage. The output of the window detector goes to ground when the phase voltage is either too high or too low.

23 Loop Filter Control Circuit

When U36b is triggered by the lock detector, it generates an AQ1 signal that is used to change the integrator time constants. The output of U36b also triggers U36a, producing a AQ2 signal that is used to modify both integrator and lag filter constants.

Q41 prevents U36 from being retriggered.

CR53 is lit when the Main Loop is out of lock.

F and H control bits are only used during frequency hopping.

24 Integrator

U37 buffers the phase detector output. U39a forms an integrator with variable time constants that gives the Main Loop a steady-state bandwidth of approx. 1 kHz.

25 Shaping Circuit

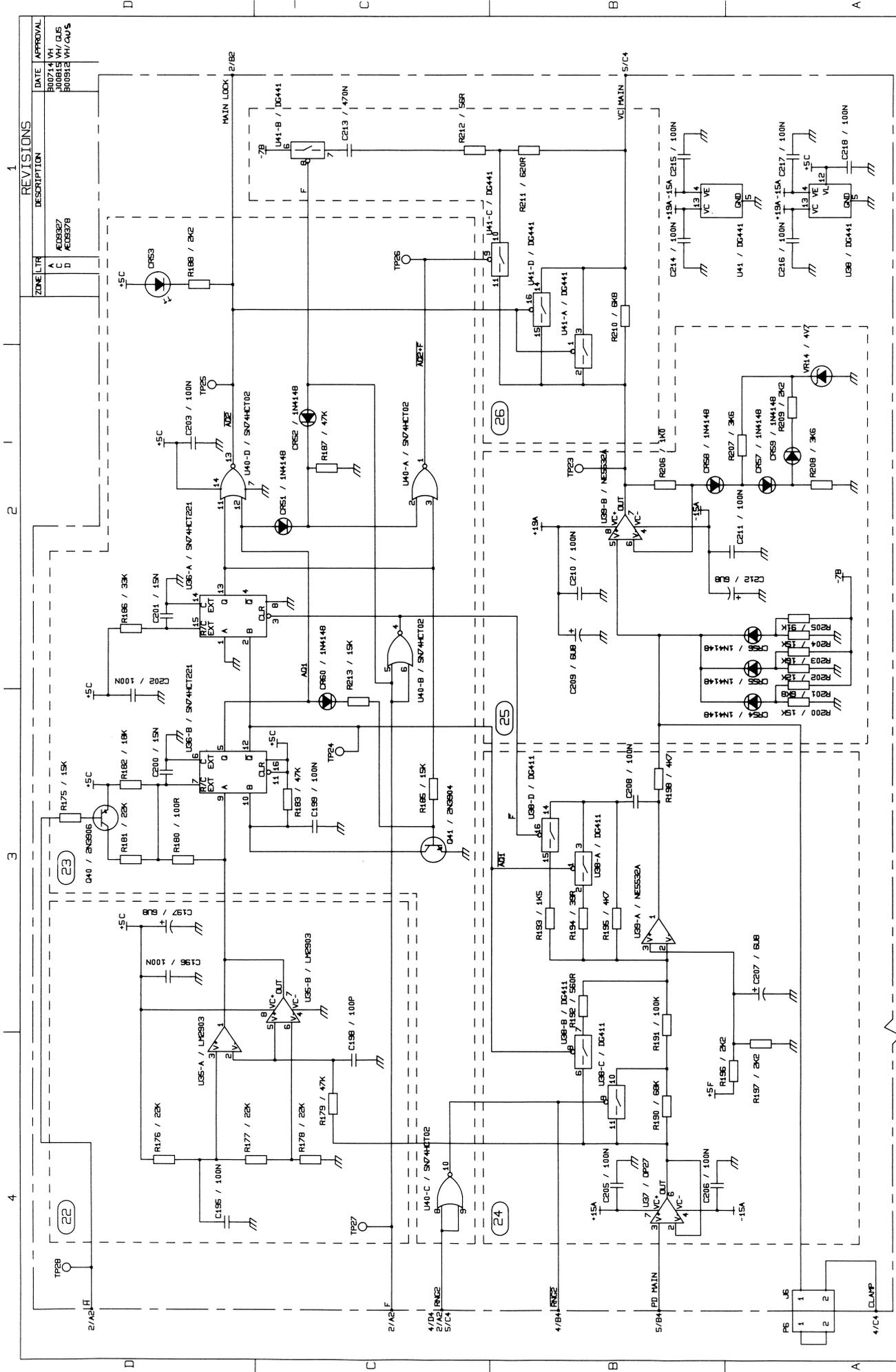
U39b with associated diodes and resistors linearizes the voltage frequency relation of the Main VCO.

When the frequency of the Main VCO exceeds the locking range of the phase detector (during locking), the voltage at J6-1 is clamped to a maximum or minimum value.

P6 can be removed for test purposes.

26 Lag Filter

This filter has variable time constants to facilitate high switching speed.



REVISIONS

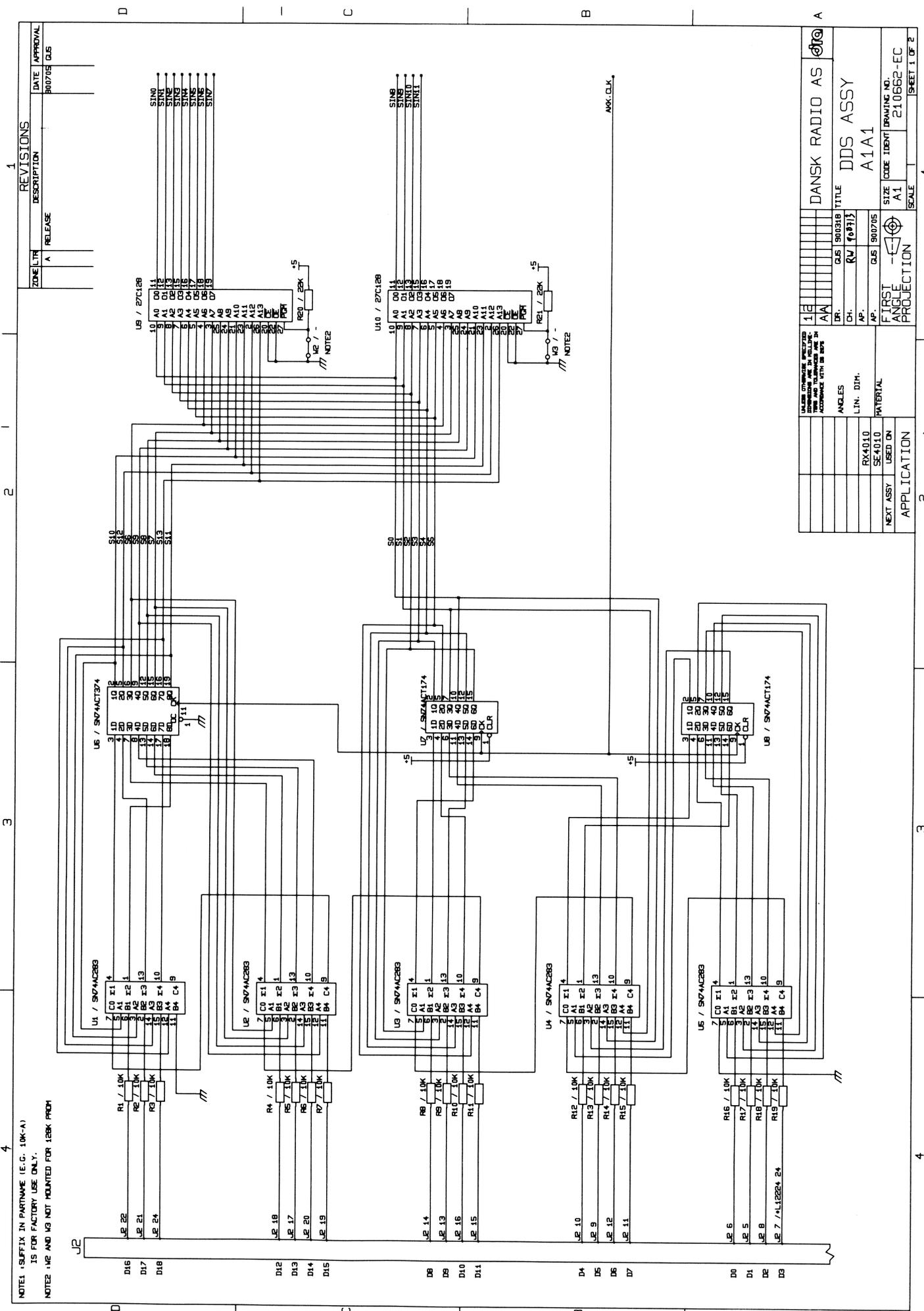
ZONE	DATE	DESCRIPTION	APPROVAL
C	300714		VH / QUS
D	300815		VH / QUS
D	300912		VH / QUS

SIZE	CODE	IDENT	DRAWING NO.
A1			49 86 29
SCALE	PROJECTION		
1	SHEET 6		

Accumulator and Sine Table

U1 to U8 form a 19-bits accumulator, clocked with 10.48576 MHz. U1 to U5 are cascaded binary adders. The outputs are latched with U6 to U8 and then fed back to the adder inputs. For every clock cycle the DDS data word D0 to D18 is added to the sum of the preceding cycle, resulting in an accumulating sum output S0 to S13.

Phase to amplitude conversion is accomplished by PROMs U9 and U10, that contain a 14-bits sine table.



NOTE1: SUFFIX IN PARTNAME (E.G. 10K-A)
IS FOR FACTORY USE ONLY.
NOTE2: W2 AND W3 NOT MOUNTED FOR 128K FROM

REVISIONS		DATE	APPROVAL
1	RELEASE	800705	CLS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH BS 8889		DANSK RADIO AS	
DR.	CLS 900318	TITLE	
CH.	RW (0371)	DDS ASSY	
AP.	CLS 900705	A1A1	
FIRST ANGLE PROJECTION		SIZE	CODE IDENT DRAWING NO.
NEXT ASSY USED ON		A1	210662-EC
APPLICATION		SCALE	SHEET 1 OF 2

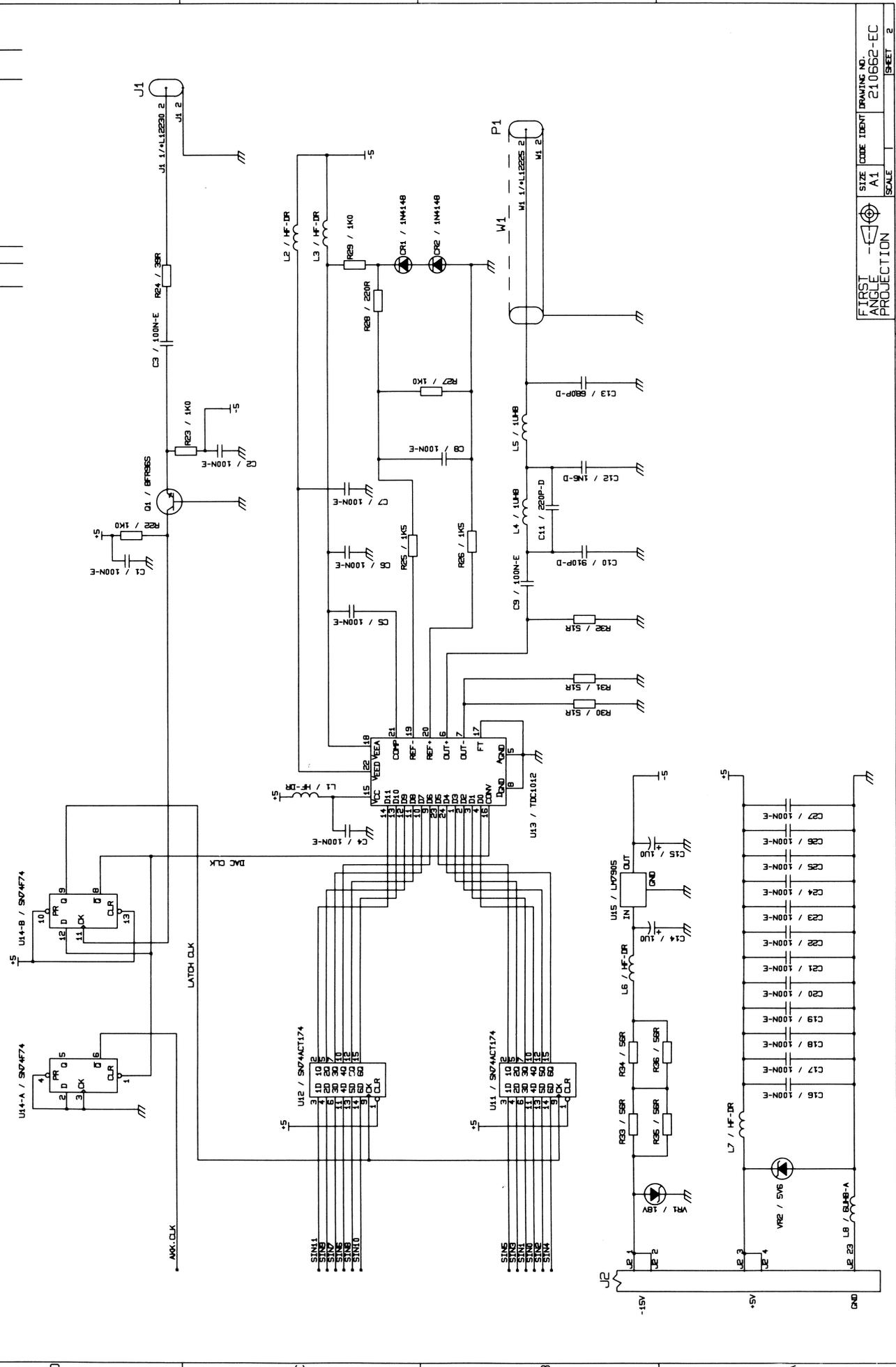
Clock Divider and D-A Converter

A 0dBm 21.97152MHz clock signal, coming in at J1, is amplified by Q1 and divided by 2 with U14b to obtain a 50% duty cycle DDS clock. U14a delays the clock to the accumulator circuit. U11 and U12 synchronize the data to the D-A converter. U13 is a high-speed 12-bits D-A converter with complementary current outputs. The output signal passes a 4.5MHz lowpass filter and the output at P1 is 0dBm into 50R.

The negative 5V supply for the D-A converter is derived from -15V by means of U15.

REVISIONS		DATE	APPROVAL
ZONE/LTR	DESCRIPTION	BRD/DES	CLS
A	RELEASE		

NOTE1: SUFFIX IN PARTNAME (E.G. 10K-A) IS FOR FACTORY USE ONLY.



FIRST ANGLE PROJECTION	SIZE A1	CODE IDENT DRAWING NO. 210662-EC
	SCALE	SHEET 2

ZONE/LTR	DESCRIPTION	DATE	APPROVAL
A	Æ084,95	13.7.90	VH
B	Æ09380	17.8.90	VH / GUS
C	Æ08741	19.9.90	VH / GUS
D	Æ09569	11.2.91	VH / GUS
E		14.8.91	VH

REVISIONS	
ZONE/LTR	DESCRIPTION
A	Æ084,95
B	Æ09380
C	Æ08741
D	Æ09569
E	

DR.	VH	13.7.1990
CH.	RL	90013
AP.	BS	900817
AP.	GUS	9007H3

TITLE	
COMPONENT LOCATION	
DDS ASSY A1A1	
SIZE	CODE/IDENT
A 2	DRAWING NO. 210662-PD
SCALE	2:1
SHEET 1 OF 1	

APPLICATION	
498629	SE4010
NEXT ASSY	USED ON

MATERIAL	
PL	

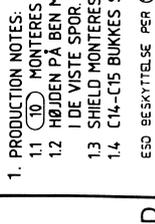
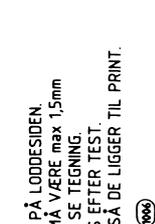
FIRST ANGLE PROJECTION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075	
ANGLES	
LIN. DIM.	

Dansk Radio AS	
----------------	--

1. PRODUCTION NOTES:
 1.1 (10) MONTERES PÅ LODDESIDEN.
 1.2 HØJDEN PÅ BEN MÅ VÆRE MAX 1,5mm
 I DE VISTE SPOR. SE TEGNING.
 1.3 SHIELD MONTERES EFTER TEST.
 1.4 C14-C15 BUKKES SÅ DE LIGGER TIL PRINT.
 ESD BESKYTTELSE PER (100)

CAUTION
 DEVICES ARE SUBJECT
 TO DAMAGE BY
 STATIC ELECTRICITY



ASSY 460354, STANDARD ASSEMBLY

Service Sheet A2

The assembly holds three basic functions:

- 10.24 MHz stable master oscillator
- 73.6 MHz synthesized 2nd LO
- 1.4 MHz synthesized 1st LO

The output signal from the 10.24 MHz oven controlled crystal oscillator (OCXO) is applied to two divider chains. One generating 32 kHz reference clock for the 73.6 MHz loop, and one generating 40.96 kHz reference clock for the 1.4 MHz loop and the A Standard Assembly with temperature compensated crystal oscillator (TCXO) instead of OCXO is optionally available. Also standard assemblies with TCXO or OCXO with possibilities for synchronizing to external 1, 5 or 10 MHz reference signals are available. Another option is an assembly with OCXO and reference output of 5.12 MHz.

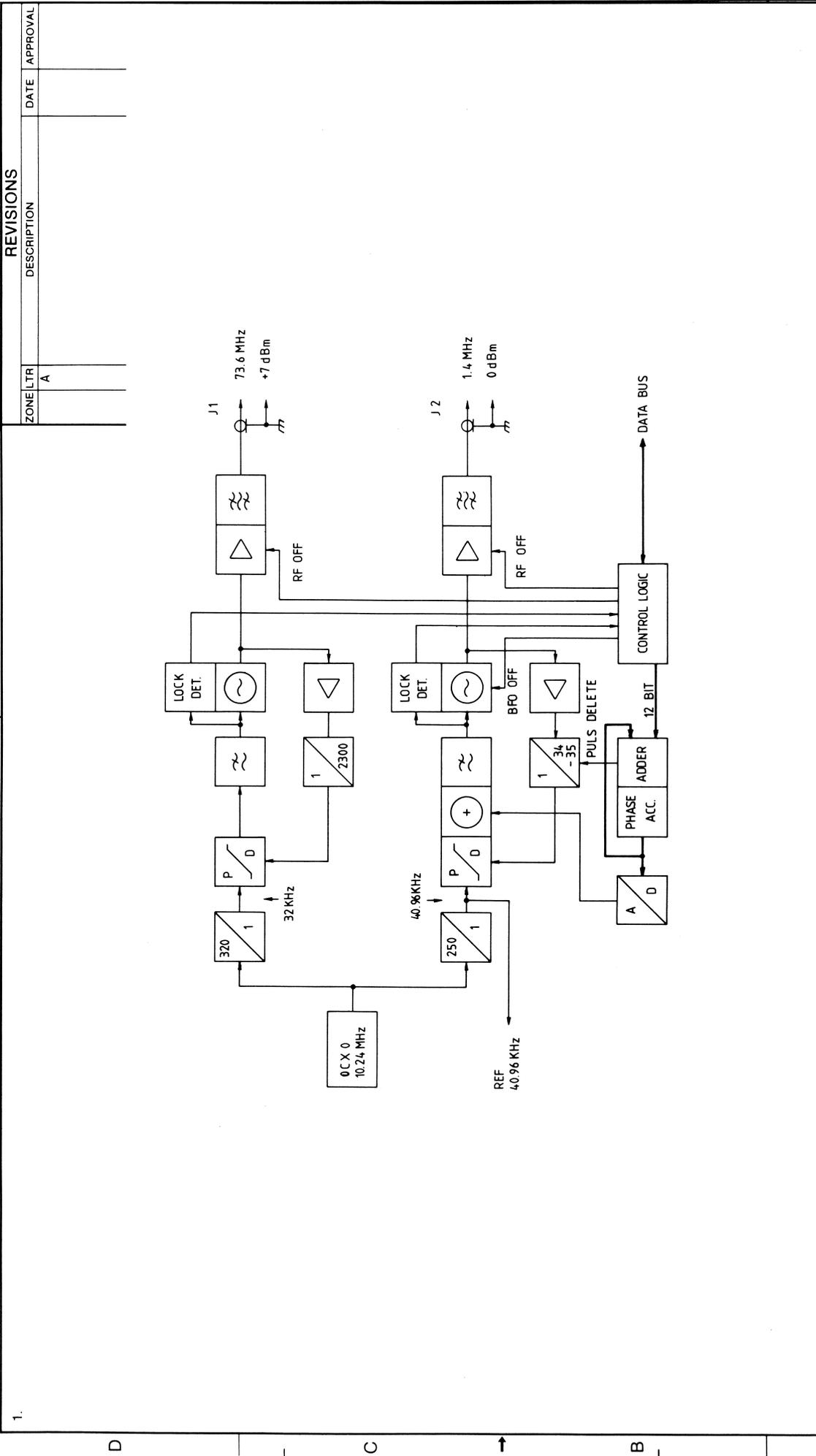
The 73.6 MHz oscillator is formed by a voltage controlled crystal oscillator ensuring low sideband noise. The loop has a 10 Hz bandwidth compensating for frequency drift.

The 1.4 MHz synthesizer is tunable in 10 Hz increments. The loop reference frequency is 40.96 kHz and the corresponding loop bandwidth approx. 800 Hz.

The loop uses a fractional N technique, where the loop output frequency is equal to the number of N.P. times the reference frequency, where N and P are positive integers. Due to the limited tuning requirements for the loop, the N number is fixed 34. The programmed number P is used as input to a digital loop adding the fractional ratio to an accumulated residual fraction.

Every time the accumulated residual fraction overflows, the N divider is commanded to divide by 35, deleting one vco clock pulse. The average vco frequency will be raised in this way with 40.96 kHz divided by P. To compensate for pulse delete sidebands on the 1.4 MHz signal, the residual fraction is converted to an analogue signal and added to the error signal from the phase detector. The composed error signal is filtered before entering the control input of the voltage controlled oscillator.

Dansk Radio AS		d/rq	
TITLE		FREQUENCY GENERATOR, STANDARD BLOCK DIAGRAM	
DR. <i>Kimble</i>	80 11 20	SIZE	A 2
CH.		CODE IDENT	DRAWING NO. 46 03 54-A
AP.		SCALE	SHEET 1 OF 1
AP.		FIRST ANGLE PROJECTION	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		MATERIAL	
ANGLES		USED ON	
LIN. DIM.		APPLICATION	
47/7A		45 78 41	
Rx 4000		M 3000	
NEXT ASSY			



REVISIONS		
ZONE	DESCRIPTION	DATE
A		

1. 2. 3. 4.

1. Phase-Frequency Detector

U23 generates a matched set of currents. One for the current translator U19, Q8, twice this current to Q9, and a reference current to the D/A converter U22. The current from Q8 acts as a ramp up current for C29. R60, R61 and R62 limiting this function. The ramp down current from Q9 is controlled by the switches CR5 and CR6. The ramp down time is dependent on the count down VCO signal. This is performed by a set-reset function, U18a and Q7. The wave form in TP10 is an approx. triangle. This is fed to the loop integrator U20, C31, C32 and R65 by R62. The loop bandwidth is approx. 800Hz. The diodes CR7 and VR3 reduce saturation time in the loop. To reduce 40.96kHz sidebands a second order low pass filter with a cut-off frequency at 2.5kHz is added U21, R66, R67, C33 and C34.

2. 1.4MHz VCO

Q11 and Q12 perform as an oscillator with tuned circuit, L17, L18, C39 and C40 in the collector of Q11. The feedback path is formed between the emitters of Q11 and Q12. A buffered output is taken from Q12 via a low Q tuned circuit L22, C42 and C43. The voltage controlled capacitor diodes CR8 and CR9 allow a tuning range at approx. 6.8kHz/V. The nominal DC voltage in TR11 is +3V at 1.400MHz adjusted by L18 at 25°C room temperature. The output level is adjusted to 0dBm +/-0.5dB by means of R111.

3. Output Amplifier

0dBm/50Ω output is performed by Q13 with the tuned circuit L19, C48 and L20. R87, R88 and R89 is a 3dB attenuator which gives a more exact 50Ω output impedance.

Q14 allows RF ON/OFF switching, with approx. 50dB attenuation.

4. Buffer-Translator

Q15 and Q16 is an emitter coupled amplifier which gives excellent isolation between the counter and the VCO. The output level is a 0-5V square wave.

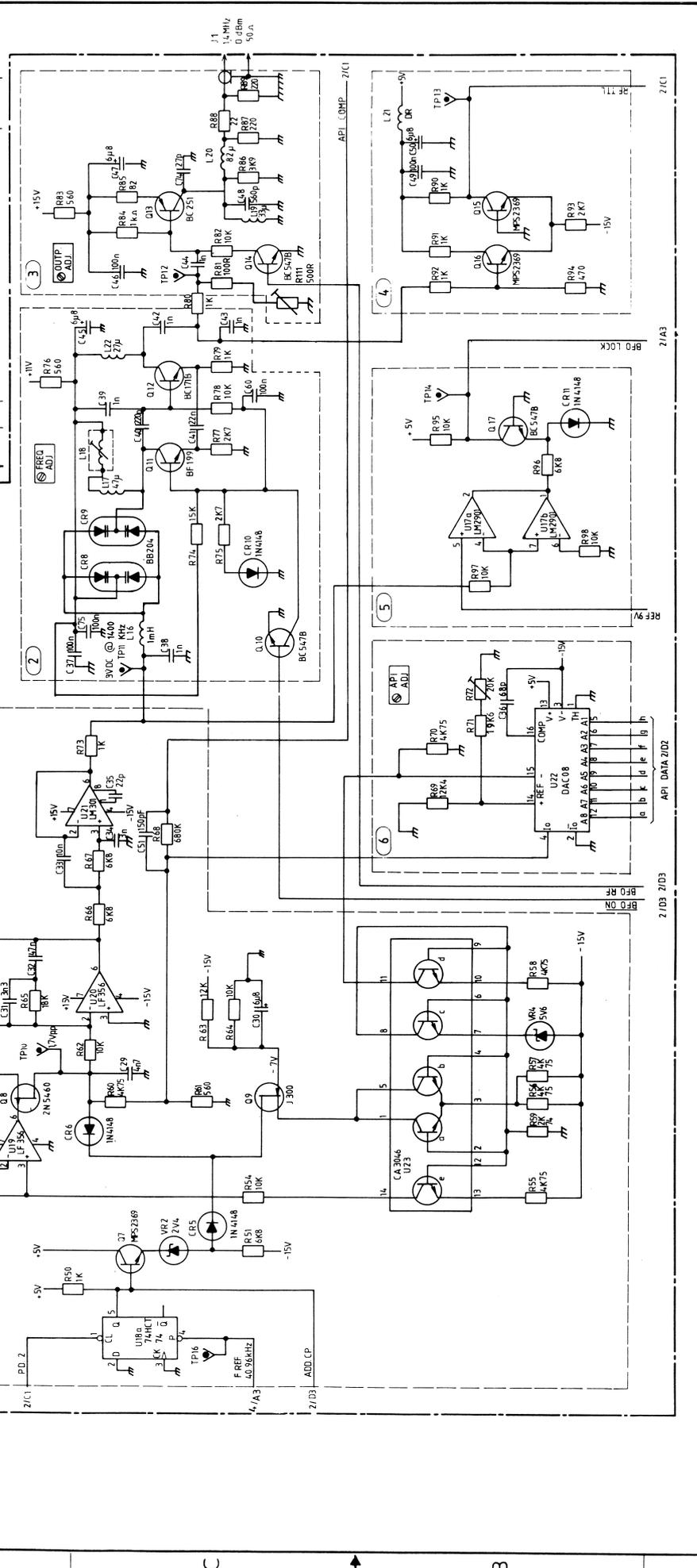
5. Lock Detector

The control voltage to the VCO is fed to a window detector U17a-b. The loop is within proper conditions if the voltage at TP11 is between 0V and +6V. Under this condition Q17 gives a HIGH, TP14.

6. API Generator

The D/A converter (U22), forms a part of the API system (analogue phase interpolator). It converts an 8-bit phase information from the adder in 8 to a ramp current. This current is converted to a voltage by R61, and injected to the loop by R60. It is adjusted to eliminate the stepped ramp error signal arising from the fractional system.

REVISIONS		DATE	APPROVAL
A	REVISED	2.12.87	VH
B	ÆM87078	18.12.87	VH
C	ÆM88054	9.1.89	VH
D	ÆM88054	8.10.91	VH
E	ÆD9617		



Dansk Radio AS

TITLE: FREQUENCY GENERATOR STANDARD

DR: *Kjeldsen* 800826

CH: *F. Winther* 800901

AP: *F. Winther* 800901

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES IN ACCORDANCE WITH DS 2075

ANGLES:

LIN. DIM.:

MATERIAL:

488100 SE4010

490008 RX4010

471112 RX4000

NEXT ASSY USED ON

APPLICATION

1 2 3 4

E D I D

DR: *Kjeldsen* 800826

CH: *F. Winther* 800901

AP: *F. Winther* 800901

FIRST ANGLE PROJECTION

SIZE: A2

CLASS: NO

NO: 46 03 54

SCALE: SHEET 1 OF 4

7. Loop Divider

This divider works in two modes. Divided by 34 or 35. When the fractional part is zero (input to U32, U33 and U35 equals 0), the counter is continuously divided by 34. The output frequency is then $34 \times 40.96\text{kHz} = 1392.64\text{kHz}$. In general the average output frequency is set by:

$$F_o = (34 + F/4096) \times 40.96\text{kHz}$$

where $F = 0-4095$ (fractional part).

If $F = 1$, 4096 reference pulses will elapse before the counter receives one divided by 35 instruction. This means that the phase detector will receive an instruction for raising the frequency each $4096 \times (1/40.96\text{kHz}) = 0.1\text{sec}$. The average frequency will raise 10Hz. For $F=2$: 20Hz and so on. For $F_o=1400.00\text{kHz}$. $F=736$.

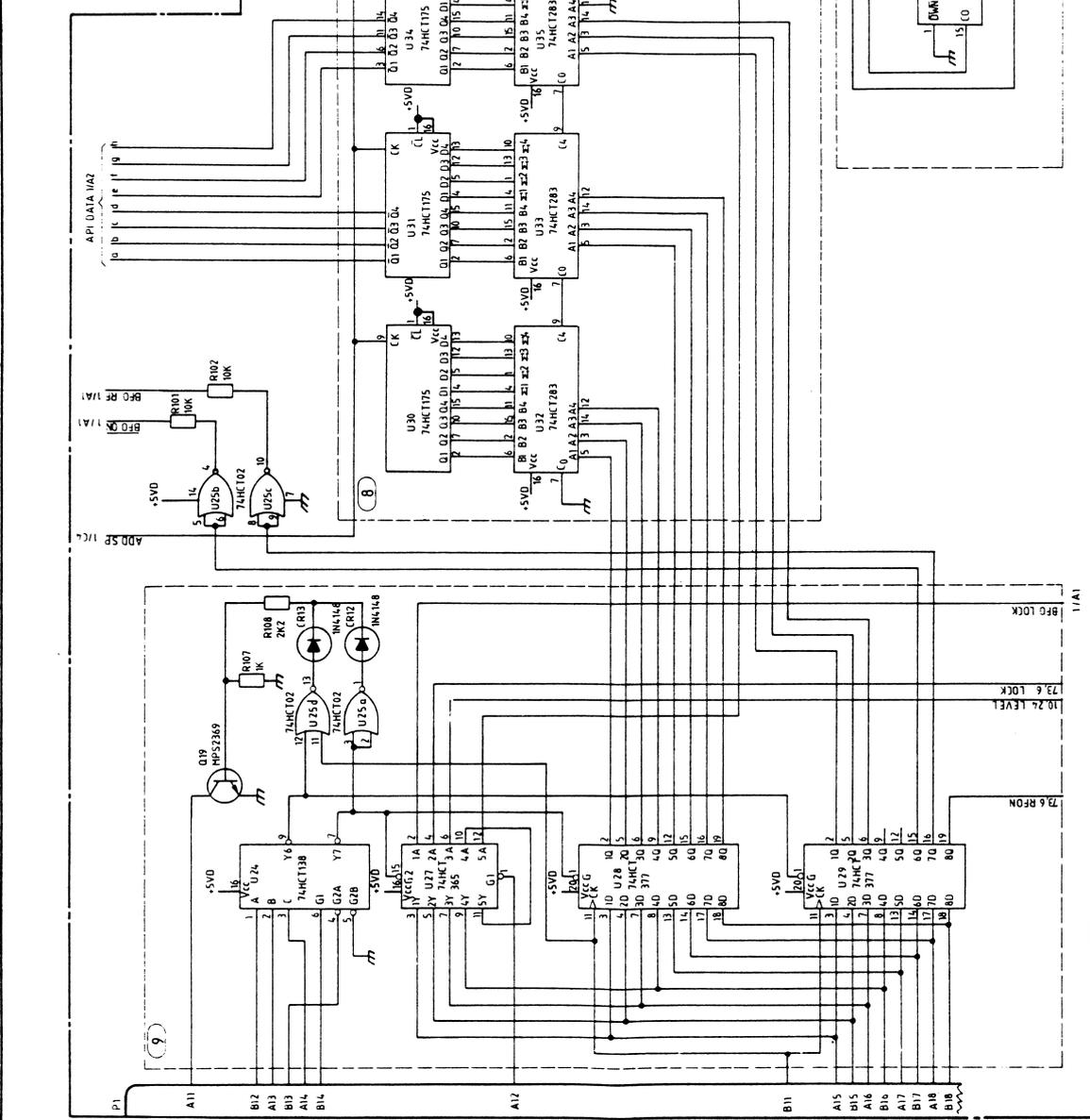
8. Adder and Phase Accumulator

The fractional part consists of 3 cascade coupled 4 bit adders connected with 3 x 4 bit latches. On reference clock, the data present on the data inputs of the latches will be transferred to the Q outputs. An addition will occur between these outputs and the data present on the frequency set inputs. After $4096/F$ additions U35 will give an overflow which is used to change the counter to divide by 35 (the same as removing 1 VCO clock cycle). The contents of the data latch U30, U31 and U34 give a phase information that converted in 6 will show a stepped ramp function similar to the error in the loop when the API is disconnected.

9. Microcomputer Interface

U28 and U29 converts the 8 bit data bus to 14 bit data information. 11 bit for BFO frequency set, 1 for BFO RF ON/OFF, and 1 for 73.6MHz RF ON/OFF switching. U27 reads BFO lock, 73.6MHz lock, 10.24MHz level and fractional control, and transmits them to the microprocessor. U24-U26 is an address key system.

ZONE	LTR	DESCRIPTION	DATE	APPROVAL
A		Added +SVD	2.12.87	VH
B		ÆM87078	18.12.87	VH
C		ÆM88054	9.1.89	VH
D				



1 2 3 4

FIRST ANGLE PROJECTION

SIZE CLASS A 2

NO.: 460354

SHEET 2

10. Divider

U1-U3 divides the input frequency of 3.68MHz with 115 to 32kHz (31.25nsec) TP1. This signal feeds the phase/frequency detector. The signal in TP1 is a negative pulse with a width of approx. 270nsec.

11. Phase/Frequency Detector

U3 performs a SET-RESET phase/frequency detector. It compares the 32 kHz from U1 -3 (TP1) with a reference signal from U9b, TP3. The output TP2 is a duty cycle controlled square wave with a frequency of 32 kHz.

12. Fine Regulator

The +15V is stabilized to a +11V low noise reference for the 73.6MHz VCXO and the 1.4MHz VCO.

13. 73.6MHz VCXO

The X-tal Y1 operates in series resonance mode with the voltage controlled circuit CR1 and L2. It forms the feedback path in the oscillator performed by Q1 and the low Q tuned circuit L1, C8 and C9. L3 eliminates the parallel capacitance in Y1. U10c ECL amplifier operates as buffer amplifier. The tune voltage at TR5 is nominally adjusted to +2.5V by L1, at 25°C room temperature.

14. Output Amplifier

The 73.6MHz +7dBm output is performed by 1/3 ECL amplifier U10c and Q3 with the tuned circuit L2, L19 and L7. R31-R33 is at 3dB attenuator which gives a more exact 50Ω output. An RF ON/Off switch function is performed by U16 and Q2. The output is disabled by approx. 60dB.

15. ECL to TTL Translator

U10b forms an isolation and driver amplifier for Q4 and Q5 emitter coupled amplifier. L8, L9 and R38 is a peaking circuit.

16. Prescaler

U11 divides by 4. The output is 18.4MHz, TP6.

17. Divider

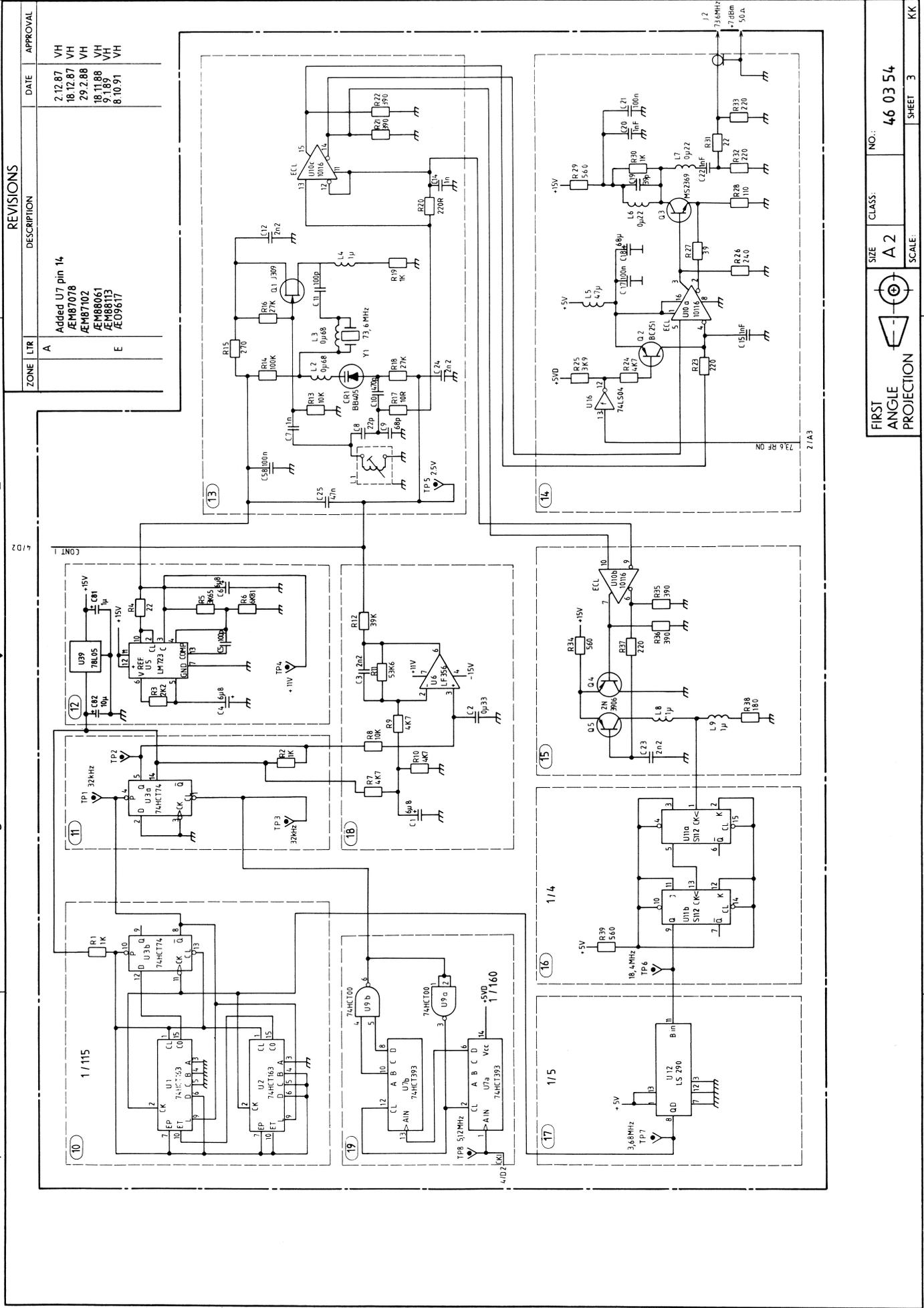
U12 divides the 18.4MHz by 5. The output is 3.68MHz, TP7.

18. Loop Filter

The square-wave from the phase detector is integrated by R8 and C2. U6 is an amplifier filter removing the 32kHz from the control voltage to the VCXO. The loop bandwidth is approx. 10Hz.

19. Divider

U7-U9 divides the input frequency on 5.12MHz (TP8) with 160. The output TP3 is a negative pulse with a width of 150nsec. The signal is used as input to the phase detector.



REVISIONS		
ZONE	LTR	DESCRIPTION
A		Added U7 pin 14
E		AEH87078
E		AEH87102
E		AEH88061
E		AEH88113
E		AE09617

DATE	APPROVAL
2.12.87	VH
18.12.87	VH
29.2.88	VH
18.11.88	VH
9.1.89	VH
8.10.91	VH

NO.:	46 03 54
CLASS:	A 2
SCALE:	3
SHEET	3
KK	

20. Reference Divider

The buffered main reference oscillator signal on 10.24MHz is fed to a divide by 2 (U15a), a divide by 250 performed by U9d, U13, U14, 15b and a detector Q18, that indicates the presence of the 10.24MHz. The output from U15b is used as a 40.96kHz reference signal. The buffered signal from U16d is a negative pulse with a width of approx. 100nsec.

21. Loop Detector

The control voltage to the 73.6MHz VCXO is fed to a window detector 1/2 U17. The loop is within proper conditions when this voltage is $-10V < V < +9V$. Under this condition Q6 gives a HIGH, TP9.

22. Filter

Power supply filter system.

23. OCXO

Master reference oven stabilized oscillator on 10.240MHz. Frequency fine tuning adjustment can be made with internal trimmer.

Connector J3 can be used to shut off the power supply to the master reference oscillator and to insert a 10.24 MHz signal from another reference source. When this option is not used pin 1 and 2 have to be shorted.

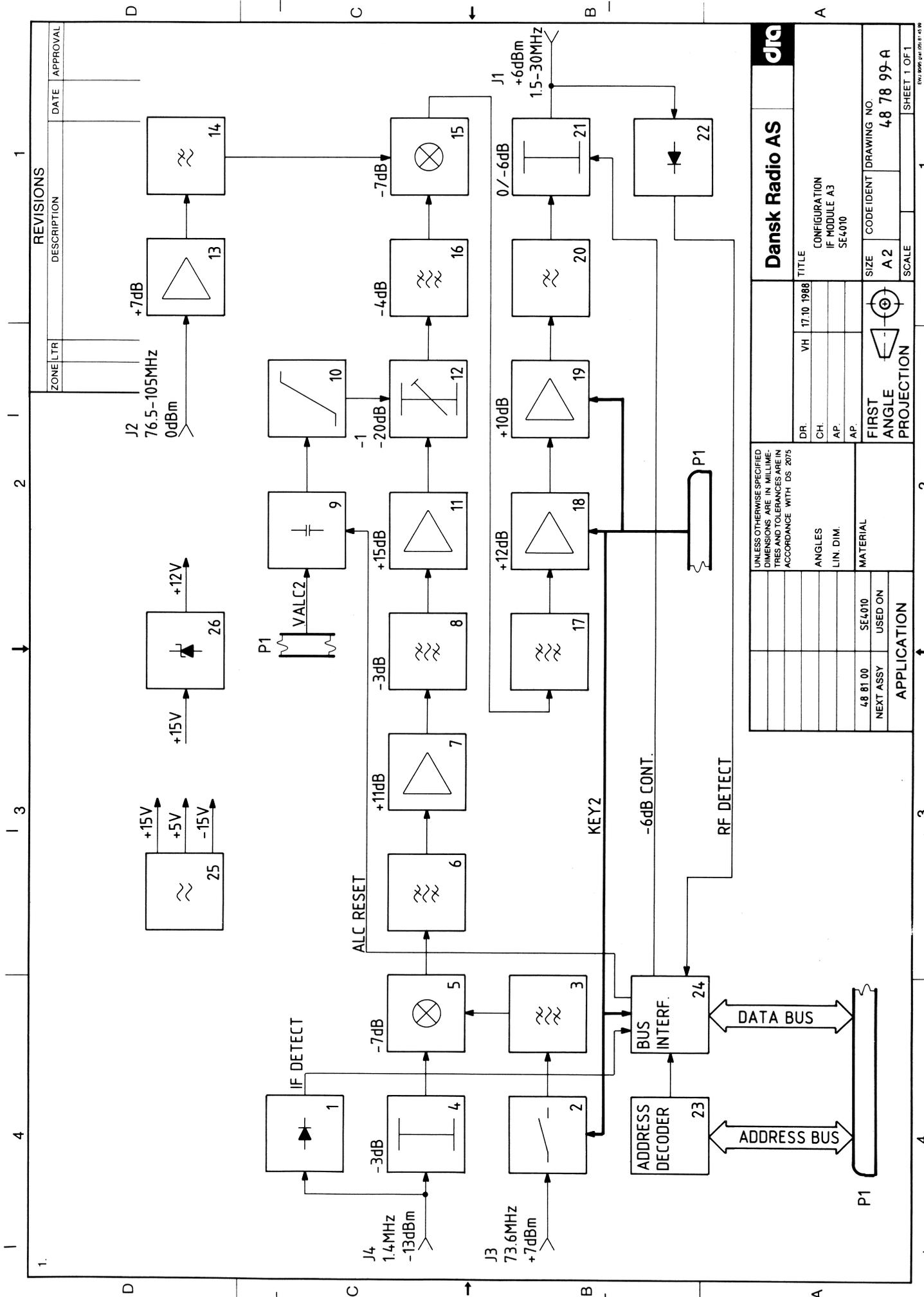
ASSY 487899, IF ASSEMBLY

Service Sheet A3

The IF is a double conversion circuit. It first converts the 1.4MHz signal to 75MHz and from 75MHz to a signal in the frequency range of 1.5MHz to 30MHz. The double conversion takes place to ease the suppression of the image signals.

The 1.4MHz signal is converted to a 75MHz signal in the second mixer 5 which is fed with a 73.6MHz signal controlled by KEY2. The 75MHz signal is amplified in 7 and 11, its level is controlled in 12 and the bandwidth in 16, a crystal filter. The third mixer is driven by a LO signal in the frequency range of 76.5-105MHz. The output from the third mixer is band-limited in 17, a diplexer, and amplified in 18 and 19, two amplifiers controlled by KEY2. The amplifiers are followed by a lowpass filter 20 and a controlled 6dB attenuator 21.

The interface part of the IF controls the 6dB attenuator and ALC reset function, while it at the same time allows the microprocessor to check the input and output levels in the circuit, through the detectors located at the input 1 and the output 22. Also the status of KEY2 is read on the IF assembly.



REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVAL

Dansk Radio AS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		TITLE	
DR.	VH	17.10.1988	CONFIGURATION IF MODULE A3 SE4010
CH.			
AP.			
AP.			
48 81 00	SE4010	MATERIAL	FIRST ANGLE PROJECTION
NEXT ASSY	USED ON	APPLICATION	SIZE CODE IDENT DRAWING NO. 48 78 99-A
			SCALE
			SHEET 1 OF 1

1. 1st IF Detector

The 1.4MHz IF signal is fed to an amplifier Q1 through a selective filter consisting of L1 and C1 parallel with Cgs. The amplified signal is then rectified in U1a which is a temperature compensated detector. The rectified voltage is compared with a reference voltage of 320mV which corresponds to an IF level of -20dBm. The information about the IF level is fed to the microprocessor through the interface.

2. 2nd LO Switch

The two switch diodes CR3 and CR4 form a RF switch with an insulation of 30dB when off. The diodes are controlled through Q3 by the overall KEY2 signal.

3. Diplexer

The components in 3 form a circuit ensuring a low reflection coefficient for the mixer over a broad frequency range.

4. 3dB Attenuator

The 3dB attenuator is used to minimize the effect of the coax cable used to supply the 1.4MHz signal to the IF.

5. 2nd Mixer

U2 is a double balanced mixer converting the 1.4MHz signal to 75MHz.

6. Diplexer

The components in 6 are used in the same way as in 3.

7. 1st 75 MHz Amplifier

The amplifier is a low noise amplifier with a gain of approximately 10dB. Q4 in grounded gate configuration to ensure 50 ohms termination for the mixer while the following amplifier Q5 is loaded in order that the following rejection filter is terminated in 50 ohm over the frequency range of interest.

8. 72.2MHz Rejection Filter

The rejection filter rejects the unwanted sideband from the 2nd Mixer. At 72.2 MHz the filter is at series resonant where the 72.2 MHz signal is shortcircuited giving approximately 20dB rejection. At 75 MHz the circuit acts as a parallel resonator whereby the 75 MHz signal is attenuated by 3dB.

9. ALC Timing

U3a forms an amplifier fed with two signals. One signal is the dominant voltage through CR9 from C28 setting the loop gain, while fast signals are fed directly to the amplifier through CR7 and CR8.

The output from U3a is limited by U3b acting as a regulator diode.

10. Linearization Circuit

The control voltage from U3 is converted through stepwise linearization to two currents giving a linear attenuation characteristic for the pin diodes in dB versus voltage.

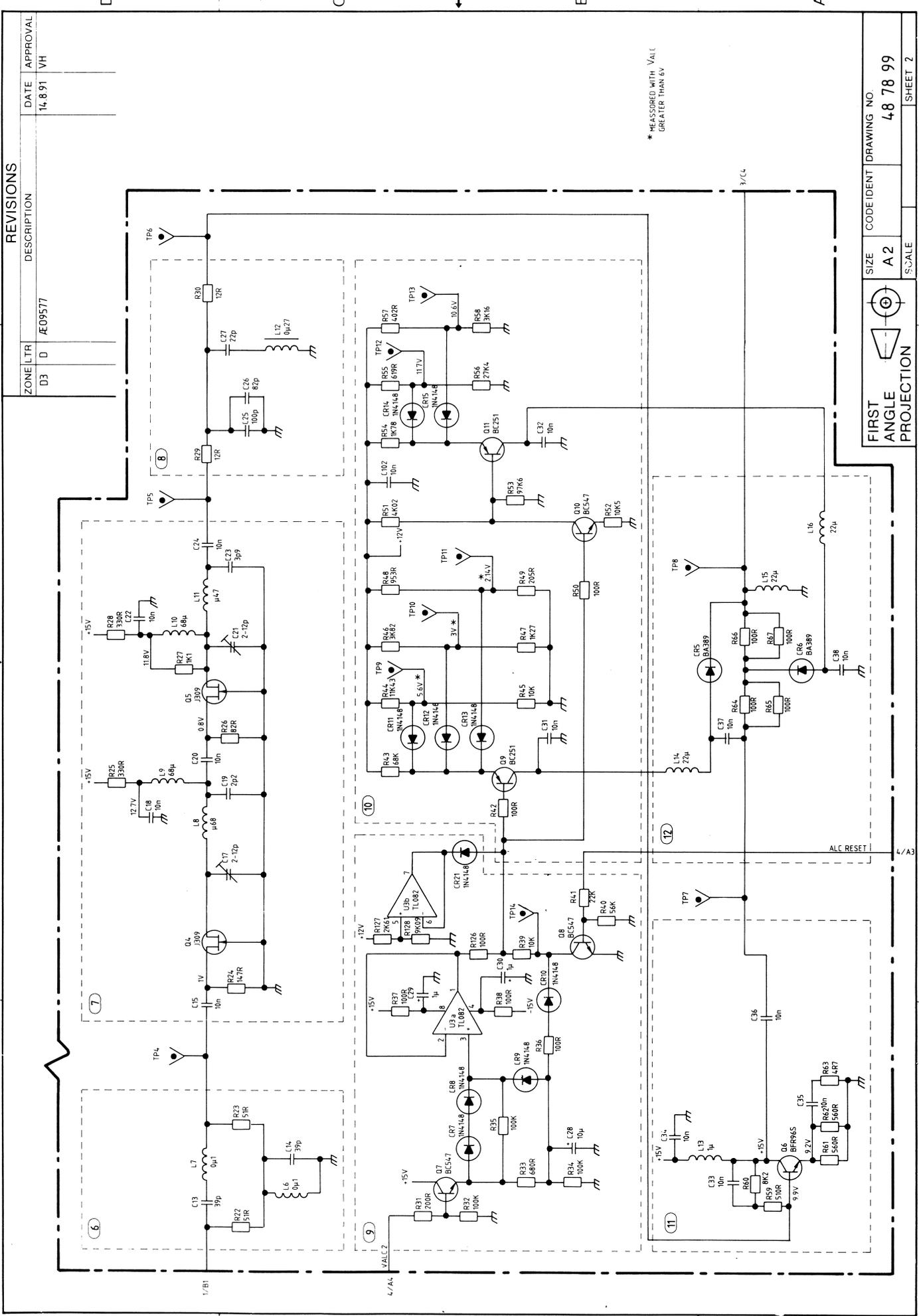
11. 2nd 75MHz Amplifier

Q6 forms a broadband high level amplifier with a gain of 15dB.

12. ALC Regulation

The two pin diodes CR5 and CR6 form together with the four 100 ohms resistors a twin-T circuit. The controlling current for the pin diodes ensures a low reflection coefficient over the regulation range of 20dB.

REVISIONS		DATE	APPROVAL
ZONE	LTR	DESCRIPTION	
D3	D	Æ09577	VH



* MEASURED WITH V_{A1C}
GREATER THAN 6V

FIRST ANGLE PROJECTION

SIZE A2

CODE IDENT DRAWING NO. 48 78 99

SHEET 2

13. 3rd LO Amplifier

Q12 forms a broadband amplifier raising the OdBm level from the syntheziser to +7dBm.

14. LO Diplexer

The diplexer terminates the mixer over a very broad frequency range to ensure low intermodulation and spurious.

15. 3rd Mixer

U4 is a double balanced mixer converting the 75 MHz IF signal to a signal in the band from 1.5 MHz to 30 MHz.

16. 75 MHz Crystal Filter

The crystal filter has a 3dB bandwidth of 20 kHz and is matched through C52-C54 and L26 for the input and through L27 and C55-C57 on the output.

17. Output Diplexer

The output diplexer is formed as an LPF/HPF configuration giving attenuation of the higher order output from the mixer and at the same time assuring a low coefficient of reflection.

18. 1st 1.5-30 MHz Amplifier

The amplifier is a low noise type made up by an amplifier with unattenuated feedback. The feedback is made via two directional couplers. The gain is 12dB. The amplifier is keyed by **KEY2** via Q13-Q16.

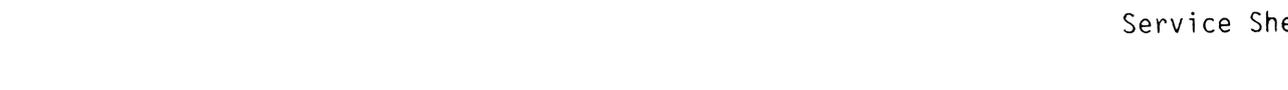
19. 2nd 1.5-30 MHz Amplifier

The second 1.5-30 MHz amplifier is the final amplifier of the IF Assembly. The amplifier is loaded via a broadband transformer to ensure very low intermodulation at the rated output of +6dBm PEP. The gain is 10dB. The amplifier is keyed by **KEY2** via Q15 and Q16.

REVISIONS		DATE	APPROVAL
B4	C	8.6.90	VH
D4	REVISED	22.4.88	VH
		27.4.89	VH

ZONE	LTR	DESCRIPTION
B4	C	ÆD9145
D4		REVISED ÆM88128

76.5-105MHz 0dBm 2/A1



20. Lowpass Filter

The lowpass filter is used to give the final suppression of the higher order output from the second mixer.

21. 6dB Attenuator

When the IF is working with full nominal output, Q19 is conducting whereby CR16 acts as a shortcircuit and CR17 as open circuit. This gives a very low insertion loss. When the 6dB pad is activated Q18 is conducting, making Q19 cut off. This makes CR16 an open circuit and CR19 a shortcircuit whereby the T-pad consisting of R97, R98 and R100 is inserted in the signal route.

22. RF Detector

The signal from the output of the IF Assembly is rectified in the detector U5b, which is a temperature stabilized detector. The rectified RF voltage is compared with a reference voltage of 200mV in U5a, a comparator, which corresponds to an output level of -1dBm. The output from the comparator is led to the microprocessor via the board interface.

23. Address Logic

The address logic consists of two similar circuits U9 and U10. Both circuits are wired for the same address with only one difference. U9 is enabled by WR signal from the microprocessor while U10 is enabled by the RD signal. This controls the direction of the data for the IF. The address logic also contains a feature for checking the presence of the module. This is done by the IIACK which will follow the WR or RD signals when the correct address is present at the address bus.

24. Data Latches

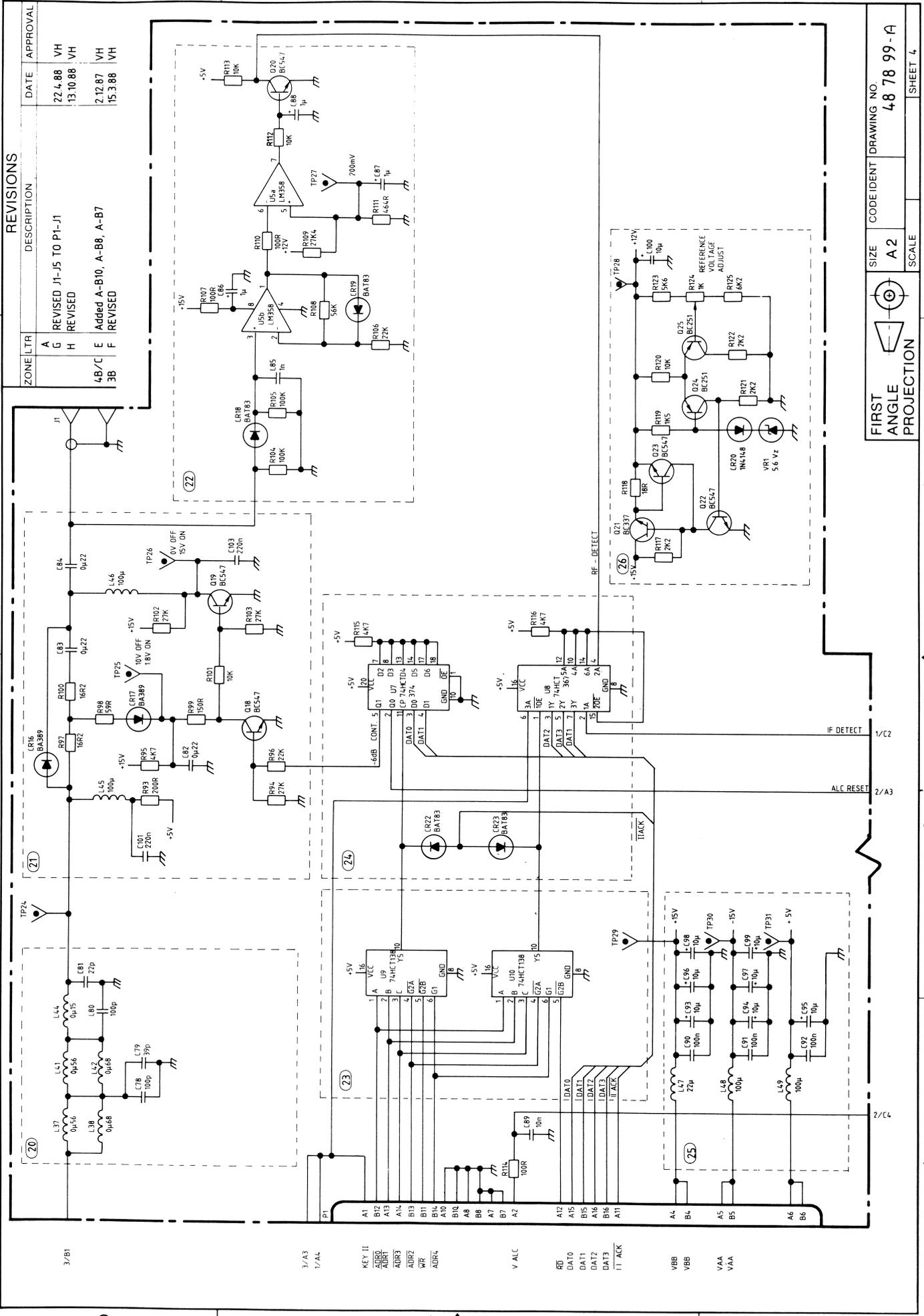
U7 is used to hold the data from the microprocessor to the IF Assembly. The data to the IF is an ALC reset (a pulse) and the 6dB control. U8 is used to interface the status data from the IF to the microprocessor data bus.

25. Supply Filters

The capacitors and inductors in 25 form filters to reject unwanted signals.

26. Reference Regulator

The reference regulator converts the +15V to +12.0V. R124 is used to adjust for 12.0V. This voltage is used to feed the ALC linearization circuit and as reference voltage for the detectors and the ALC limiter.



ZONE/LTR	DESCRIPTION	DATE	APPROVAL
A	REVISED J1-J5 TO P1-J1	22.4.88	VH
H	REVISED	13.10.88	VH
E	Added A-B10, A-B8, A-B7	2.12.87	VH
F	REVISED	15.3.88	VH

FIRST ANGLE PROJECTION

SIZE A2

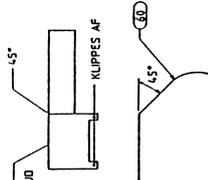
CODE IDENT DRAWING NO. 48 78 99-A

SCALE

SHEET 4

1. CR5 OG CR6 SKAL HAVE SAMME FARVEKODE.
2. RIE VED TAPPE RETTES UD. TAPPE KLIPPES AF. BUKKES 45°. MONTERES MELLEN UL OG SKÆRHVÆG. LODDES VED TILFØRELSE AF VARME PÅ FØRERSIDE AF SKÆRHVÆG. PÅ DE SKÆRHVÆG OG UL SKAL HAVE 5 STEDER.
3. MONTERES MØDT PÅ SKÆRMLOJSE. LODDES 2 STEDER.
4. C106 MONTES I TP2, 3, 7, 16 OG GND 5 STEDER.
5. LIMES MED CS3 EFTER TEST.

NOTE 2



NOTE 5



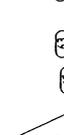
NOTE 2



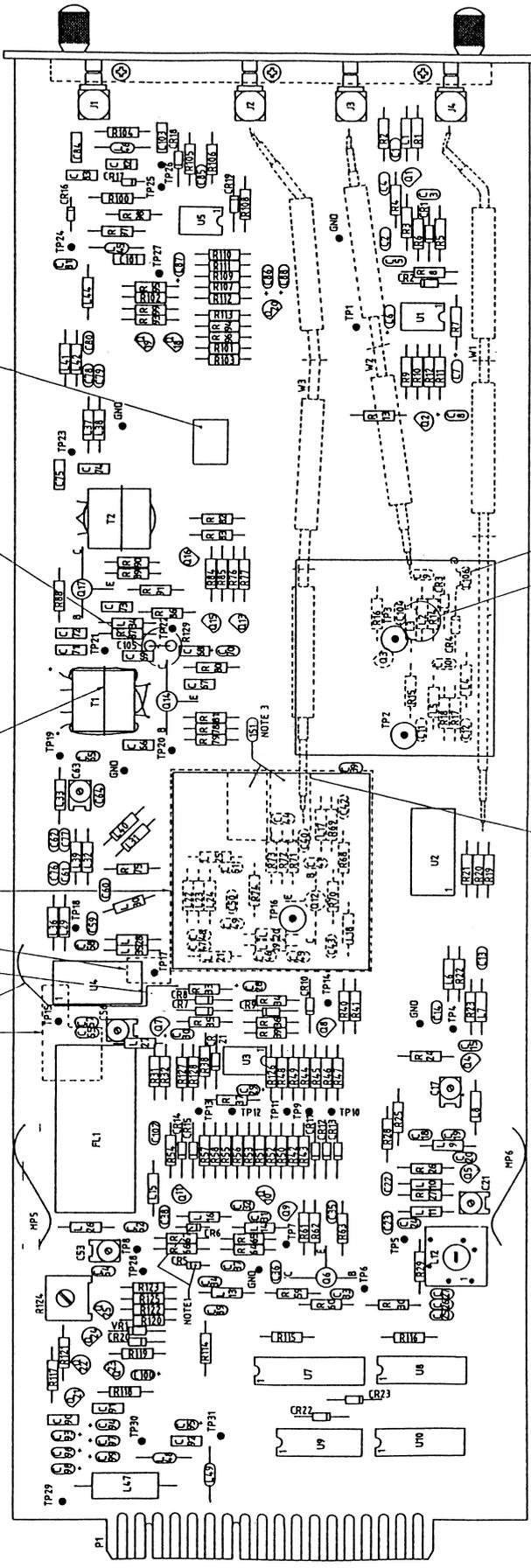
NOTE 3



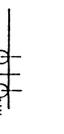
NOTE 3



REVISIONS		DATE	APPROVAL
ZONE/LETR	DESCRIPTION		
H1	Æ013611	3.11.92	VH
J	Æ013615	11.12.92	VH
J1	17552	17.05.94	GC



NOTE 3



Dansk Radio AS		diq	
DR.	VH 26.6 1987	TITLE	
CH.		COMPONENT LOCATION	
AP.	31 2C. 6. 1988	IF MOBILE	SE470
AP.		SIZE	A1
AP.		CODE IDENT	
AP.		FIRST ANGLE PROJECTION	
AP.		DRAWING NO.	48 78 99
AP.		SCALE	1:1
AP.		SHEET 1 OF 1	

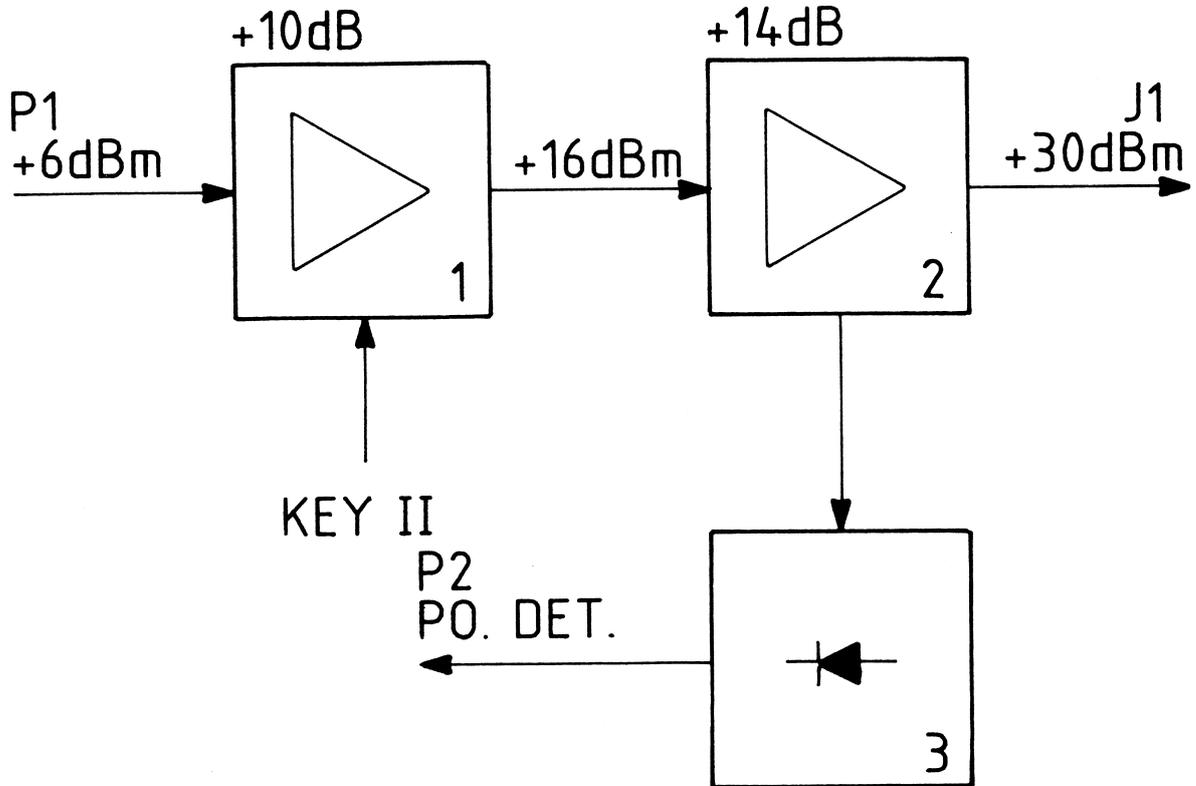
ASSY 497290, WIDE BAND AMPLIFIER

Service Sheet A4

The Wide Band Amplifier increases the RF output level of the IF assembly from nominal +6dBm to the level required to drive the power amplifier of the transmitter.

The Wide Band Amplifier consist of two amplifiers, one with a gain of 10dB and one with a gain of 14dB. The output level can be monitored on the front panel meter by means of the detector circuit.

APPLICATION		REVISIONS			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVAL
48 81 00	SE4010				



REV STATUS	REV LTR																			
OF SHEETS	SHEET NO																			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075	DR.	VH	10.7.89
	CH.	Gs	14.7.89
	AP.		
	AP.		
ANGLES LIN. DIM.			
MATERIAL			
FIRST ANGLE PROJECTION			

Dansk Radio AS		
TITLE CONFIGURATION WIDE BAND AMPLIFIER A4 RETRO SE4010		
SIZE A 4	CODE IDENT NO.	DRAWING NO. 49 72 90-A
SCALE		SHEET 1 OF 1

1. 1st. Amplifier

The +6dBm signal from the IF Assembly is amplified in Q4 which is controlled by KEY2 via Q1 and Q2. The collector current of Q4 is temperature stabilized by Q3.

2. 2nd. Amplifier

The second amplifier raises the +16dBm level from Q4 to +30dBm. The collector current of Q6 is stabilized by Q5. The output from the amplifier is made balanced by T3.

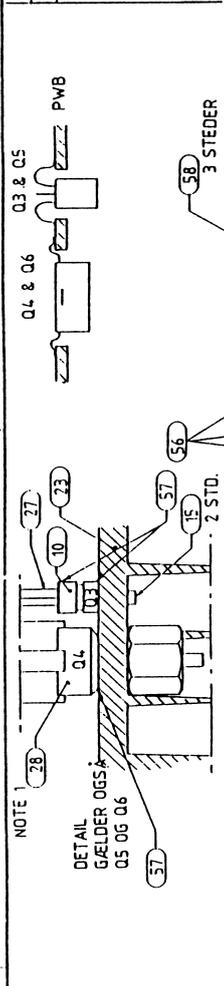
3. RF Detector

The RF is first rectified in the detector made up by CR1, CR2 and U1b. Then the signal is peak detected in U2 and buffered by U1a before being fed to the Interface Assembly via the Power Supply Assembly.

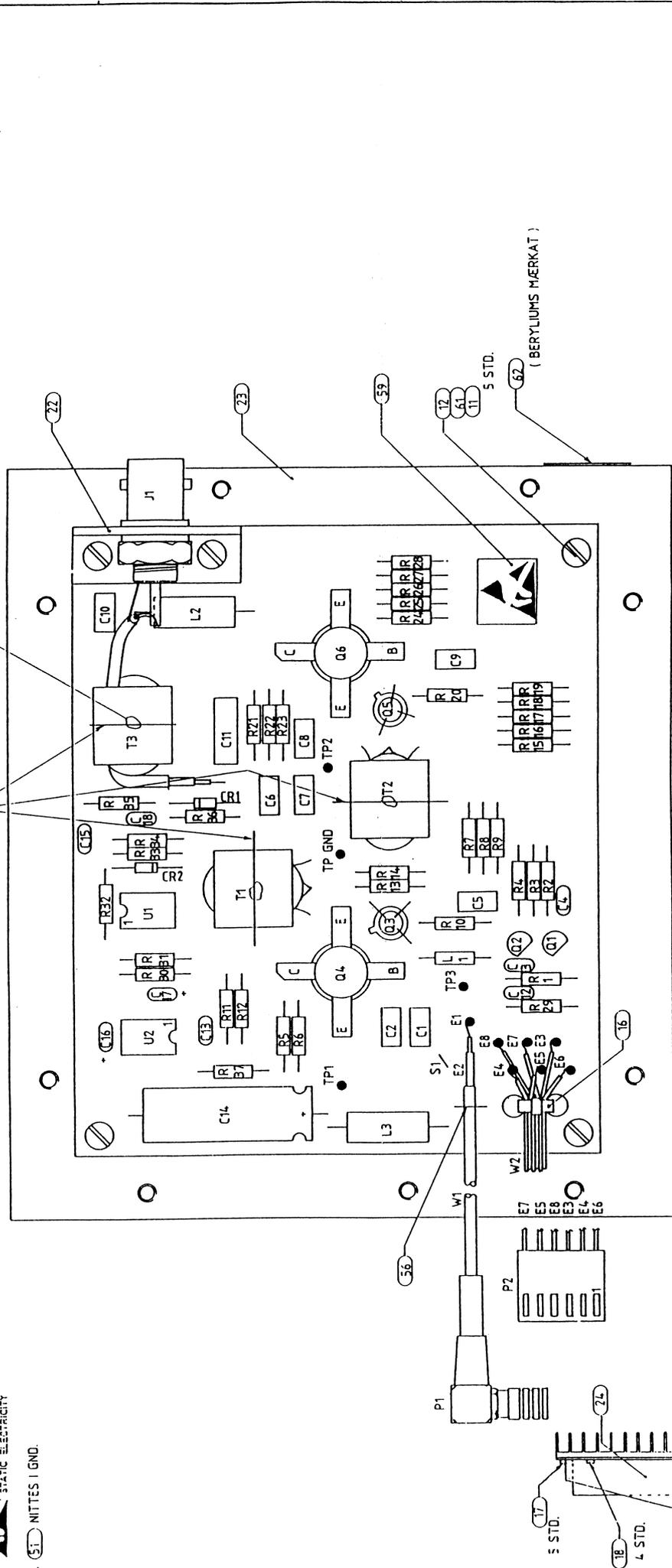
1 2 3 4

REVISIONS

ZONE/TRI	DESCRIPTION	DATE	APPROVAL
A	Æ09039	4.3.90	
B	Æ09416	14.9.90	
C	Æ09566	21.3.91	
D	Æ08947	19.11.91	
E	Æ013615	4.11.92	
F	Æ017517	J10 27.01.94	
G	Æ017608	B/C 94.0805	
61			



1. 25 MONTERES MED VÆRKTØJSNO. 9970340358
 10 MONTERES MED VÆRKTØJSNO. 9970340359
 ESD BESKYTTELSE PER 8099
CAUTION
 DEVICES ARE SUBJECT TO DAMAGE BY STATIC ELECTRICITY
 2. 51 NITTES I GND.



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH IS 2075		Dansk Radio AS	
DR.	VH 10.7.1989	TITLE	
CH.	GS / M.7.89	COMPONENT LOCATION	
AP.		WIDE BAND AMPLIFIER A4 RETRO	
AP.		SE4010	
APPLICATION		SIZE	CODE IDENT / DRAWING NO.
488100	SE4010	A 2	49 72 90
NEXT ASSY USED ON		FIRST ANGLE PROJECTION	SCALE 2:1
			SHEET 1 OF 1

ASSY 210892, INTERFACE ASSEMBLY

Service Sheet A5

The ADDRESS DECODING AND DATA IN/OUT BUFFERS circuit, decodes the addresses used by the module. The 8 bit external data bus is buffered by the in/out buffer circuit.

The REFERENCE VOLTAGE circuit consists of voltage reference circuit and an 8 bits D/A converter which is controlled by the microprocessor. The circuit provide the reference voltage for the ALC circuit.

The INTERRUPT HANDLING CIRCUIT consists of 6 mutually independent D-flip flops. The interrupt status can be read by the microprocessor and the flip flops can be reset without affecting the interrupt status.

The SUPPLY VOLTAGE WATCH DOG circuit continuously measures the supply voltage. If the voltage drops below $4.7 V_{DC}$ the circuit interrupts the microprocessor and disables the output latches.

The A/D CONVERTER CIRCUIT consists of a 4 channel A/D converter with adjacent input protection.

The output circuits (6 and 7) provides the outputs for control of the power amplifier.

The input circuits (10 and 12) provides the inputs for control of the power amplifier.

The BAUD RATE CLOCK CIRCUIT provide the clock signal for the serial communication to the antenna tuner.

The ATU IN/OUT PUT INTERFACE circuit provide control of the antenna tuner.

The ATU SENSE CIRCUIT detects if an antenna tuner is connected.

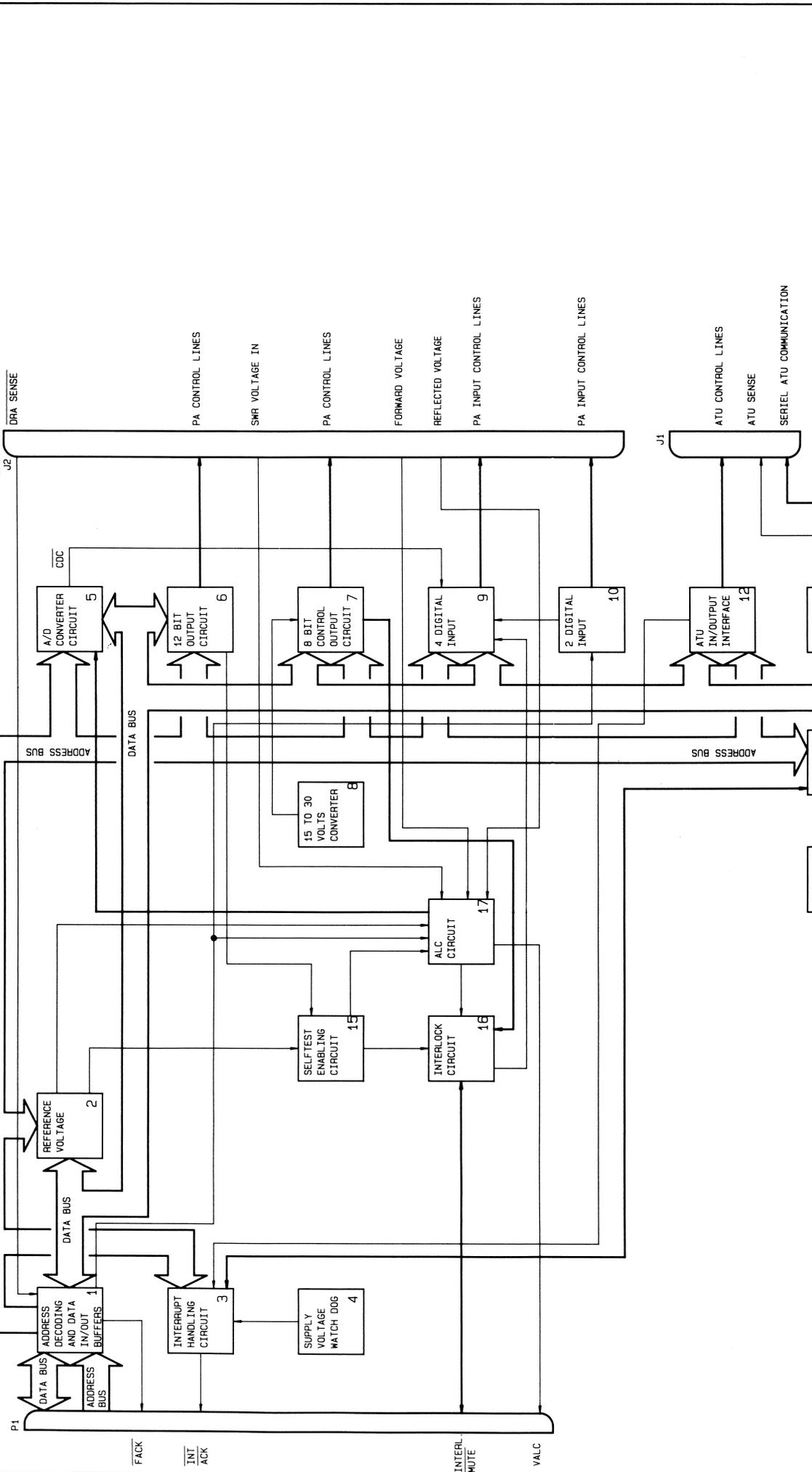
The SERIAL COMMUNICATION TO ATU circuit provide the necessary interface for serial RS485 communication with the antenna tuner.

The SELFTEST ENABLING CIRCUIT is active during selftest.

The INTERLOCK CIRCUIT supervices the SWR at the output of the power amplifier and will cause the Synthex to interlock if the SWR reaches a certain value.

The ALC CIRCUIT contains the necessary circuits for control of the output power level of the power amplifier. The circuit will reduce the output power of the power amplifier in accordance to mismatch on the antenna output.

CHANGE ORDER/REVISION			
CD: 9670	REV: B	CD: 9670	REV: B
CHKD: CK	JG: CK	CHKD: CK	REV: CK



MATERIAL:		PROJECTION:		TERMA Elektronik AS NYNARSEN 4, DK-8000 LYSTRAP, DENMARK	
GENERAL TOLERANCE:		REVISION STATUS OF SHEETS (OTHER THAN 1):		TITLE: CONFIGURATION INTERFACE A5	
SHEET NO.:		DATE OF THIS ISSUE: 91125		REV: B	
REVISION:		INITIAL RELEASE: 91125		DATE OF THIS ISSUE: 920205	
CODE: D2		JHL: N/A		DOCUMENT NO: 210892 EB	
PREP: VH		CHKD: CK		SHEET NO: 1	

1. Address decoding and data in/output buffers.

The 8 data bits are buffered via an 8 bits bidirectional buffer U13. The data direction of the buffer is controlled by the **rd** and **wr** pulses in combination with the addresses which the module is coded to acknowledge. The two 4 bit buffers U22 simply buffer the control signals to the module. The two 3 to 8 lines decoders U20 and U21 decode a total of 10 addresses, regardless of the **wr** or **rd** status, whereas the 3 to 8 lines decoder U12 only decodes addresses related to the **wr** signal.

The module gives an acknowledge to a total of 10 addresses. These addresses are tied together via U17. The output signal from the NAND gate U17 is converted and form together with the **rd** and **wr** pulses the acknowledge signal from the module. The logic circuit U19 and U32 controls the direction of the 8 bits bidirectional data flow, too. The transistor Q18 converts the level of the acknowledge signal and is an open collector circuit.

2. Reference Voltage

The integrated circuit U8 is a digital to analog converter. When an 8 bit binary signal is applied to the input, the converter generates a current out of pin 4. This current is converted to a voltage by U9-B. The nominal maximum output level is 10 V which is adjusted by R22. The reference voltage is used to set the output level of the power of the transmitter. U9-A makes use of the integrated reference voltage circuit U47 to generate a stable voltage close to 10 V. U7 is the data latch for U8.

3. Interrupt handling circuit.

This block consists of 6 D flip flops U27, U28 and U40. Each D flip flop controls an interrupt status. All 6 outputs are tied together via two 4 input AND gates U41 and a 2 input OR gate, and the transistor Q16 buffers the output signal to the microprocessor. All the 6 D flip flops are reset by the address pulse ADR 18H WR.

4. Supply voltage watch dog.

The integrated circuit U38 continually measures the supply voltage, and if the supply voltage goes below 4.7 volt, the output of the watch dog circuit goes low. The D flip flop U18 is cleared and the output Q clears all the output LATCHES by taking the signal line OUTPUT CLEAR to a low level. The output Q goes high triggering the interrupt D flip flop circuit U40-B.

5. A/D Converter Circuit

The integrated circuit U24 is an 8 bit analog to digital converter with four multiplexed inputs.

CH1 on U24 is used to measure the standing wave ratio SWR.

CH2 on U24 is used to measure the forward output power of the transmitter. The input voltage is divided by R116 and R136 because Q42 is switched on.

CH3 on U24 is used to measure the power output level of SE4010.

CH4 on U24 is used to measure the AF input levels of SE4010.

6. 12 bit output circuit

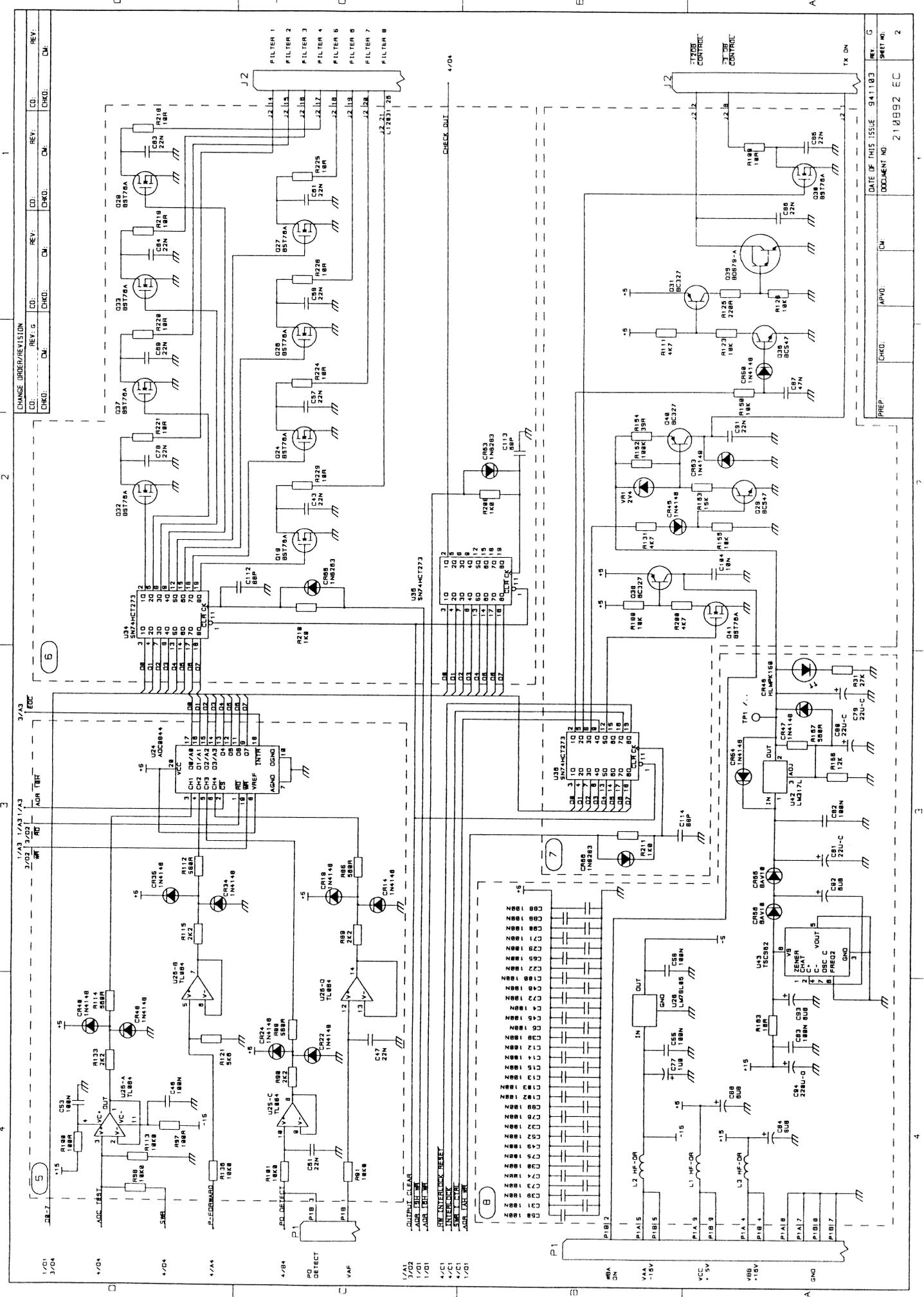
11 of the 12 outputs are identical. When the output signal from the 8 bit latch U34 or U35 goes high, the FET transistors go on, forcing the output pins on connector J2 to go low. The output resistors form together with the output capacitor low pass filters avoiding noise signals coming from the connector J2 to clock the 8 bit data latch. The diodes form together with the pull-up resistors a 5 volts pull voltage. The diodes protect the internal circuit if higher voltage is applied to the module. The last output is a 15 volts output. The transistor Q20 is on when pin 12 on U35 is high. The output resistor R205 form together with output capacitor C60 the low pass filter. The output U35 pin 2 is used to enable the test circuit in block 17.

7. 8 bit control output circuit

4 bits are used for internal control bits. The remaining 4 bits are converted to a higher output voltage than 5 volts, or to source a high current. The output J2 pin 1 is a 24 volt 200 mA current limited output, output J2 pin 6 is a darlington output capable of sinking by 2 A, output j2 pin 6 is a open drain output pulled up to 15 volt.

8. 15 to 30 volts converter

When 24 volts are needed to drive the relay connected to the output J2 pin 1, an voltage doubler is implemented to the circuit. The input PI filter C94,C93,C83 and R163 prevents the noise coming from the free running oscillator circuit U43 to disturb the 5 volts supply line. The diodes CR55,CR56 and the capacitors C92 and C81 the voltage doubler circuit. The voltage reference circuit U42 limits the output voltage to 24 volts.



REV. NO.	REV. DATE	REV. BY	CHKD. BY	CD.	CHKD. CD.	REV. NO.	REV. DATE	REV. BY	CHKD. BY	CD.	CHKD. CD.
1/01	3/04					1					
1/04						2					
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1/04						100					

9. 4 digital input

There are four identical inputs. The input voltage below approx. 20 volts is detected as low, whereas input voltage over approx. 25 volts is detected as high. The input circuits are protected against the input voltage by diodes. The input circuits have an hysteresis of approx. 2 volts preventing the input signals to the microprocessor from pendling. Each input comparator has the same reference voltage applied to the input circuit.

10. 2 digital input

The transistors Q8 and Q12 is switched on and the transistors Q9 and Q10 is switched off. Therefore the resistors R68, R38 and R35 are disconnected and the input circuits act as the four input circuits described above.

11. Baud rate clock circuit

The X-tal is excited by the buffers U6. The buffered clock signal is divided by the circuit U12. One output clock (3,07 MHz) is used to clock the USART directly, whereas the second output is divided by an integrated circuit U4. To set the BAUD rate of the serial communication line to the ATU, the strap P2 is mounted in the current position.

12. ATU in/output interface

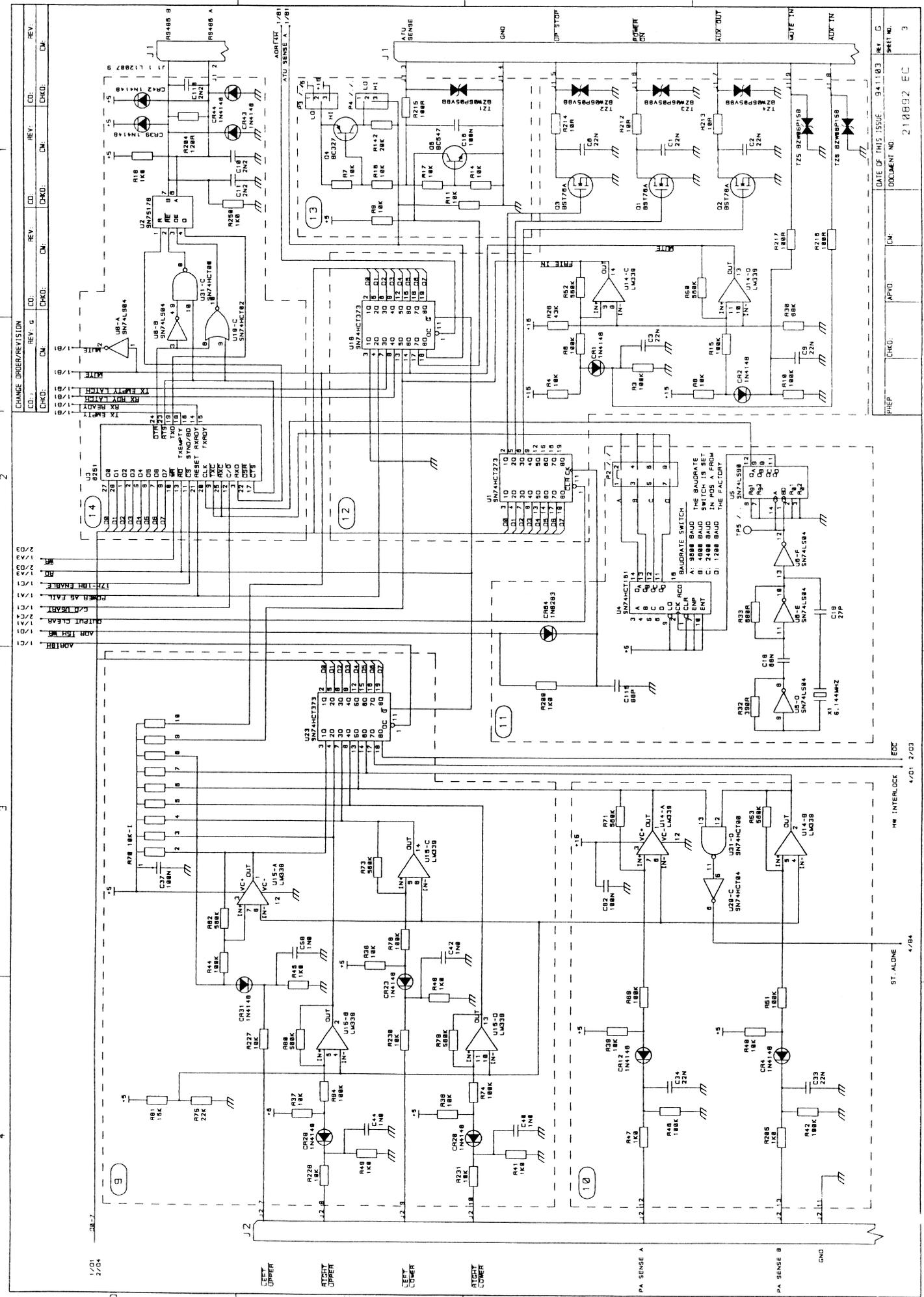
The interface consists of 3 open drain outputs and two inputs. The inputs detect voltage levels below approx. 2 volts as a low signal. The outputs simply sink current and are not pulled up.

13. ATU sense circuit

The ATU SENSE input is a 3 level detector. When ATU SENSE is 0 volt, pin 17 and 18 on U16 are high, whereas they are low, when ATU SENSE is 5 volts. If ATU SENSE is not connected, pin 17 is low and pin 18 is high.

14. Serial communication to ATU

The circuit consists of an intergrated USART circuit U3 which controlls the serial interface to the ATU. The external logical circuit U29, U31 and U19 generates the control signals to the integrated line receiver/transmitter U2. The capacitors C10 and C11 reduce possible noise and the resistor R204 gives the correct line impedance.



CHANGE ORDER/REVISION

CD: 1	REV: 5	CD: 1	REV: 5	CD: 1	REV: 5
CHKD: CM					

2/03
1/29
1/28
1/27
1/26
1/25
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13
14

1/01
2/04

DATE OF THIS ISSUE: 3/11/03
DOCUMENT NO: 210892 EC
REV: G
SHEET NO: 3

DATE OF THIS ISSUE: 4/20/03
HW INTERLOCK
ST. ALONE 4/84

DATE OF THIS ISSUE: 4/20/03
HW INTERLOCK
ST. ALONE 4/84

DATE OF THIS ISSUE: 4/20/03
HW INTERLOCK
ST. ALONE 4/84

15. Selftest enabling circuit

This circuit is only active when the CHECK OUT line from the latch U35 pin 2 is high. Several components serve to disable or enable several circuits. The basic functions of the selftest circuit are first to enable/disable the transmission gates U37B and U37C to transmit the Vref voltage to the AD converter, and second, to check the interlock flip-flop U18B.

16. Interlock Circuit

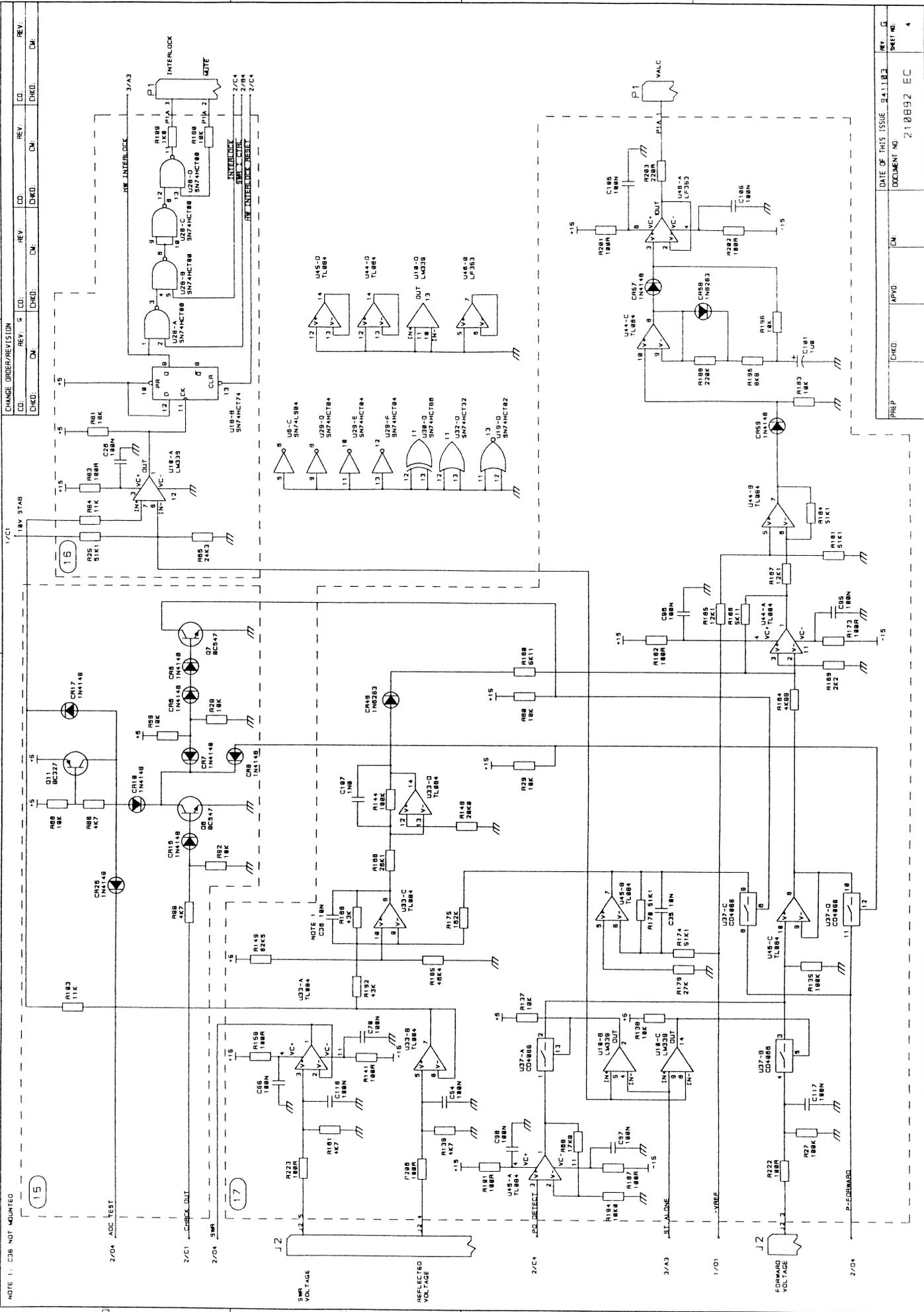
When the REFLECTED VOLTAGE applied to U10-A exceeds 3.2 V corresponding to a reflected power of 50 W for S76150 or 100 W for S76210, a clock pulse sets the flip-flop U18-B. SE4010 is then interlocked and the status signal **HW INTERLOCK** to the microcomputer is set to logical "1". An interlock causes the microcomputer to take precautions to protect the transmitter against bad SWR. Then the microcomputer disables the interlock signal by applying a logical "0" on **HW INTERLOCK RESET**.

17. ALC-circuit

The gate of Q35 is grounded. This causes the circuits necessary for operating the DRA transmitter to be connected and the other circuits to be disconnected.

The **FORWARD VOLTAGE** is buffered by U45-C. In the circuit consisting of U44-C and U44-D, the reference voltage (VREF) is subtracted from the **FORWARD VOLTAGE** and amplified. The **REFLECTED VOLTAGE** is buffered by U33-C and feed to U44-A, where a voltage corresponding to a SWR of 1.5 is subtracted. Untill the **REFLECTED VOLTAGE** reach the value corresponding to a SWR of 1.5, CR49 is off. When the **REFLECTED VOLTAGE** reach the value corresponding to a SWR of 1.5, CR49 will switch on, and a voltage will be added to the **FORWARD VOLTAGE**. This will cause the output power to decrease for SWR bigger than 1.5.

Before the signal leaves the interface assembly, it is routed through the peak/hold circuit consisting of U45-B, U46-A and adjacent components.



NOTE 1: C08 NOT MOUNTED

15

2/04 - ADC TEST

2/C1 - CHECK OUT

17

SWR VOLTAGE

SELECTED VOLTAGE

2/C4 - SQ. WAVE

3/A3 - ST. ALONE

1/W01 - VREF.

J2

FORWARD VOLTAGE

2/04

REV.	CO.	REV.	CO.	REV.	CO.	REV.	CO.
1		2		3		4	
CHKD:	DN:	CHKD:	DN:	CHKD:	DN:	CHKD:	DN:

DATE OF THIS ISSUE	24.11.82	REV. G
DOCUMENT NO.	210892 EC	SHEET NO. 4
PREP	CHKD:	APVD:
CM		

1. PRODUCTION NOTES:
 - 1.1 POS 2 MONTERS FOR MONTAGE AF J1 OG J2
 - 1.2 POS 8 MONTERS I POS A, P2: POS LO P3.4
 - 1.3 POS 9 MONTERES I TP3 OG 4
2. NUMBERS IN ARE FIND NUMBERS IN PARTSLIST
3. C36 NOT MOUNTED

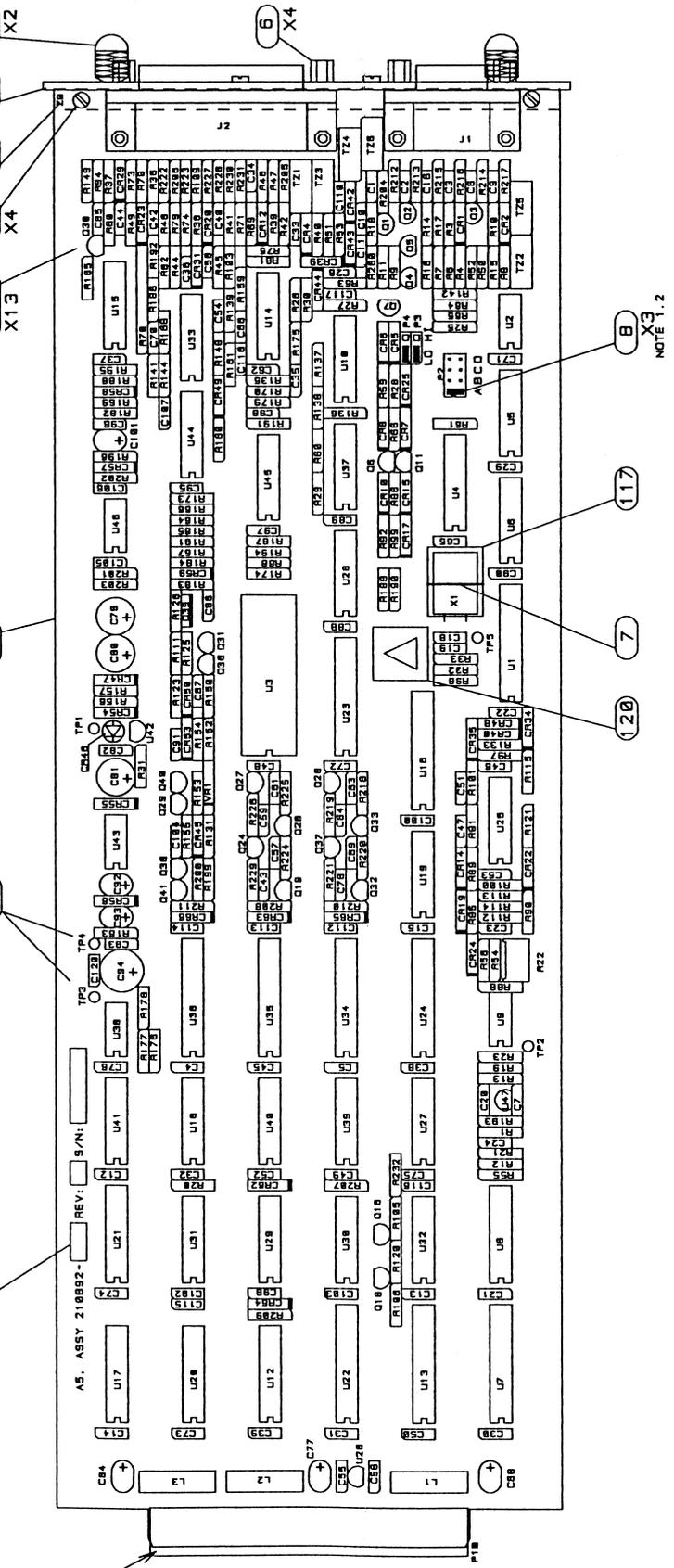
SOLDER SIDE COMPONENT SIDE: A1

MARK RELEVANT VARIANT NR. REV. OG SERIENR.

NOTE 1.3

ESD PROTECTION PER 1006 X13

NOTE 1.1



ASSY 496103, MODULATOR ASSEMBLY, SSB

Service Sheet A7

The AF signals are fed to the Modulator Assembly via the balanced line transformers or the microphone amplifiers. The wanted AF input is selected and fed to the compressor through a bandpass filter.

The meter and remote key switch switches are used when the Remote Key is supplied*.

The VOX is placed immediately before the compressor. With this circuit it is possible to key the exciter when the amplitude of the supplied AF signal exceeds a certain level.

After the compressor, the compressed signal is mixed with the first LO signal at 1.4MHz in the double balanced mixer. The output of the mixer consists of two side bands whereas one is selected by the following crystal filter.

The 1.4MHz signal is fed to the mixers through a limiter amplifier. The signal from the limiter amplifier is a square wave signal with an amplitude independent of temperature variations. The side band and a 1.4MHz carrier signal is fed into a gain controlled amplifier before the three signals are summed together. The gain of the amplifiers are dependent on the mode.

The shaper after the summing amplifier shapes the envelope of the output signal when the exciter is keyed. Finally the signal is amplified to $-13\text{dBm}/50\hat{\Omega}$.

* The Remote Key is an option, which is used to key the exciter in connection with the Transmitter Remote Control TC4010.

1. AF Input

The module contains two line inputs and a microphone amplifier. To provide a good return loss on the line inputs, a 6 dB attenuator is inserted in front of the line transformers. The capacitors C3 to C6 attenuate RF frequencies on the line inputs. The level of the signals from the line transformers are adjustable by means of R16 and R24.

The microphone amplifier amplifies the signal from the microphone. The capacitor C7 on the microphone input forms an RF filter. The level is adjusted by R27.

3. Audio Selector

U2 forms an audio selector controlled by the data latch 18 and the key logic 22.

4. Morse Tone Generator

The integrated circuit U4 generates an 800Hz tone. The harmonics are reduced by the active lowpass filter U5d with surrounding components. The generator is keyed via the **MORSE KEY** on U5a pin 2. U5a is coupled as a comparator and Q1 acts as a switch. The output from the generator is continuously fed to the audio selector 3 and to the side tone pin on the J2 connector. The last output is keyed via the **MORSE KEY**.

6. 20dB Amplifier

In this block, the AF signal is amplified by 20 dB giving a correct input level for the compressor 14.

8. Bandpass Filter

The filter is a 2nd order Chebychew bandpass filter. The bandwidth depends on the specifications of the exciter.

9. AF Meter Circuit

U7 is a peak detector. The output of the detector is amplified by the following operational amplifier U8. In this way, the level of the AF signal can be measured.

10. Meter and Remote Key Switch

This circuit is used to couple the AF signal through the optional remote key module 33 if provided. This will automatically happen if the remote key module is connected to J4.

12. VOX Circuit

U11 is coupled as a comparator. When the amplitude of the AF signal exceeds a certain level determined by the circuit, the output of the comparator will go high triggering the monostable flip-flop U12b, which will key the exciter via the key logic 29.

29. Key Inputs

The exciter will be keyed if the selected key input is grounded. The key inputs are constructed in such a way that they can be operated by optocouplers instead of keys.

33. Remote Key (Option)

As mentioned in part 10 and 28, it is possible to expand the modulator module with a Remote Key Module. This is an optional module, mounted in the modulator module and connected to this via the J4 connector.

The Remote Key module enables keying of the exciter (each side band separately) when the exciter is remote-controlled. This takes place via a key tone of 2990Hz which is added to the AF signal. The remote key will separate and detect this tone and key the exciter. The key tone will be suppressed by the remote key module and will not be transmitted.

REVISIONS		DATE	APPROVAL
DESCRIPTION		15.89	VH

ZONE LTR
2C

DESCRIPTION
4E1890023

C

VAF

5/D2

5/A3

14. Compressor

The compressor will attenuate the AF signal in such a way that the peak value on the output of the compressor will remain constant. The resistor R122 and the FET Q7 form a variable voltage divider followed by the amplifier U17. The signal on the output of the compressor is full-wave rectified and compared with a reference voltage in the circuit consisting of U16c, U16d and adjacent components. Via Q8 the charge circuit, consisting of Q9, Q10, CR10, CR11 and adjacent components, charges C54. The voltage over C54 controls Q7 which functions as a controlled resistor. U16a is inserted to linearize Rds of Q7 reducing intermodulation and harmonic distortion.

16. Mixer

The double balanced mixer is operated in saturated mode. The mixer is fed balanced with a 1.4MHz (+/- offset) square wave signal converting the AF signal from the compressor to the frequency of the 1st IF. The carrier is balanced out by adjusting R170. When the mixers are operated in the saturated mode there is the advantage of a constant gain.

REVISIONS

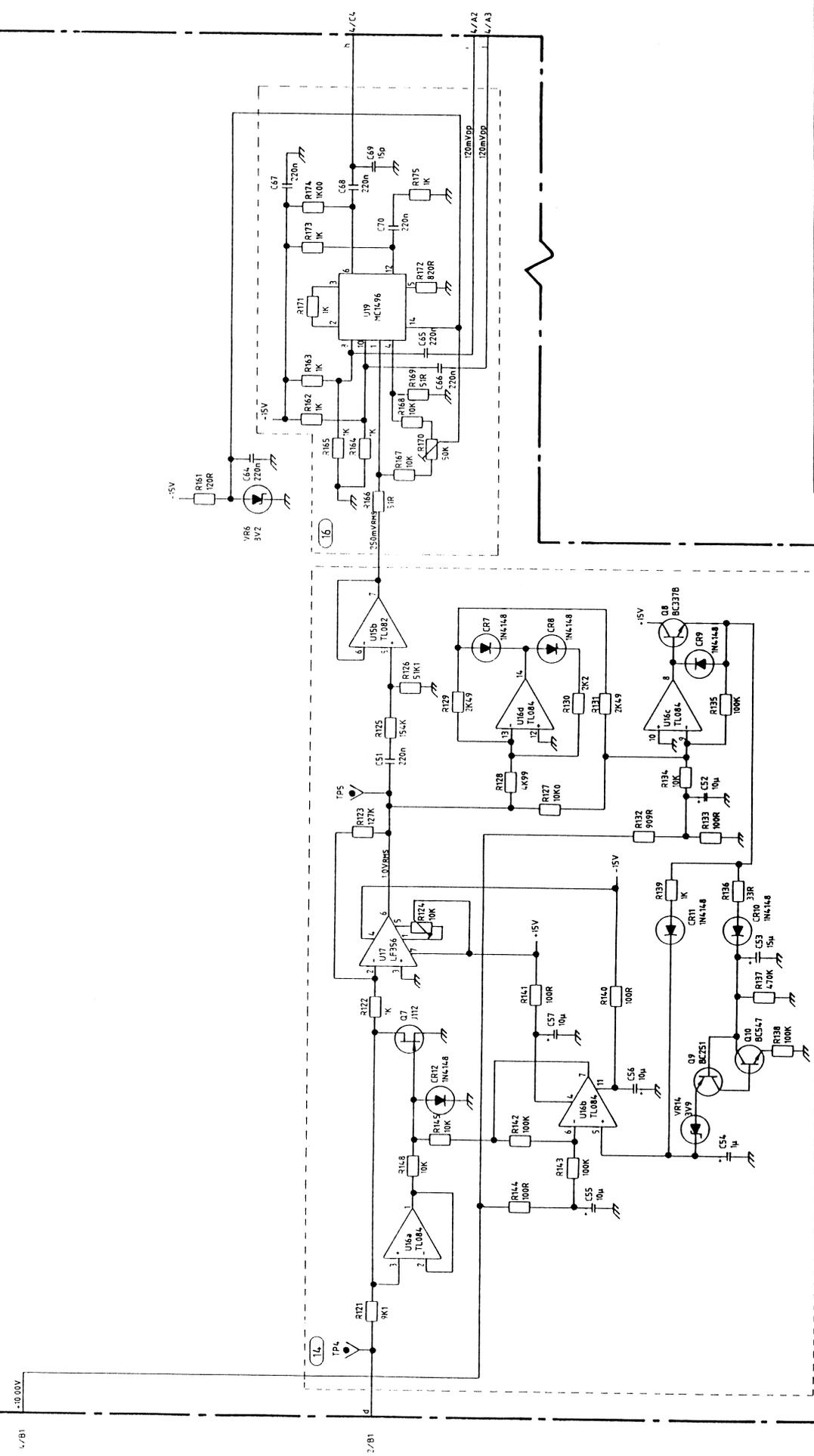
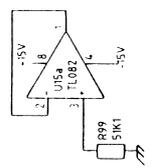
ZONE/ETRI DESCRIPTION DATE APPROVAL

ZONE/ETRI	DESCRIPTION	DATE	APPROVAL
B			

FIRST ANGLE PROJECTION

SIZE CODE/IDENT DRAWING NO. A2 49 61 03

SCALE SHEET 3



18. Side Band Filter

After the mixer, the side band is selected by the side band filter.

20. Gain Controlled Amplifier for Side Band

The common base stage Q17 provides the correct impedance for the side band filter FL2. The level of the side band signal is adjustable by means of R194. Q19 acts as a switch controlling the base voltage of Q18. In this way Q18 acts as a signal switch. With Q20, Q21 and Q22 the load on the collector of Q18 can be changed. This will change the gain of the stage such that the different modes of emission can be constructed.

21. Summation and Shaping

The side band and the carrier are summed by the common base stage Q23. The common collector stage Q24 matches the impedance to the shaper stage Q25. When the exciter is being keyed, the voltage on the base of Q25 forms a ramp shaping the IF signal. C88 and L3 are inserted to avoid self-oscillation. The amplifier Q26 after the shaper converts the impedance into 50 ohms.

22. DC Ramp Circuit

When the exciter is keyed, the charge capacitor C95 will be charged with a constant current through Q28. This will cause the voltage on the emitter of Q30 to rise as a ramp, until it remains on a constant voltage of 5.7V. When the key is released, the charge capacitor will still be charged with a constant current through Q28, but now Q29 will discharge with a constant current two times the current through Q23; thereby the voltage on the base of Q30 will be a falling ramp which will reach 0V and remain on this value until the exciter is being keyed again.

23. 10V Reference Voltage Supply

This circuit produces a stable voltage used as reference in the compressors 14 and in the DC-ramp circuit 22. The voltage can be adjusted to 10.00V by R239.

24. Limiter Amplifier

The stage consisting of Q31 and Q32 has a high input impedance, and an output impedance of 50 ohms, so it can drive the 50 ohms coaxial cable between the amplifier and the limiter amplifier. The limiter amplifier U21 converts the sine wave to a square wave.

25. Gain Controlled Amplifier for Carrier

The input impedance of this stage is 50 ohms so the parallel connection of this stage and the high-input impedance stage (Q31, Q32) will still be 50Ω. It functions in a way similar to the gain controlled amplifiers for side bands.

26. Data Latch

The address on the address bus is decoded by U25 causing the data on the data bus to be latched into the actual latch, and causing the **IIACK** to go low (the **IIACK**-wire is pulled up to +5V on the microprocessor assembly).

27. Mode Gain Controller

This circuit decodes the two bits from the data latch: **M0** and **M1**. In this way the gain of the gain controlled amplifiers 20 and 25 is controlled by switching the load transistors of the amplifiers.

28. Check Circuit

This circuit has two main functions. If the **CHE**-bit on the data latch is logically 0, the **ALC KEY**-wire will become a logical 0 if the Remote key is mounted in the modulator. If the **CHE**-bit is a logical 1 the **ALC KEY**-wire will become a logical 1 when the modulator is modulated.

The circuit is also used to detect the strapping of the assembly.

30. Key Logic

With the key logic, the wanted key (or keying method) is selected. It is controlled via the data latch. The decoder U31 is coupled in such a way that the line input will be preferred if both the line key and the microphone key are keyed at the same time. When the **INTERLOCK**-wire is set to a logical 1, it is not possible to key the exciter.

R294, CR32 and CR33 are also used to detect the strapping of the assembly.

31. Key Circuit

U34a, U34f and adjacent components form the necessary circuit to generate **KEY2**. This is a key signal which is delayed about 10mS on the falling edge, while the rising edge equals **KEY1**. **KEY2** also generates the necessary keying signals to the switches in the Gain Controlled Amplifiers via U28d, U35b, and U35d.

The key circuit also contains a muting relay, enabling muting of a connected receiver when the system is operating in simplex mode.

32. DC Filters

The DC filters are used to clean the supply voltages for incoming noise.

Strapping

In an SE4010 exciter, SSB version, the microcomputer must detect the bandwidth of the side band filter in the Modulator Assembly. Therefore the Modulator Assembly is strapped by the factory in accordance with the mounted filter option.

The strapping consists of a diode which connects one of the strap points OS1, OS2, OS3 or OS4 with the common strapping point OSC. However, the assembly is not strapped when the side band filter is an O1 or O5 filter option, which is the default value for the strapping. The diodes used are type BAT83, which must always be mounted with the cathode on the common strap point OSC.

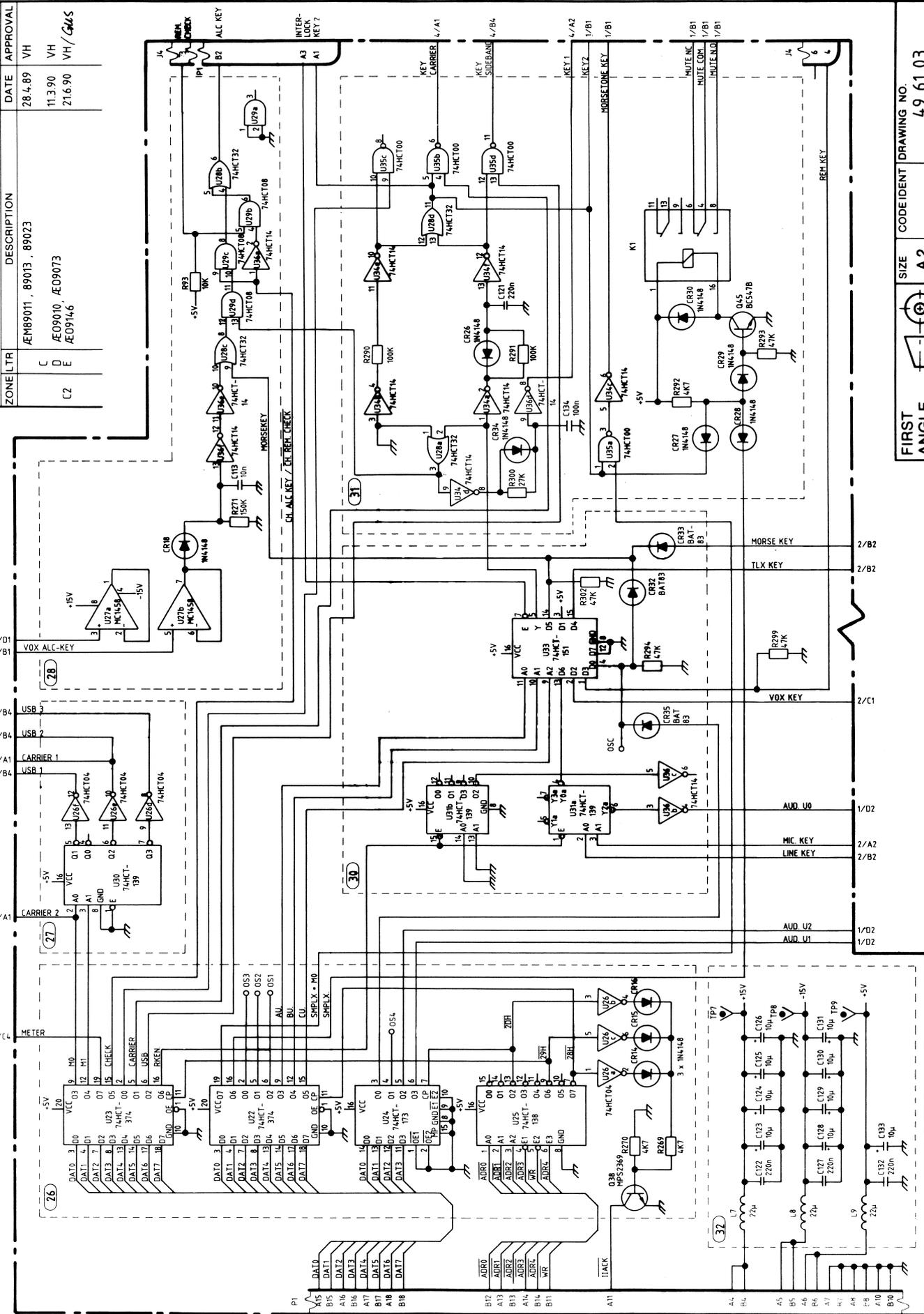
In the table below the filter bandwidths and their corresponding option numbers are listed for the SSB version.

Bandwidth	Option number
3000Hz	01
3400Hz	02
not defined	03
2700Hz	04
3000Hz	05

The number of the mounted filter option is indicated by a yellow label on the rear plate of the Modulator Assembly.

REVISIONS

ZONE/LTR	DESCRIPTION	DATE	APPROVAL
C	ÆMB9011, 89013, 89023	28.4.89	VH
D	ÆO9010, ÆO9073	11.3.90	VH
E	ÆO9146	21.6.90	VH/GMS



FIRST ANGLE PROJECTION

SCALE

SIZE A2

CODE IDENT DRAWING NO. 49 61 03

SHEETS

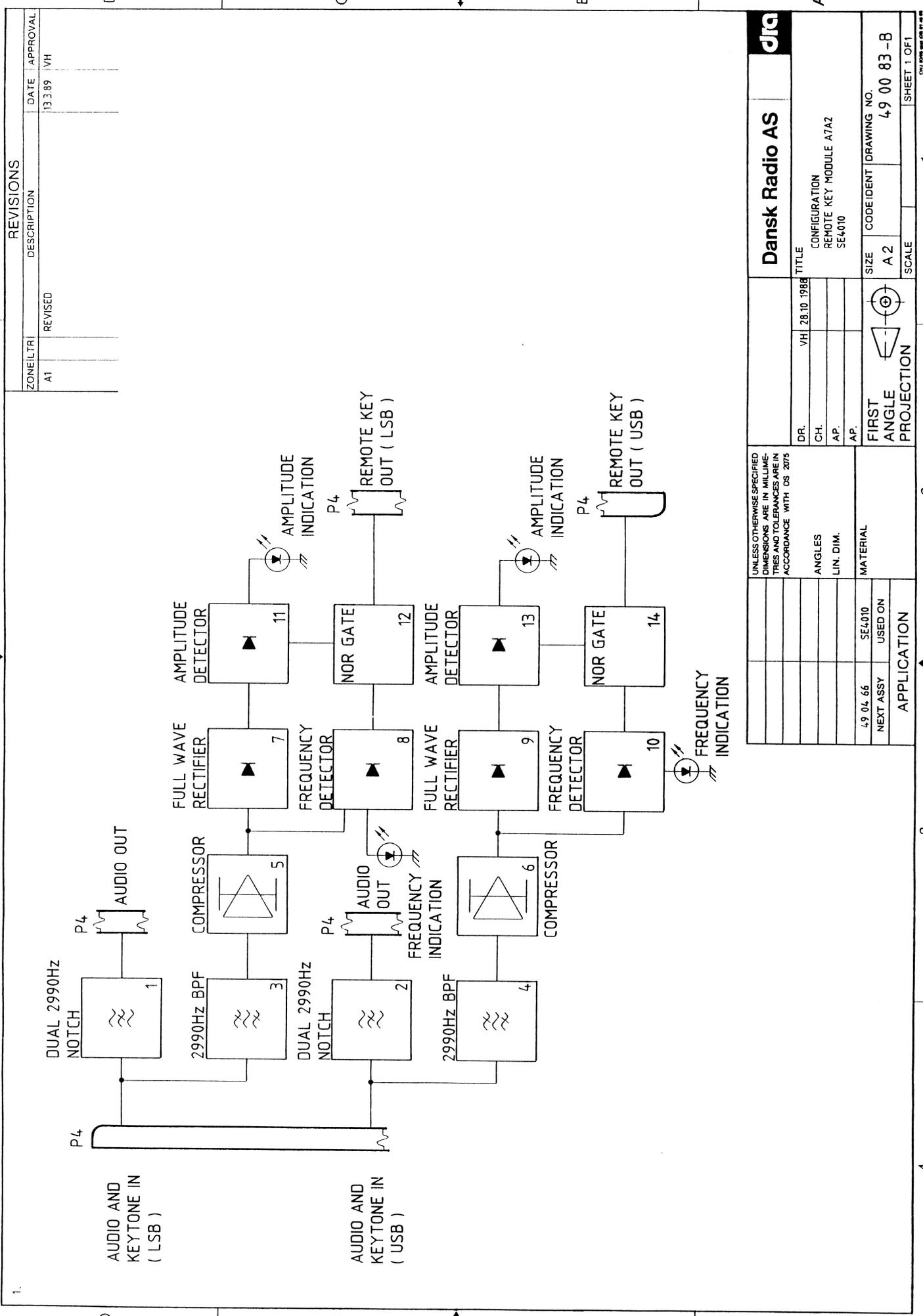
ASSY 490083, REMOTE KEY MODULE

Service Sheet A7A2

The Remote Key Module separates the audio from the key signal. The upper frequency of the audio is limited to 2700 Hz with a key tone frequency of 2990 Hz. The amplitude of the key tone is 7 dB lower than the audio amplitude.

The audio is led through two notch filters **1** (**2** in USB) centered at 2990 Hz giving a suppression of more than 50 dB of the key tone. The audio is then led to the compressor on the modulator assembly.

The audio and key tone are also led to a bandpass filter **3** (**4** in USB) centered at 2990 Hz and with a selectivity of more than 30 dB at 2700 Hz. From the bandpass filter the separated key tone is led through a compressor **5** (**6** in USB) giving a constant level for the frequency detector **8** (**10** in USB) and the fullwave rectifier **7** (**9** in USB). The output level is detected in the amplitude detector **11** (**13** in USB) which output is NOR'ed **12** (**14** in USB) together with the output from the frequency detector giving the remote key.



REVISIONS			
ZONE/LTR	DESCRIPTION	DATE	APPROVAL
A1	REVISED	13.3.89	VH

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH CS 2075		Dansk Radio AS		dra	
DR.	VH	28.10.1988	TITLE		
CH.	CONFIGURATION				
AP.	REMOTE KEY MODULE A7A2				
AP.	SE4010				
FIRST ANGLE PROJECTION		SIZE	CODE/IDENT	DRAWING NO.	
		A 2		49 00 83 - B	
APPLICATION		SCALE	SHEET 1 OF 1		

1/2. Notch Filters

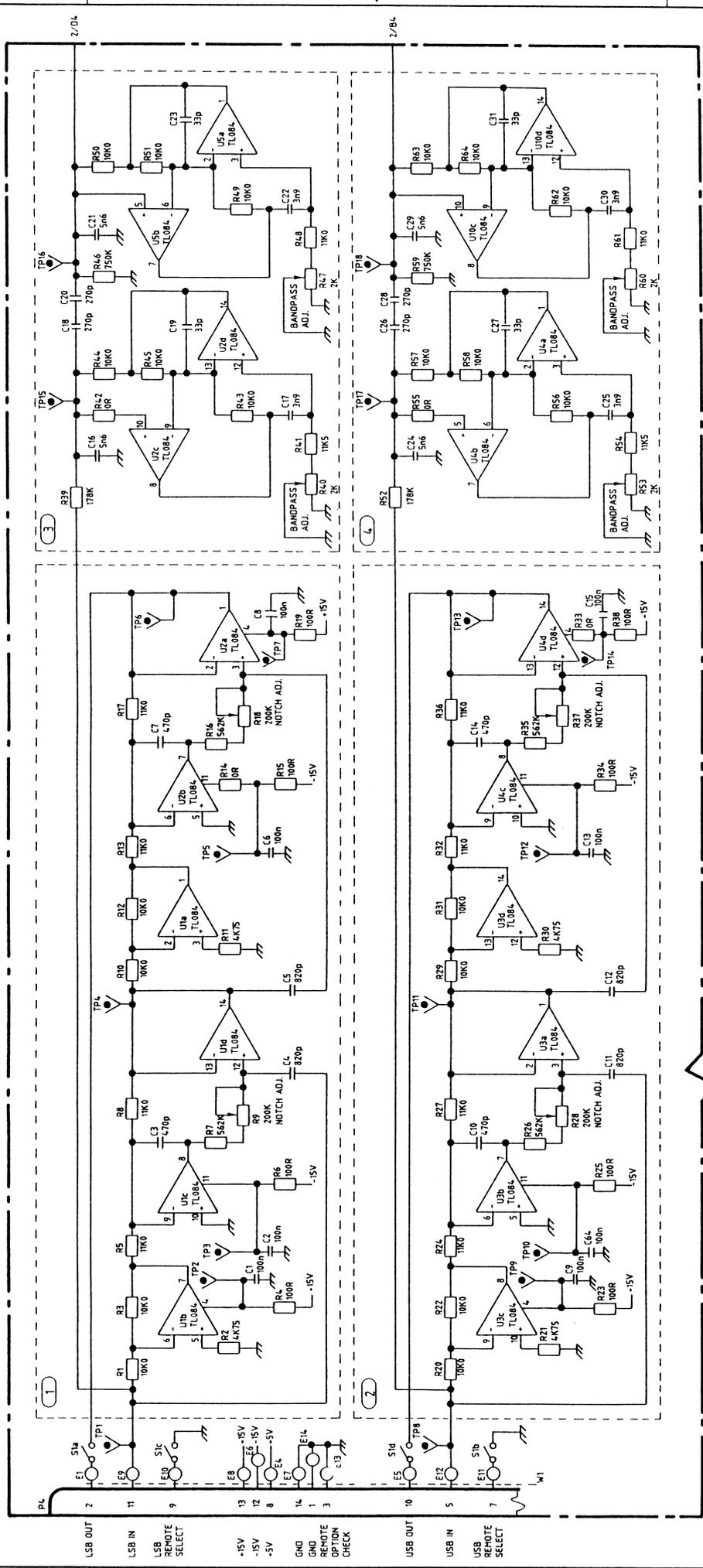
The center frequency of the notch filters is adjustable with R9 and R18 in LSB, R28 and R37 in USB giving a total notch of more than 50 dB.

3/4. Bandpass Filter

The bandpass filter has Gaussian shape to ensure a low ringing and delay in the filter. The filter consists of a coupled resonans circuit where the inductors are simulated by gyrators. The filter response is adjusted by R40 and R47 in LSB, and R53 and R60 in USB. The filter has a selectivity of more than 30 dB at 2700 Hz. The filter insertion loss is less than one dB.

REVISIONS		DATE	APPROVAL
REVISID		20.10.88	VH
REVISED		13.3.89	VH
S.2	C	17.11.92	VH
S.2	D	10.05.94	LIS

ZONE/LTR	DESCRIPTION
A1	REVISID
S.2	REVISED
S.2	REVISID



1 2		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH OS 2075	
0 0		ANGLES	
		LIN. DIM.	
		MATERIAL	
		49 04 66 SE4010 USED ON NEXT ASSY	
		APPLICATION	

DANSK RADIO AS		TITLE	
REMOTE KEY MODULE A7A2		SE4010	
DR. VH 2.5 1988		CH. H/S - 88	
AP		AP	
FIRST ANGLE PROJECTION		SIZE CODE IDENT DRAWING NO	
SCALE		A 2 49 00 83	
		SHEET 1 OF 2	

5/6. Compressor

The level to the remote unit can vary 20 dB and therefore the variation of the keytone amplitude is compressed to a variation of less than 3.6 dB. This is done in order to reduce the distortion of the keysignal. The gain reducing element in the compressor is a FET Q1 (Q2 in USB), which is in the high impedance area when no signal is present. This is done through the reference voltage made by R65 and R66 (R80 and R81 in USB), which is inverted through U6a (U11b in USB) and fed to the gate of Q1 (Q2 in USB). When a signal is present at the output of U5d (U10a in USB) this signal is rectified through CR1 and CR2 (CR3 and CR4 in USB) giving a positive voltage at R69 (R84 in USB) which again is added to the reference voltage giving a less negative voltage on Q1 (Q2 in USB) giving a lower resistance and thereby a lower gain.

7/9. Full Wave rectifier

The rectifier is a full wave rectifier with a gain of 6 dB.

11/13. Amplitude detector

The amplitude detector U6d (U11c in USB) compares the full wave rectified signal with a reference voltage. Each time the amplitude from the rectifier reaches the reference level of 1.7 Vdc, the capacitor C59 (C63 in USB) at the output is shortcircuited. To ensure a well defined output the time constants of C59 and R131 (C63 and R140 in USB) are greater than the time between the peak in the full wave rectified signal.

8/10. Frequency detector

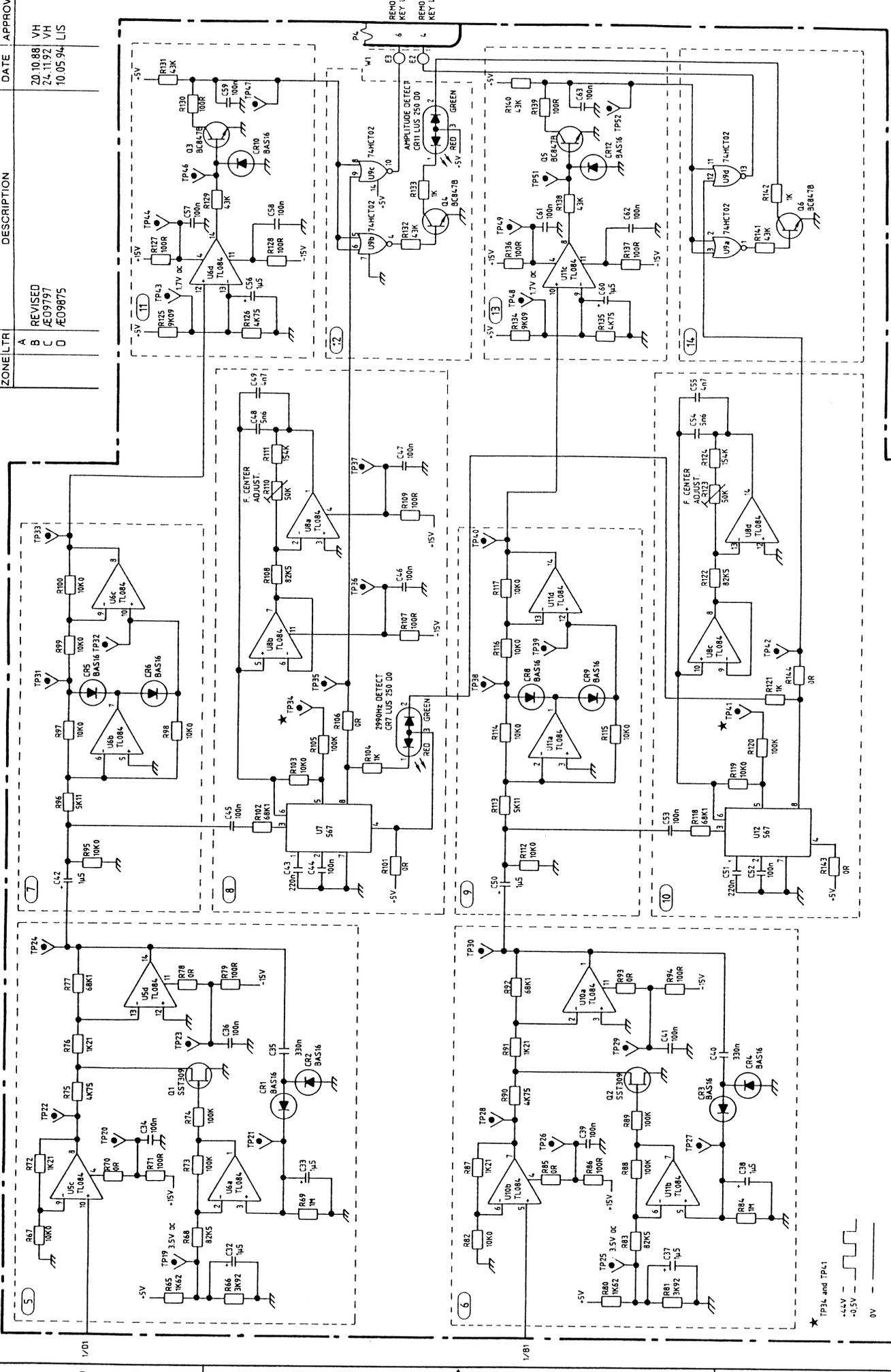
The frequency detector is made by a free-oscillating PLL U7 (U12 in USB) which will obtain lock when the keytone is present. The frequency determining capacitor is made by a capacitance multiplier to allow use of a temperature stable capacitor. Whenever a keytone of the right frequency is present, a LED is lit as indication, red for LSB and green for USB.

12/14. Frequency / amplitude NORing

The logic signals from the amplitude and frequency detector are NORed together to give a positive TTL level whenever both criteria are present.

U9 is also used as inverter for the amplitude detection indicator CR11, red for LSB and green for USB.

ZONE/LTR	DESCRIPTION	DATE	APPROVAL
A	REVISD	20.10.88	VH
B	AE09797	24.11.92	VH
C		10.05.94	LIS
D	AE09875		



TP34 and TP41
 -4.5V
 -0.5V
 0V

ASSY 487740, MICROCOMPUTER ASSEMBLY

Service Sheet A8

The assembly consists of an 8085 microprocessor large scale integrated circuit that controls all basic functions within the exciter.

The operating system software for the microcomputer is stored in three programmable read-only memories (PROM's). Each PROM is capable of storing 16K x 8-bit words.

A random access memory chip (RAM), capable of storing 8k x 8-bit words, is required for the temporary storage and manipulation of input and output data. During power failure and receiver standby, the RAM is powered from a 3V battery back-up preventing interruptions from disturbing the stored data.

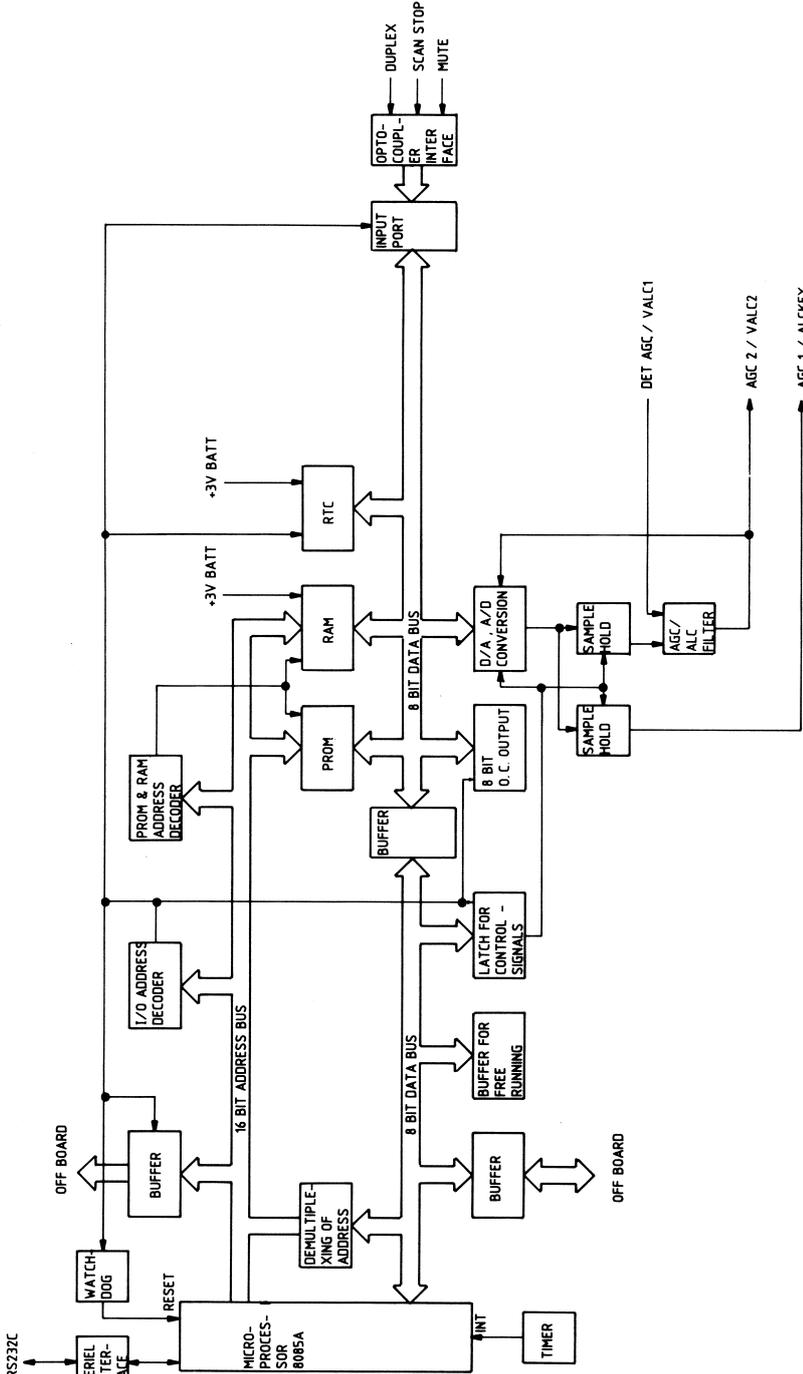
Various buffers and decoders assure proper drive levels and timing to and from various circuits and input/output ports.

A battery back-upped real time clock integrated circuit is mounted to ensure correct time keeping even during power failure or exciter standby.

Timing of the assembly is via a 6.144MHz crystal oscillator contained in the CPU.

The Microprocessor Assembly performs the automatic level control ALC. Analogue loops provides fast attack ALC-levels for the IF assembly. The peak voltage of **VALC1** is held by a sample and hold circuit. As long as **ALCKEY** is a logical "1", the microcomputer will approach **VALC2** to **VALC1**.

REVISIONS		DATE	APPROVAL
ZONE	LTR	DESCRIPTION	
		EM88110	VH
		EM89032	VH



Dansk Radio AS		TITLE	
DR.	VH 22.5.87	CONFIGURATION	
CH.		HPU BOARD	
AP.	MIF 11.6.87	RC4000, RX4000, RX4009, SE4010	
AP.			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		SIZE	A2
471909	RC4000	CODE IDENT	DRAWING NO. 48 77 40
471712	RX4000	SCALE	
488240	RX4009		
488100	SE4010		
NEXT ASSY	USED ON		
APPLICATION		FIRST ANGLE PROJECTION	SHEET 1 OF 1

1. Microprocessor Circuit

This circuit contains an 8085 microprocessor with associated 6.144MHz crystal for internal clock-stabilization. U12 is an eight bit latch for multiplexing address line **DB0** to **DB7**. U13 is a buffer for command signals etc.

2. Watch-Dog

Watch-dog for surveillance of correct start-up and system software operation.

At system start-up R4 and C1 ensures that a reset pulse of approx. 10msec is generated. This pulse is routed to the microprocessor through U2.

U2 is a retrigger astable multivibrator with a period of 1sec. Under normal operation, the software ensure that U2 is retriggered at appropriate intervals so that the reset signal to the microprocessor is disabled. Appearance of software error causes the retrigger to cease and the reset pulse generation will start-up.

3. 15msec No-Acknowledge Timer

This timer starts counting when **OFF BD REQ** goes low. If the timer counts out, no acknowledge signal has been received within the last 15 msec, and a trap-interrupt is generated to the micro-processor. In normal operation, acknowledge signals should be received within 15 msec.

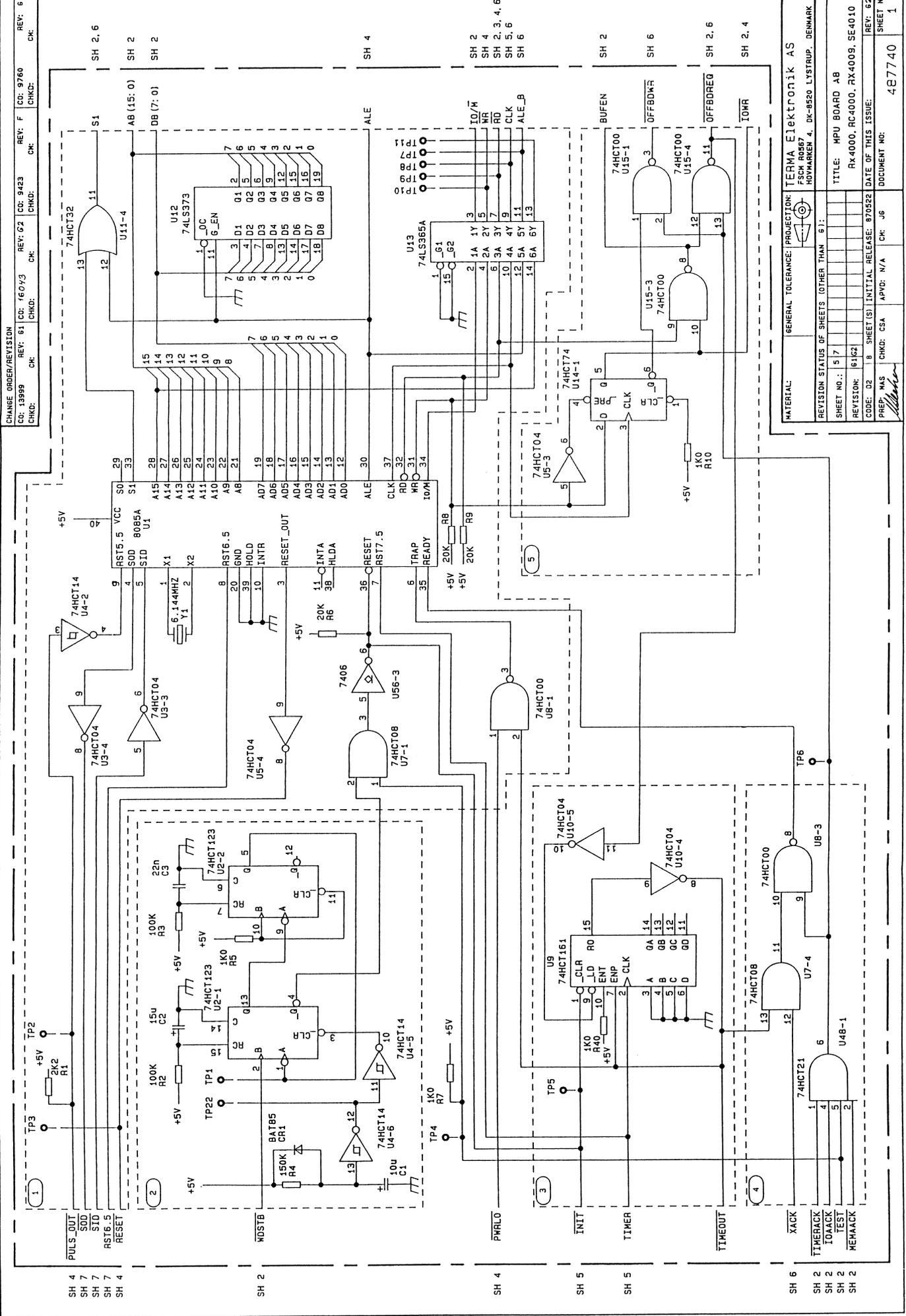
4. Acknowledge Network

The circuit converts the different acknowledge signals to a ready-signal to the microprocessor.

5. OFF Board Request

The J/K flip-flop U14 delays the start of the **WR**-signal one half of a clock period which ensures that **BUFEN**-signal delays the enable of buffer U17 in accordance with the timing. **OFF BD REQ** and **OFF BD WR** are only generated if no acknowledge signal on board has been received before start of **BUFEN**.

CHANGE ORDER/REVISION
 CO: 13999 CH: CC: 160V3 REV: G2 CD: 9423 REV: F CO: 9760 REV: 6
 CHKD: CH: CHKD: CHKD: CHKD: CHKD: CHKD:



MATERIAL:		GENERAL TOLERANCE:		PROJECTION:	
TERMA Elektronik AS		FSCB R0567		NOVEMARKEN 4, DK-8550 LYSTRUP, DENMARK	
REVISION STATUS OF SHEETS (OTHER THAN 6 1):		SHEET NO.:		TITLE: MPU BOARD A8	
6 1/2		5 7		RX4000, RC4000, RX4009, SE4010	
REVISION: 6 1/2		DATE OF THIS ISSUE:		REV: 6 2	
8		870522		SHEET NO.:	
PREP: MAS		APVD: N/A		DOCUMENT NO: 4E7740	
CHKD: CSA		CR: J6		SHEET NO.:	
				1	

6. Test Buffer

U16 is an 8 bit buffer which is enabled during "free-running", i.e. when TEST is low. When "free-running" is selected, U16 forces the microprocessor to read NOP-instructions, regardless of the microprocessor addressing.

7. Data Buffer

U17 is an 8 bit bidirectional data buffer which is enabled during on-board operations.

8. Internal Address Decoding

Address decoding for generating on-board chip selects for I/O operations. An acknowledge signal I/O AACK is generated for every I/O-address, as handshaking signal to the microprocessor.

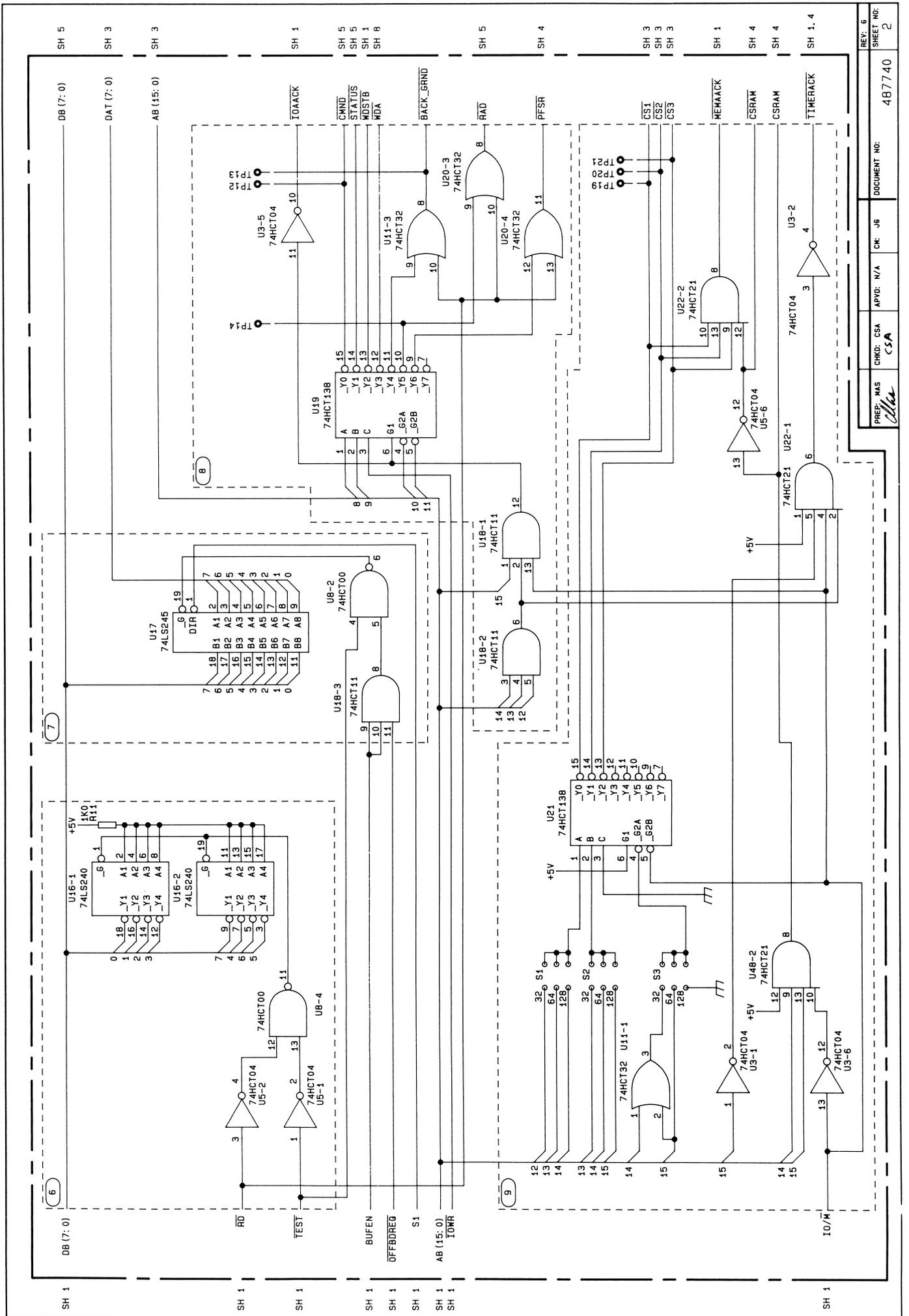
9. Address Decoding for Memory

Address decoding for generating on-board chip selects for memory operations. An acknowledge signal MEM-AACK is generated for every memory address, as handshaking signal to the microprocessor.

The S1, S2 and S3 strap fields determine the address range of CS1, CS2 and CS3

S1,S2,S3	32	64	128
CS1	0-0FFFH	0-1FFFH	0-3FFFH
CS2	1000-1FFFH	2000-3FFFH	4000-7FFFH
CS3	2000-2FFFH	3000-4FFFH	8000-BFFFH

The address range from C000H to FFFFH is reserved for RAM memory.



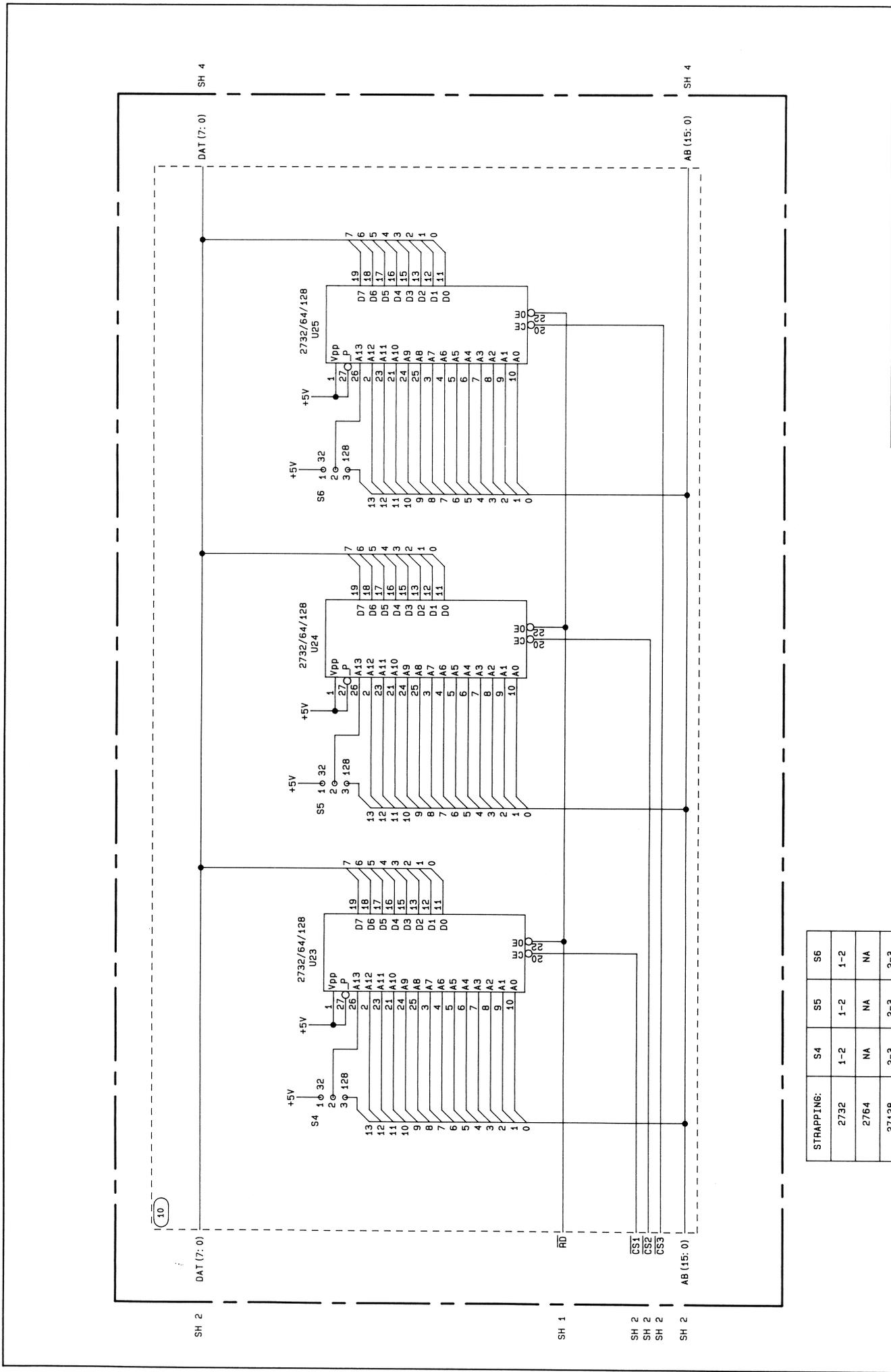
REV: 6	SHEET NO: 2
487740	DOCUMENT NO:
CK: J6	APVD: N/A
CSA	CHKD: CSA
PREP: MAS	CHKD: CSA

10. EPROM Area

The contents of 2732 are 4K x 8 bit.
 The contents of 2764 are 8K x 8 bit.
 The contents of 27128 are 16K x 8 bit.

S1, S2, S3	S4	S5	S6	U23	U24	U25
32	32	32	32	2732	2732	2732
64	-	32	-	2764	2732	N.U.
64	-	-	32	2764	2764	2732
64	-	-	-	2764	2764	2764
128	128	32	-	27128	2732	N.U.
128	128	64	-	27128	2764	N.U.
128	128	128	-	27128	27128	2764
128	128	128	128	28128	28128	27128

(N.U. = not used).



10

STRAPPING:	S4	S5	S6
2732	1-2	1-2	1-2
2764	NA	NA	NA
27128	2-3	2-3	2-3

11. Back-Up Circuit

Circuit which ensures power to CMOS-gates U49-U51, CMOS-RAM U45 and U46 (if large RAM area is required) and RTC (U26) during power off.

BT1 is a lithium battery and R51 protects the battery against serious damage if a short circuit appears.

12. RAM Area

The RAM area consists of one 8K x 8 bit. The RAM area can be extended to 16K x 8 bit by placing an additional 8K x 8 bit RAM circuit in socket U46.

When U45 is used as RAM memory, the strap S8 must be strapped between a and b.

When large PROM memory is required, the strap S8 must be strapped between b and c. In this case, the U45 must be a PROM memory

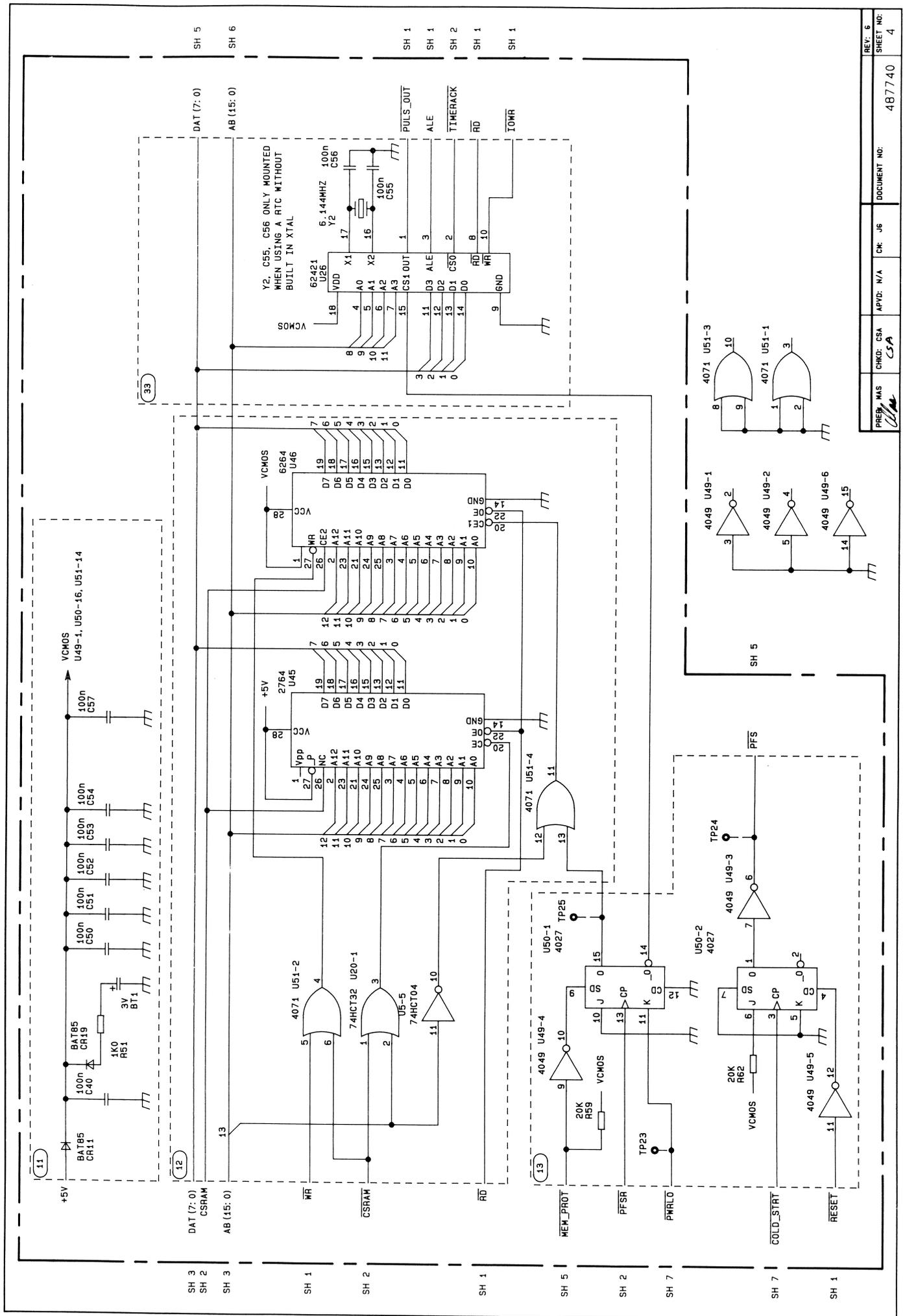
and U46 must be a RAM memory.

13. RAM Protection

When power is removed intentionally by PWR OFF on the front panel, U50a is set. The PWR LO will interrupt the microprocessor. This will read the status of U50a and store relevant information in the CMOS RAM (U45 and U46) and hereafter protect the CMOS RAM against writing by setting U50b. During start-up U50a will be cleared by **RESET** and the CMOS RAM will be enabled by clearing U50b.

33. Real Time Clock

The real time clock consists of a battery back-upped integrated circuit U26. If the integrated circuit has a built-in oscillator crystal, the external components C35, C36 and Y2 are not mounted.



PREP: MAS	CHKD: CSA	APVD: N/A	CHK: J6	DOCUMENT NO: 487740	REV: 6
	CSA				SHEET NO: 4

14. 1msec Timer

This timer counts on the CLK-signal from the microprocessor. The output gives an RST 7.5 interrupt to the microprocessor for every 1ms, and a clock pulse to 3.

15. Input Buffer for Internal Signals

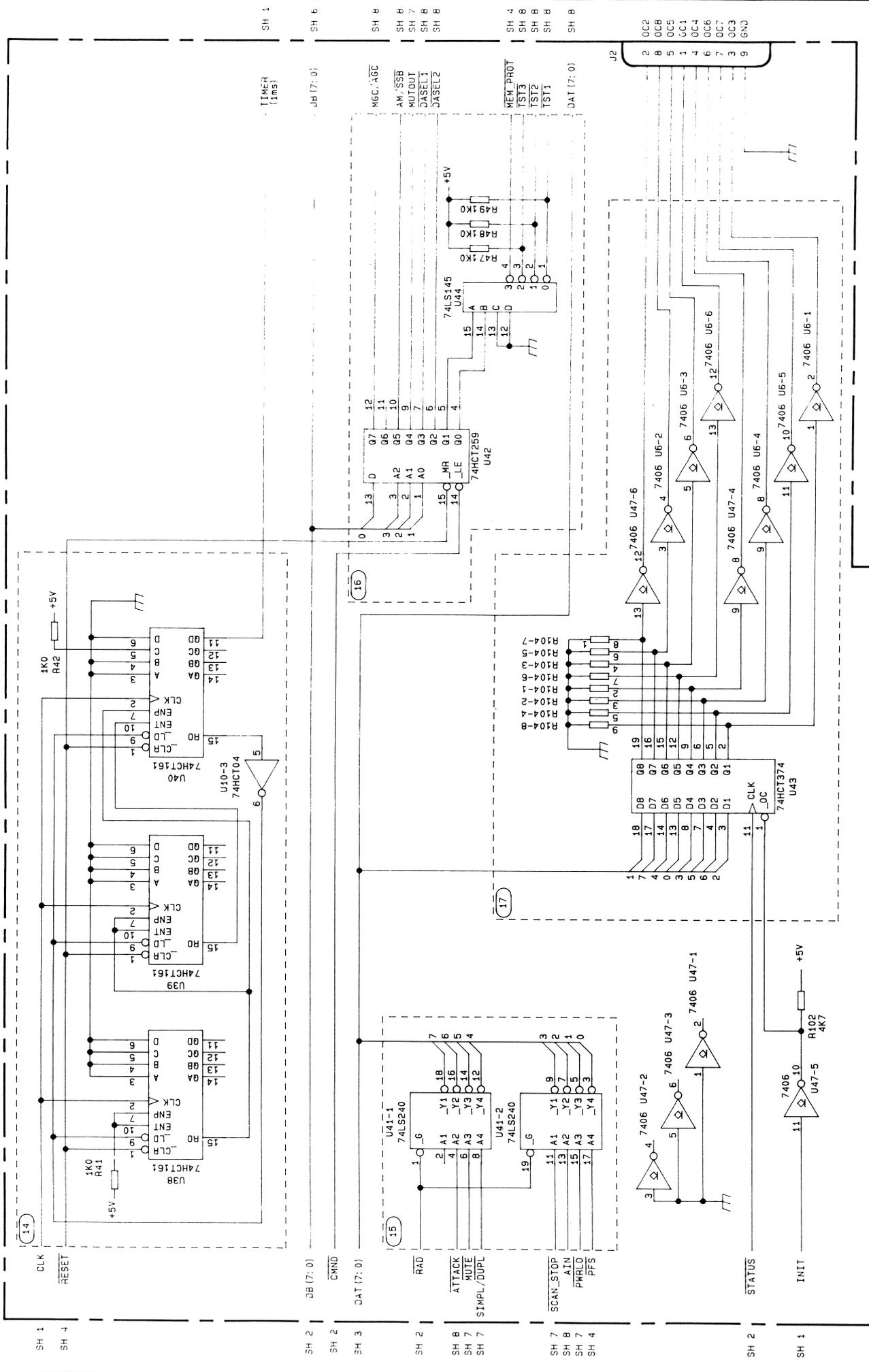
8 bit input port.

16. Control Latch

U42 is an 8 bit addressable latch used for control signals. U44 is a one out-of-four decoder with associated pull-up resistors used for control signals.

17. 8 bit Open Collector Output Circuit

Each output consists of an unprotected open collector inverter capable to sink max. 24 mA. The open collector voltage must not exceed 30 Volt. The 8 bit output is available via the connector J2 on the rear plate.



SH 1
SH 4

SH 2
SH 2
SH 3

SH 2
SH 8
SH 7
SH 7

SH 7
SH 8
SH 7
SH 4

SH 2
SH 1

SH 1

SH 6

SH 8
SH 8
SH 7
SH 8
SH 8

SH 4
SH 8
SH 8
SH 8
SH 8

SH 2
SH 1

REV: 51
SHEET NO: 5

PREP: MAS
CHKD: CSA
APVD: N/A
CUI: JB
DOCUMENT NO: 487740

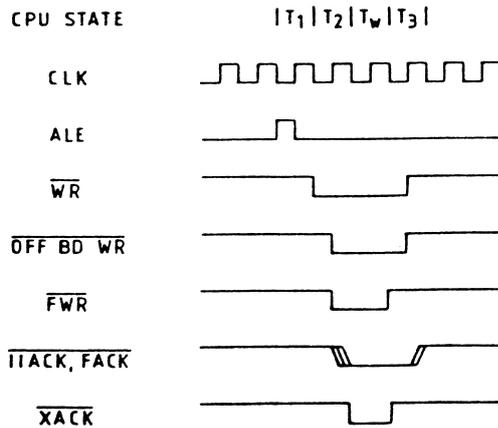
18. Supply Filters

19. Off-Board Data Latch

U27 is an 8 bit bidirectional data bus buffer, which is enabled during off-board operations.

20. Off-Board Acknowledge

Circuit to provide at least 1 wait-state in the microprocessor timing, during off-board write operations. This ensures that data is valid on the rising edge of **FWR**.

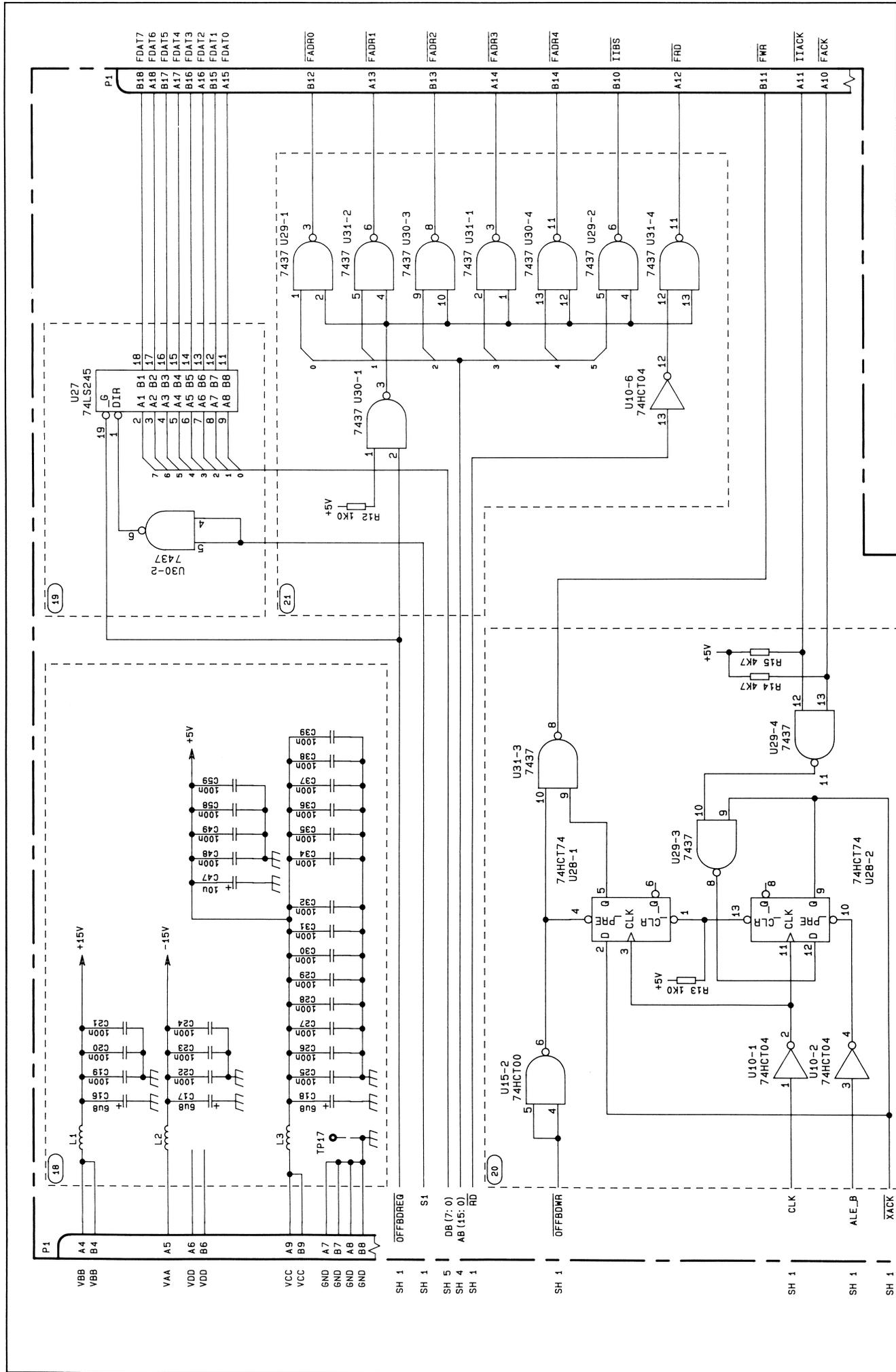


Timing diagram for generating of 1 wait-state.

21. Off-Board Address Buffer

Buffers for Off-board address and command signals.

Service Sheet A8



PREP: MAS	CHKD: CSA	APVD: N/A	CK: J6	DOCUMENT NO:	REV: 6
	CSA			487740	SHEET NO: 6

22. RS232 Interface (Optional)

RS232 interface for serial communication.

23. Optocoupler Interface

Optocoupler interface to ensure electrical separation between incoming signals and on-board signals.

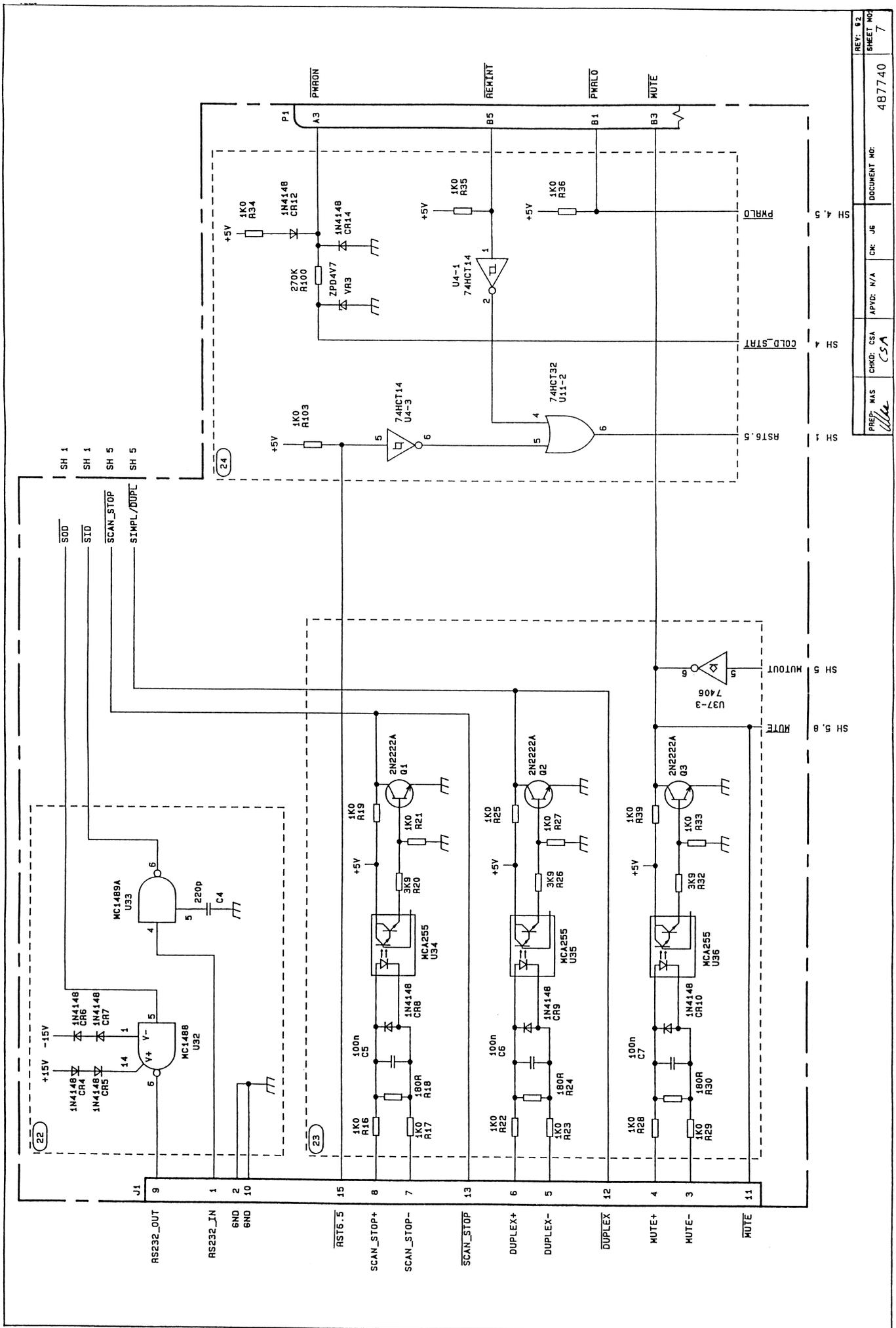
External signal generators shall be 24V, 10mA to provide a proper TTL-signal on Q1's, Q2's or Q3's collector.

The duplex input is used only in RX4010.

24. Power Control Inputs

Diode network CR13 and CR14 are protection diodes. R34 and CR12 ensure current through the connector when **PWRON** is low.

If power is removed by turning "PWR OFF" on the front panel, **PWRON** goes high, and enables U50a in 13 to be cleared, by means of **COLD STRT**.



REV: 02	DOCUMENT NO: 487740
SHEET NO: 7	
PREP: MAS	CHKD: CSA
APVD: N/A	CR: J6

25. D/A Converter

U52 is an 8 bit latch. U53 is a bit digital to analogue converter with associated resistor network. U54 is an operational amplifier with an output to be range set by R67. The maximum output may be adjusted to 10V.

26. ATTACK Detector

Circuit to provide an **ATTACK** as long as Q9 is open. To avoid spikes to cause an **ATTACK**, R91, C10 determines the minimum time Q9 has to be open. R70, R71 and C10 holds the **ATTACK** to ensure the microprocessor to read the **ATTACK**.

27. MUTE Buffer

A MUTE Signal will force the AGC2/VALC2 and the AGC1/ALCKEY to +15 VDC. (Optionally).

28. Analogue Switch

U57 is an analogue switch. When the microprocessor assembly is used in SE4010 this switch will always be closed. CR23 protects U57 against negative levels.

29. Gain Control Filter/Strap

Only when the microcomputer assembly is used in SE4010, the strap S7 must be strapped between a and b. This will minimize the effect of the filter and cause the transfer function to equal 1 approximately.

Otherwise the strap S7 must be strapped between b and c.

If **VALC1/AGCDET** exceeds **Vhold + Vbe** (Q8) (**Vhold** is the voltage on the output of U54b) an **ATTACK** is fed to the microcomputer causing **Vhold** to increase.

When used in SE4010 **Vhold** decreases slowly when no **ATTACK** is present provided that **AGC1/ALCKEY** is on logical "1".

When used in a receiver **Vhold** decreases according to the AGC time constants.

30. Sample and Hold Circuit for Vhold

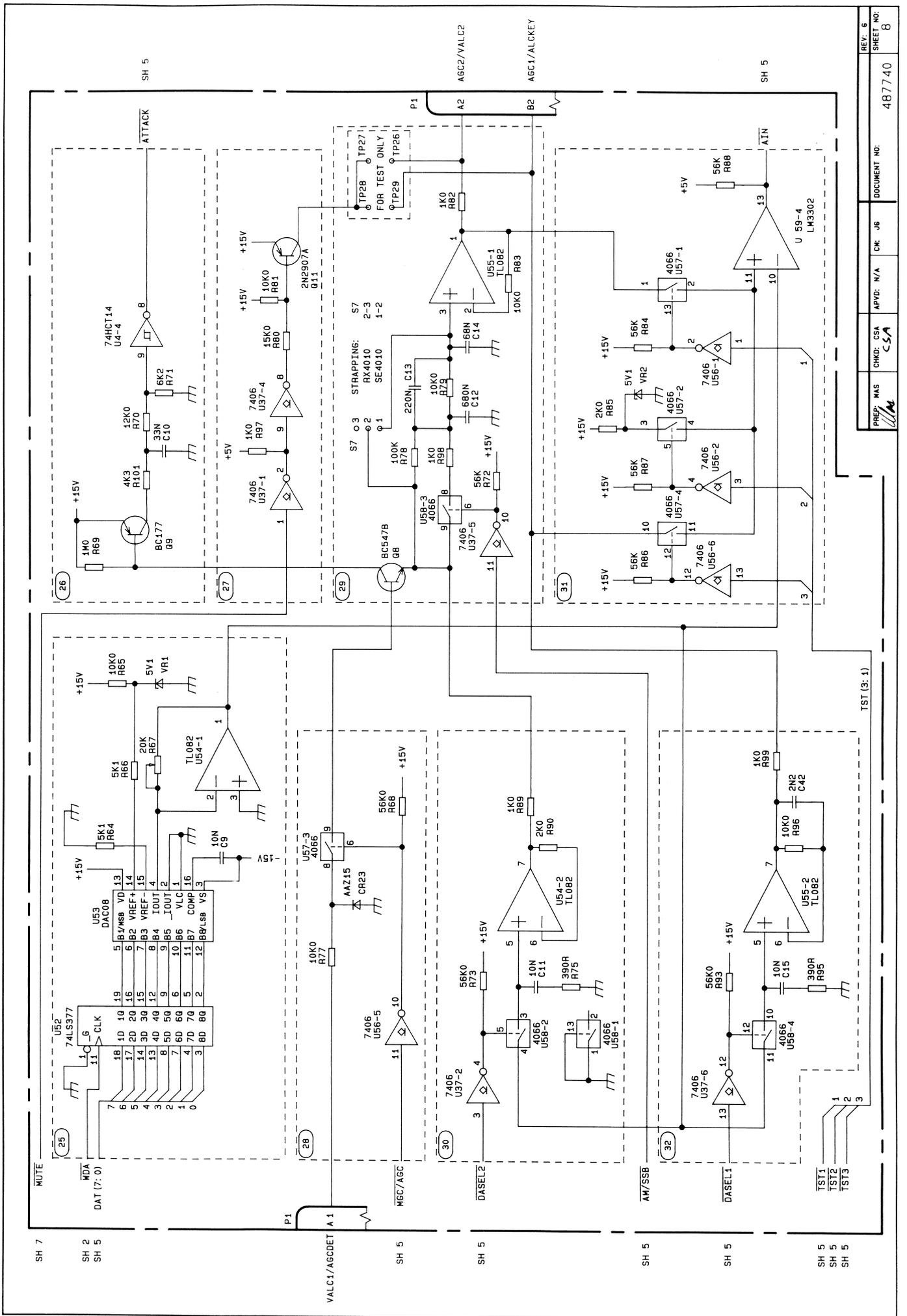
Sample and hold circuit supplying **Vhold**.

31. Test Circuit

By means of the comparator U59 and the D/A-converter in (25), an A/D-conversion of either **AGC1/ALCKEY**, **AGC2/VALC2** or a test level can be performed.

32. Sample and Hold Circuit for AGC1

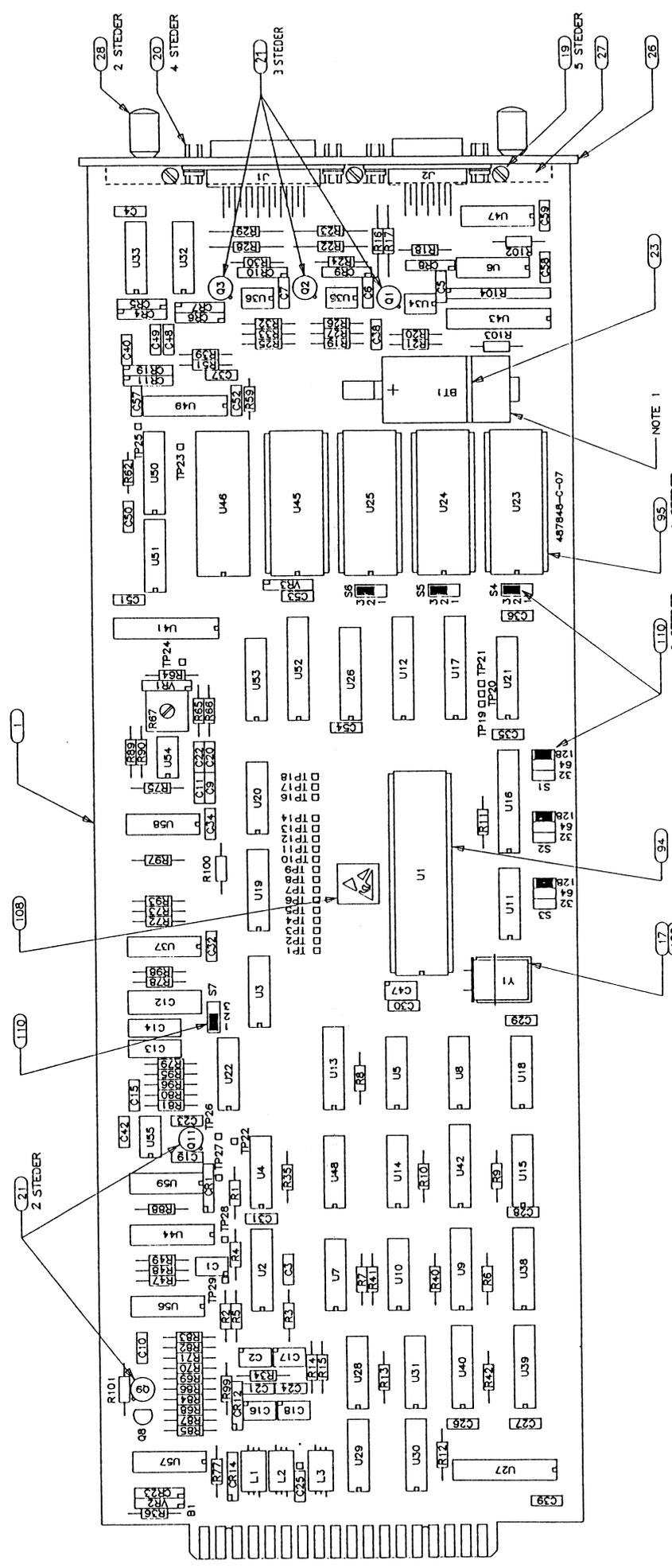
When used in receivers the circuit supplies AGC-voltage to **AGC1**.



REV: 6	SHEET NO: 8
487740	DOCUMENT NO:
CM: J6	APVD: N/A
CSA	CHKD: CSA
MAS	PREP: MAS

CHANGE ORDER/REVISION
 CO: 13099 REV: K2 CHD: CSA
 CO: 17210 REV: K3 CHD: CSA
 CO: 17613 REV: K4 CHD: C-6
 CO: 18078 REV: K5 CHD: C-6

- BT1 (BATTERY) LOODES PA - POL
 + POL MA IKKE HAVE FORBINDELSE.
 + POL PALODES NAR MODUL MONTERES I UNIT.
 THE + POLE OF THE BATTERY IS SOLDERED
 TO THE CIRCUIT AT DELIVERY.



PROM	S1	S2	S3	S4	S5	S6
2732	POS	POS	POS	POS	POS	POS
2764	64	64	64	64	64	64
27128	128	128	128	128	128	128

STRAPPING OF S7	POS	POS	POS
SE4010	1-2	1-2	1-2
RX4010	2-3	2-3	2-3

* STANDARD STRAP

MATERIAL: TERMA Elektronik AS
 PROJECTION:

REVISION STATUS OF SHEETS (OTHER THAN X1):

SHEET NO.:									
REVISION:									

DATE OF LATEST REV.: 9/10/83
 INITIAL RELEASE: 900118
 DATE OF LATEST REV.: 9/10/83
 INITIAL RELEASE: 900118

TITLE: COMPONENT LOCATION
 MPU BOARD A8

DOCUMENT NO.: 487740

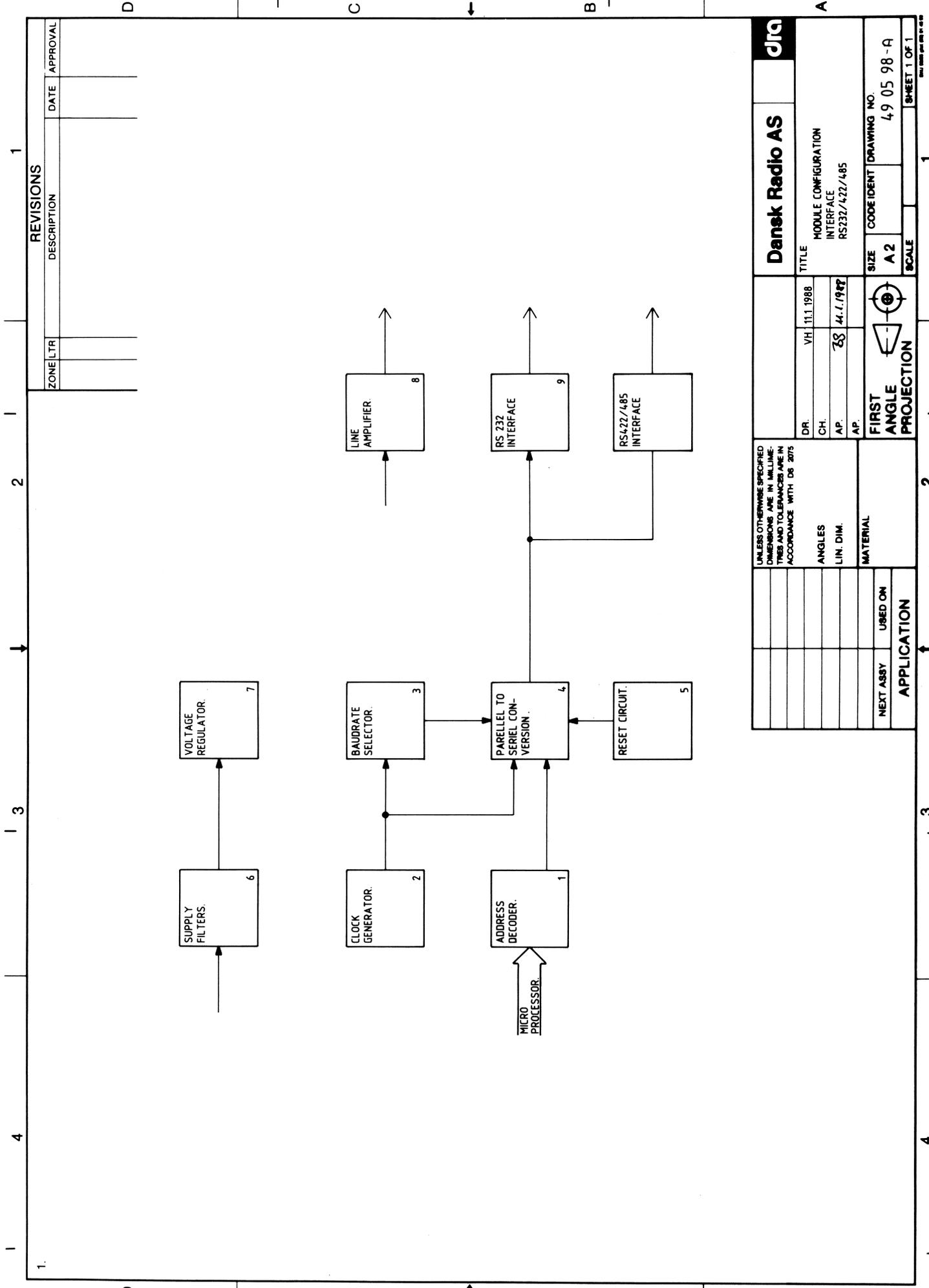
ASSY 490598, INTERFACE RS232/422/485

Service Sheet A9

Service Sheet A9

4905981A.WP1

The clock generator (2) running at 6.144 MHz delivers clock pulses to the parallel to serial conversion circuit (4) with a frequency of 1.2288 MHz. The baudrate generator (3) controls the baudrate of the remote communication. The parallel to serial conversion circuit (4) interfaces the serial data bus to an 8-bit data bus which is controlled by the microprocessor of the equipment via the address decoder (1). The serial data bus is converted to RS232C, RS422 or RS485 levels in the interface circuits. A balanced line output (8) is available when the module is installed in an RX4010 receiver.



REVISIONS

ZONE/LTR	DESCRIPTION	DATE	APPROVAL

Dansk Radio AS		dra	
DR. VH 11.1.1988	TITLE: MODULE CONFIGURATION INTERFACE RS232/422/485		
CH. 28	AP. 14.1.1988	SIZE: A2	CODE IDENT: DRAWING NO. 49 05 98 - A
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		SCALE	SHEET 1 OF 1
ANGLES LIN. DIM.	MATERIAL	FIRST ANGLE PROJECTION	
NEXT ASSY	USED ON	APPLICATION	

1. Control/Data Interface

This circuit controls the data transmission between the CPU card (A8) and the interface card (A9).

The card is controlled through 3 ports, each having an address decoded by U6.

Address	Function
02H	UART command port
03H	UART data port
0CH	equipment address in port

A handshake signal (FACK) is sent to A8, when a port is addressed. U14 is a hex bus driver for the remote address of the receiver.

2. System Clock

U1 forms a clock generator running at 6.144 MHz. U2 divides this by 5 to obtain a clock to the UART.

3. Baudrate Generator

The baudrate generator consists of dividers U3 and U4 giving the receive/transmit clockrate at 16 times the baudrate determined by the straps.

4. UART

Controlling the serial data transmission and associated control signals.

5. Power on Reset

Generates a power on reset pulse to the UART.

6. Supply Filters

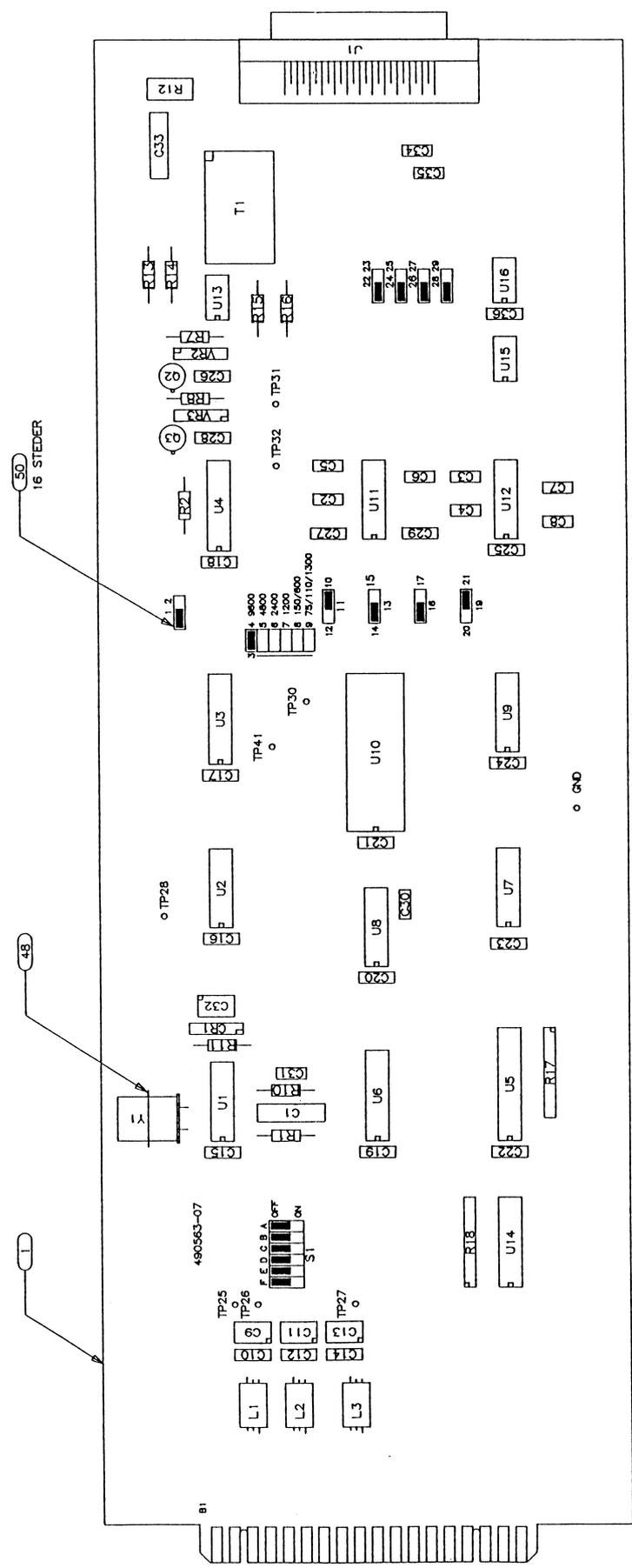
7. Voltage Regulators for +12V and -12V Voltages

8. Line Amplifier with Variable Gain

9. Data Driver/Receiver

Data drivers and receivers for RS232, RS422 and RS485 data busses.

CHANGE ORDER/REVISION
 CO: 13586 REV: E AUT: CH: JG
 CO: 9798 REV: F AUT: CH: JG
 CO: 17158 REV: G AUT: CH: JG
 CO: 17307 REV: G1 AUT: CH: JG



MATERIAL:	GENERAL TOLERANCE:	PROJECTION:	TERMA Elektronik AS PÅRÅBETTERI LØRSTADEN 1, DK-8000 LYSTBÆK, DENMARK
REVISION STATUS OF SHEETS (OTHER THAN G):			
SHEET NO.:			TITLE: COMPONENT LOCATION INTERFACE RS232/422/485
REVISION:			DATE OF LATEST REV.: 9/10/89
CODE: D2	1 SHEET(S)	INITIAL RELEASE: 800907	REV.: G1
PREP: IN	CHG: CSA	APPD: N/A	CH: JG
			DOCUMENT NO.: 490568 P0
			SHEET NO.: 1

ASSY 494186, POWER SUPPLY ASSEMBLY

Service Sheet A10

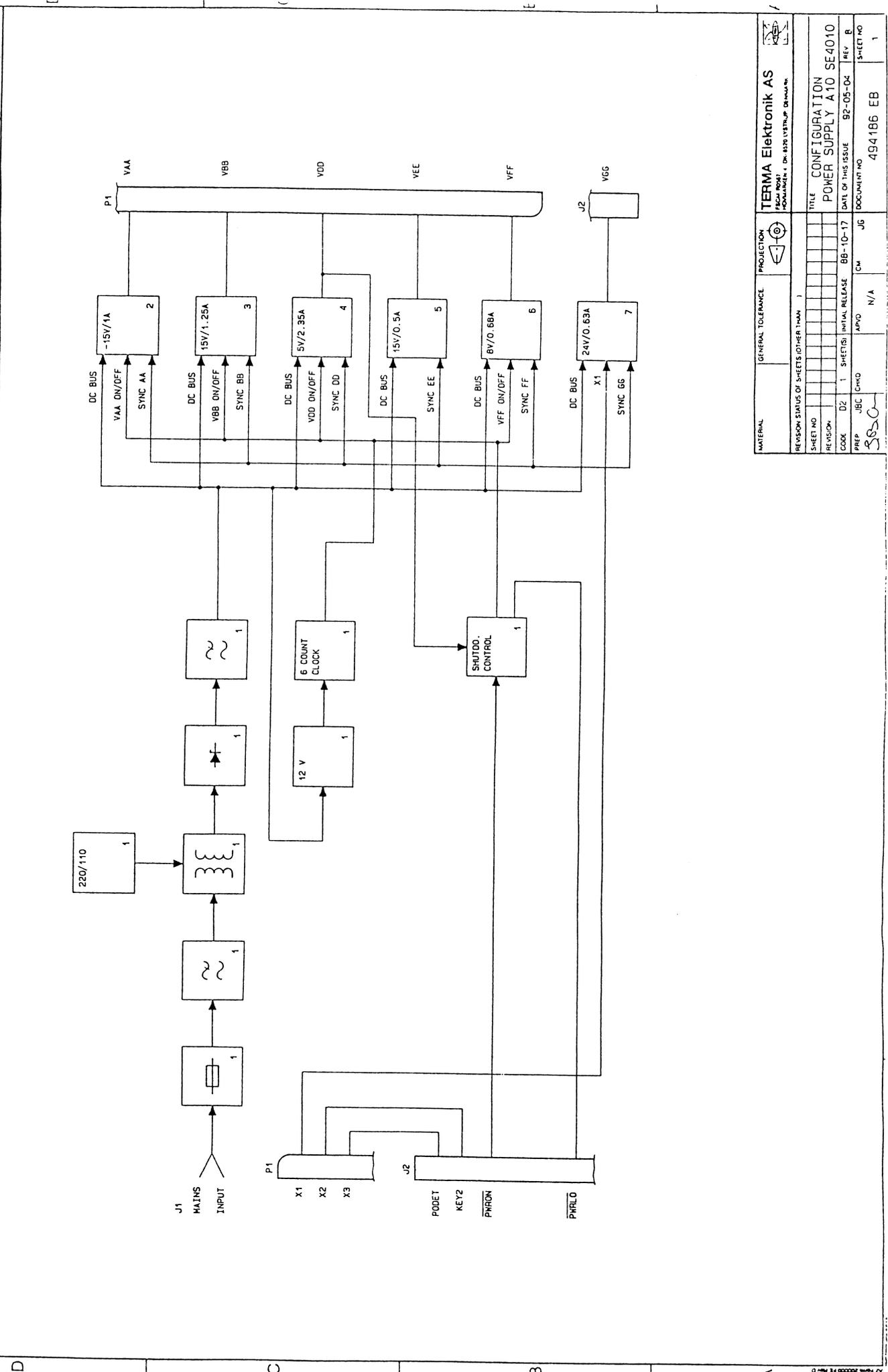
The Power Supply Assembly is a secondary switch mode power supply with 6 output voltages and a total output power of 70W. A secondary switch mode power supply is a power supply where the mains are connected through a transformer, giving the galvanic insulation between input and output.

Block 1 contains the transformer, rectifier and filter and a 6-phase clock used for the 6 regulators. Blocks 2 to 7 contain the regulators for the 6 different output voltages. Further block 1 contains the Shutdown control, which controls the 5 regulators. The 6th regulator, 5 giving VEE can only be shut down by switching off the mains. The signal **PWRON** energizes the regulators giving VAA, VBB, VDD and VFF, while the regulator giving VGG is controlled by the signal **X1**.

All the regulators are overvoltage protected, as well as current limited.

1 2 3 4

CHANGE OR DERIVATION			
CO.	REV.	CD	REV.
CM	CM	CM	CM



MATERIAL		GENERAL TOLERANCE		PROJECTION	
TERMA Elektronik AS					
PROJEKTION					
REVISION STATUS OF SHEETS OTHER THAN 1					
SHEET NO.					
REVISION					
CODE	D2	1	SHEET(S)	INITIAL RELEASE	BB-10-17
PREP	JBC	CM	AP/CO	N/A	JG
DOCUMENT NO.			494186 EB		
SHEET NO.			1		

TERMA Elektronik AS					
PROJEKTION					
REVISION STATUS OF SHEETS OTHER THAN 1					
SHEET NO.					
REVISION					
CODE	D2	1	SHEET(S)	INITIAL RELEASE	BB-10-17
PREP	JBC	CM	AP/CO	N/A	JG
DOCUMENT NO.			494186 EB		
SHEET NO.			1		

1. Transformer and Mains Filter

The mains filter is a common mode filter. The filter prevents common mode noise from the power supply to reach the mains input. The filter also prevents noise on the mains to enter the Power Supply.

The filter contains a varistor preventing spikes on the mains to enter the transformer T101. The transformer T101 can be strapped to either 110V or 220V. The transformer has a built-in thermo switch for protection. The AC voltage is rectified in CR101 and filtered by C104, C105 and L102.

1. Regulator Supply and Clock Generator

VR103 and Q102 generate the voltage supply for the clock generator and the shutdown control.

The crystal, X101 generates the input signal to the Johnson-counter, U103 coupled for dividing by 6.

The 6 output signals have a mutual phase offset of 60 degrees and a frequency of 154 kHz.

1. Shutdown Control

One of the regulators (VEE) operates continuously while all other regulators are controlled by control signals.

The $\overline{\text{PWRON}}$ signal controls the VAA, VBB, VFF and VDD regulators.

Three voltages are used for generating the $\overline{\text{PWRLO}}$ signal. **DCBUS** is compared to a reference voltage from CR106. When the voltage at **DCBUS** is too low, **PWRLO** will be low.

VDD is also compared to the reference voltage. This ensures that

PWRLO cannot be activated before VDD has reached the voltage 4.75 V.

The diode, CR105 forces $\overline{\text{PWRLO}}$ to be low when $\overline{\text{PWRON}}$ goes high.

2. VAA Regulator (-15V)

The converter is built as a current-mode controlled fly-back converter around the integrated controller U201.

The switch stage is performed by the power MOSFET, Q213. The current signal for the converter is made by the source resistors R224/R225.

The output stage is performed by the rectifier, CR214, followed by the coil, L201 and the capacitors, C214, C215 and C216.

The controller, U201 has a built-in undervoltage detector with an hysteresis of approx. 6 V. Until the start-up voltage for U201 is reached, the current consumption is very low. When the DCBUS voltage rises, C202 will be charged through R203 until the start-up voltage has been reached. When the converter is started, it generates its own voltage supply through CR206. If the converter is overloaded or shorted, the voltage across C202 will drop below the minimum voltage for U201. The converter will stop and a new start-up will take place. The timing constant R203/C202 controls the timing for the start-up.

Overvoltage at the output is detected by the shunt regulator, CR201. When overvoltage is detected, the cathode of CR201 is grounded; this connects pin 7 to pin 3 of U201 through R206 and CR202. U201 stops when the voltage at pin 3 is higher than 1 V. At the same time C202 will be discharged through Q204 and R208. Because of R202 the voltage supply must be removed before the converter will start-up again.

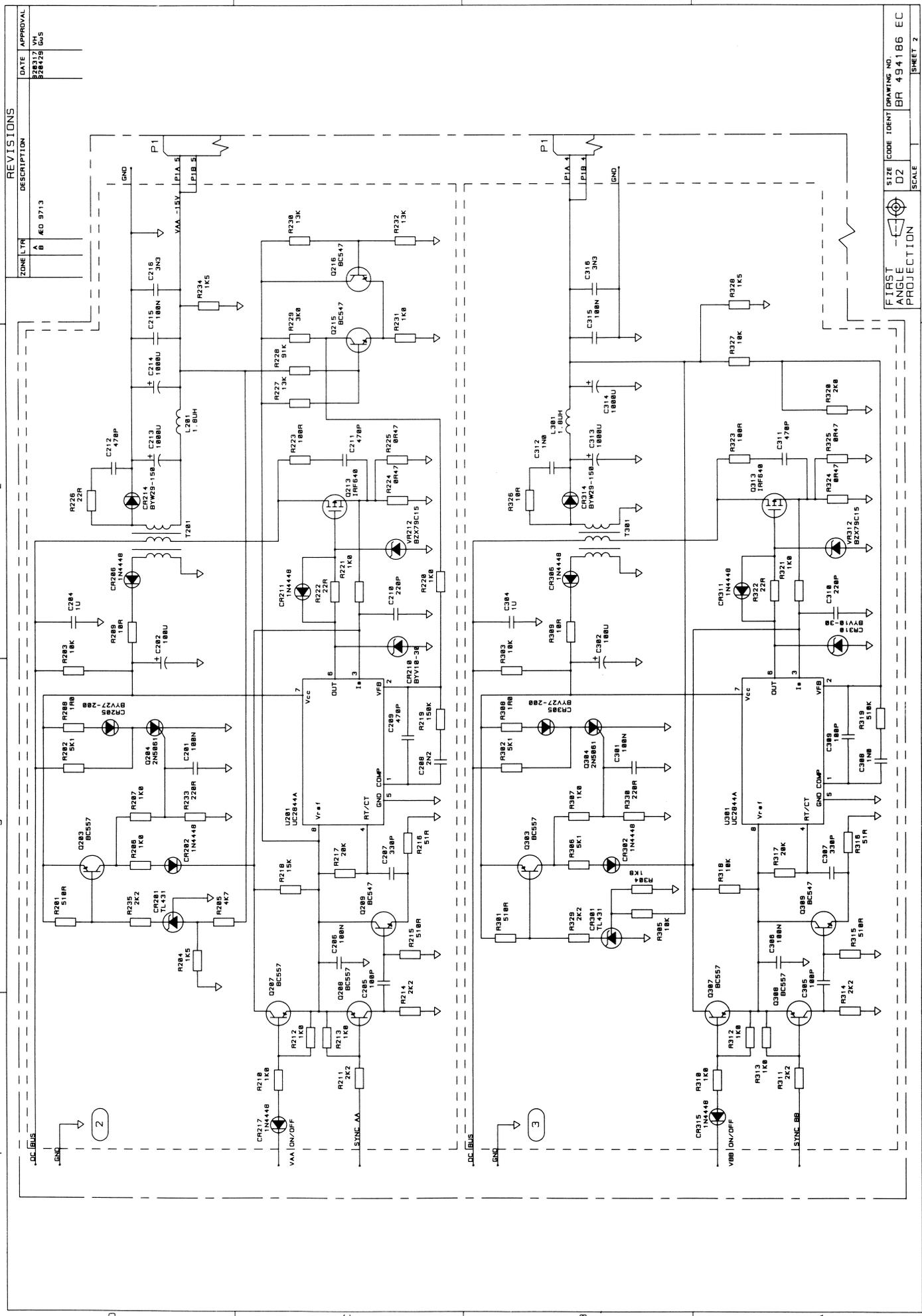
The synchronization of U201 is taken from Q208. The SYNC AA is differentiated through C205 and R215 and added to the timing condenser C207.

Start and stop are controlled by Q207. When VAA ON/OFF activates Q207, VREF is connected to pin 3 through Q207, stopping U201.

The differential stages Q215 and Q216 are used for changing the negative output voltage, VAA to a positive voltage (-VAA).

3. VBB Regulator (+15V)

Operates in the same way as the regulator in 2, except that no differential stage is present because of positive output voltage.



REV	DATE	DESCRIPTION	APPROVAL
1	02/28/18	REV 9713	

ZONE LTR: A
 DATE: 02/28/18
 DESCRIPTION: REV 9713
 APPROVAL:

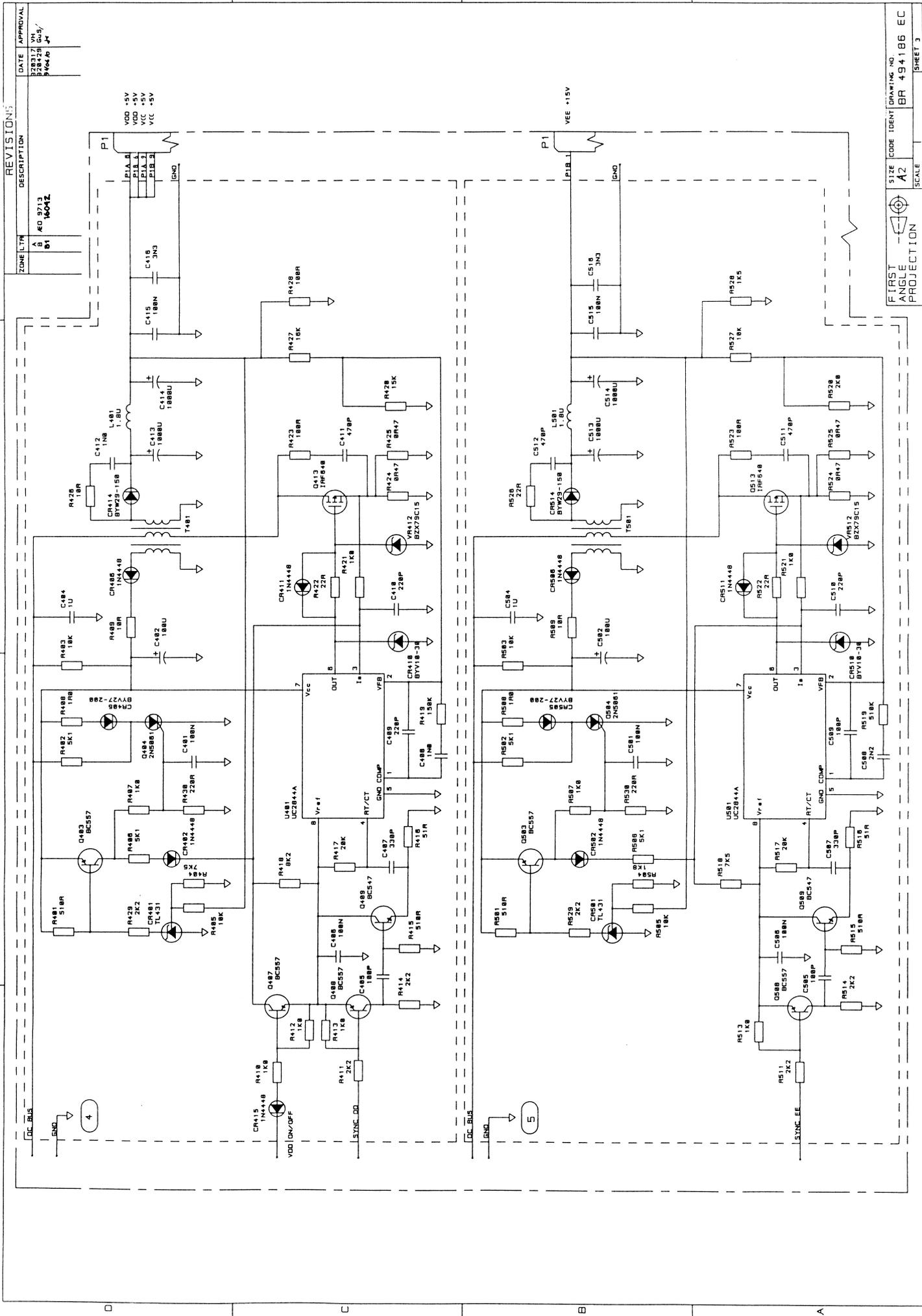
FIRST ANGLE PROJECTION
 SCALE: 1
 DRAWING NO.: BR 494186 EC
 SHEET 2

4. VDD Regulator (+5V)

Operates in the same way as the regulator in 3.

5. VEE Regulator (+15V const.)

Operates in the same way as the regulator in 3, except that it can only be deenergized by removal of the mains.



REVISION:	DESCRIPTION	DATE	APPROVAL
1	40 9713	3/28/37	VH
2	1004Z	3/24/35	GSJ
3			
4			

FIRST ANGLE PROJECTION
 SIZE A2
 BR 494186 EC
 SHEET 3

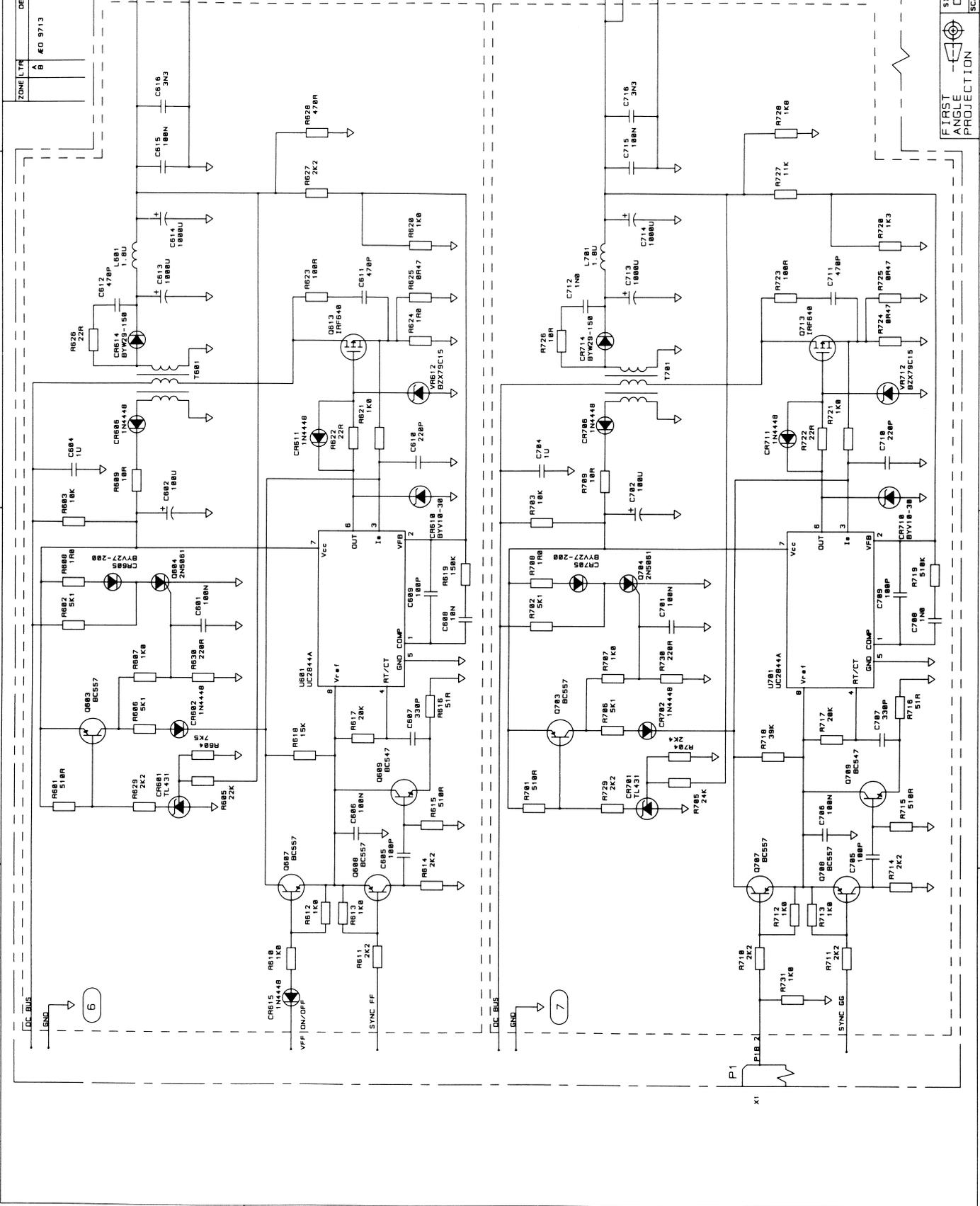
6. VFF Regulator (+8V)

Operates in the same way as the regulator in 3.

7. VGG Regulator (+24V)

Operates in the same way as the regulator in 3 except that the signal X1 controls the VGG regulator.

ZONE	LTR	DESCRIPTION	DATE	APPROVAL
A	80	9713	3/28/72	VH
B			5/28/75	GUS



REVISIONS	DATE	APPROVAL
1		
2		
3		
4		

SIZE	CODE	IDENT	DRAWING NO.
D2			BR 494186 EC

SCALE	SHEET	PROJECTION
	4	FIRST ANGLE

ASSY 488534, FRONT PANEL ASSEMBLY

Service Sheet A11

Assy 488356, Front Panel Circuit

Configuration

The front panel assembly mounts and interconnects most of the front panel controls, including power ON/OFF dimmer, mode, key, meter and power select. The LEDs and meter read-outs are also mounted on this assembly.

All digitally controlled push buttons are scanned by the Micro-computer Assembly. The LED read-outs and the front panel meter are synchronously updated.

A single ribbon cable interconnects the assembly to the exciter mother board.

Assy 488356, Front Panel Circuit

Schematic 1

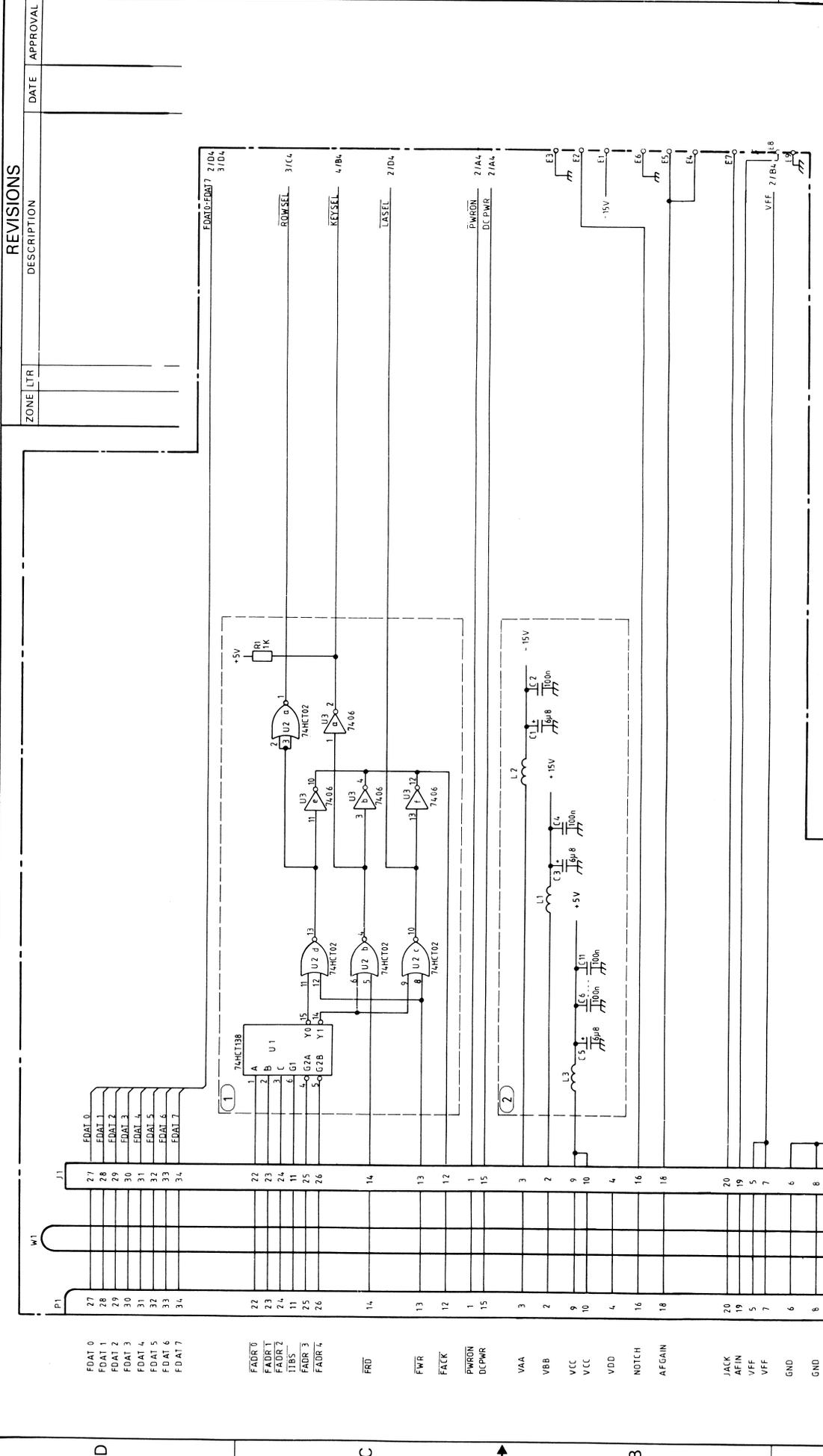
1. Address Decoder

Address decoding with associated gates for generation of acknowledge FACK, as handshaking signal for the Microcomputer.

2. Supply Filters

Service Sheet A11A1

Dansk Radio AS		dra	
DR.	VH 17.6.1988	TITLE	FRONT PANEL CIRCUIT
CH.			SE4010
AP.		SIZE	CODE IDENT DRAWING NO
AP.		SCALE	48 83 56
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		FIRST ANGLE PROJECTION	SHEET 1 OF 5
ANGLES			
LIN. DIM.			
MATERIAL			
48 85 34	SE4010	APPLICATION	
NEXT ASSY	USED ON		

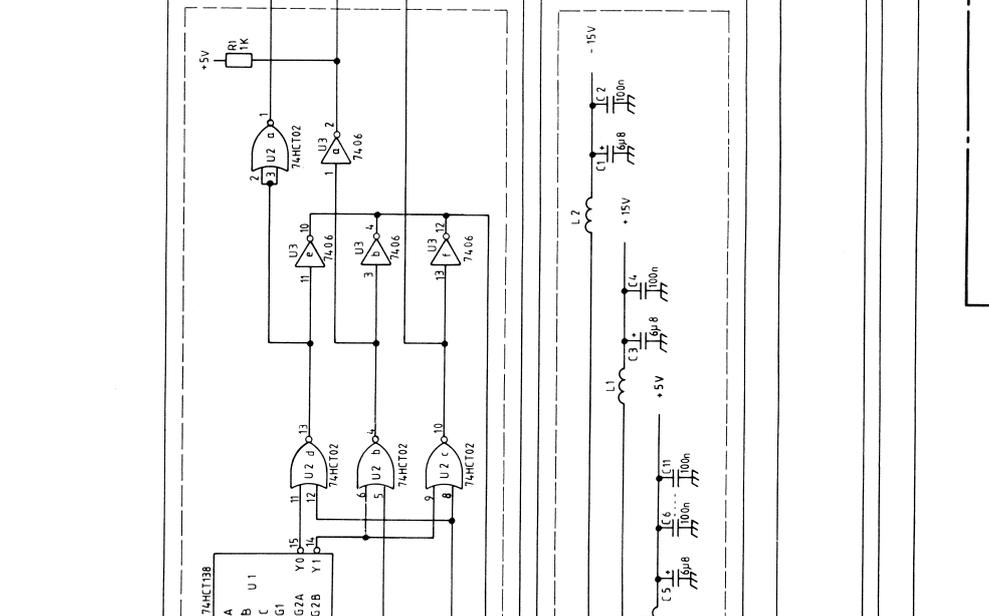


REVISIONS		DATE	APPROVAL
ZONE	LTR		
DESCRIPTION			

1 2 3 4

- FDAT 0
- FDAT 1
- FDAT 2
- FDAT 3
- FDAT 4
- FDAT 5
- FDAT 6
- FDAT 7
- FADR 0
- FADR 1
- FADR 2
- ILRS
- FADR 3
- FADR 4
- FRD
- FWR
- FAK
- PWRON
- DC PWR
- VAA
- VBB
- VCC
- VCC
- VDD
- NOTCH
- AFGAIN
- JACK
- AFIN
- VFF
- VFF
- GND
- GND
- GND
- GND

- 74HCT138
- A
- B
- C
- G1
- G2A
- G2B
- Y0
- Y1
- 74HCT02
- U2
- U3
- U4
- U5
- R1
- 1K
- C1
- C2
- C3
- C4
- C5
- C6
- L1
- L2
- L3
- E1
- E2
- E3
- E4
- E5
- E6
- E7
- E8
- VFF
- VFF



- FDAT 0
- FDAT 1
- FDAT 2
- FDAT 3
- FDAT 4
- FDAT 5
- FDAT 6
- FDAT 7
- ROWSEL
- KEYSEL
- LASEL
- PWRON
- DC PWR
- VAA
- VBB
- VCC
- VCC
- VDD
- NOTCH
- AFGAIN
- JACK
- AFIN
- VFF
- VFF
- GND
- GND
- GND
- GND

- 74HCT138
- A
- B
- C
- G1
- G2A
- G2B
- Y0
- Y1
- 74HCT02
- U2
- U3
- U4
- U5
- R1
- 1K
- C1
- C2
- C3
- C4
- C5
- C6
- L1
- L2
- L3
- E1
- E2
- E3
- E4
- E5
- E6
- E7
- E8
- VFF
- VFF

3. Data Latch

8 bit latch used for segment information to displays, LEDs and data to D/A-converter 11.

4. Driver Circuit for Displays and LEDs

Q1 to Q8 are drivers for segment information. R4 to R11 are current limiting resistors.

5. LED Indicators

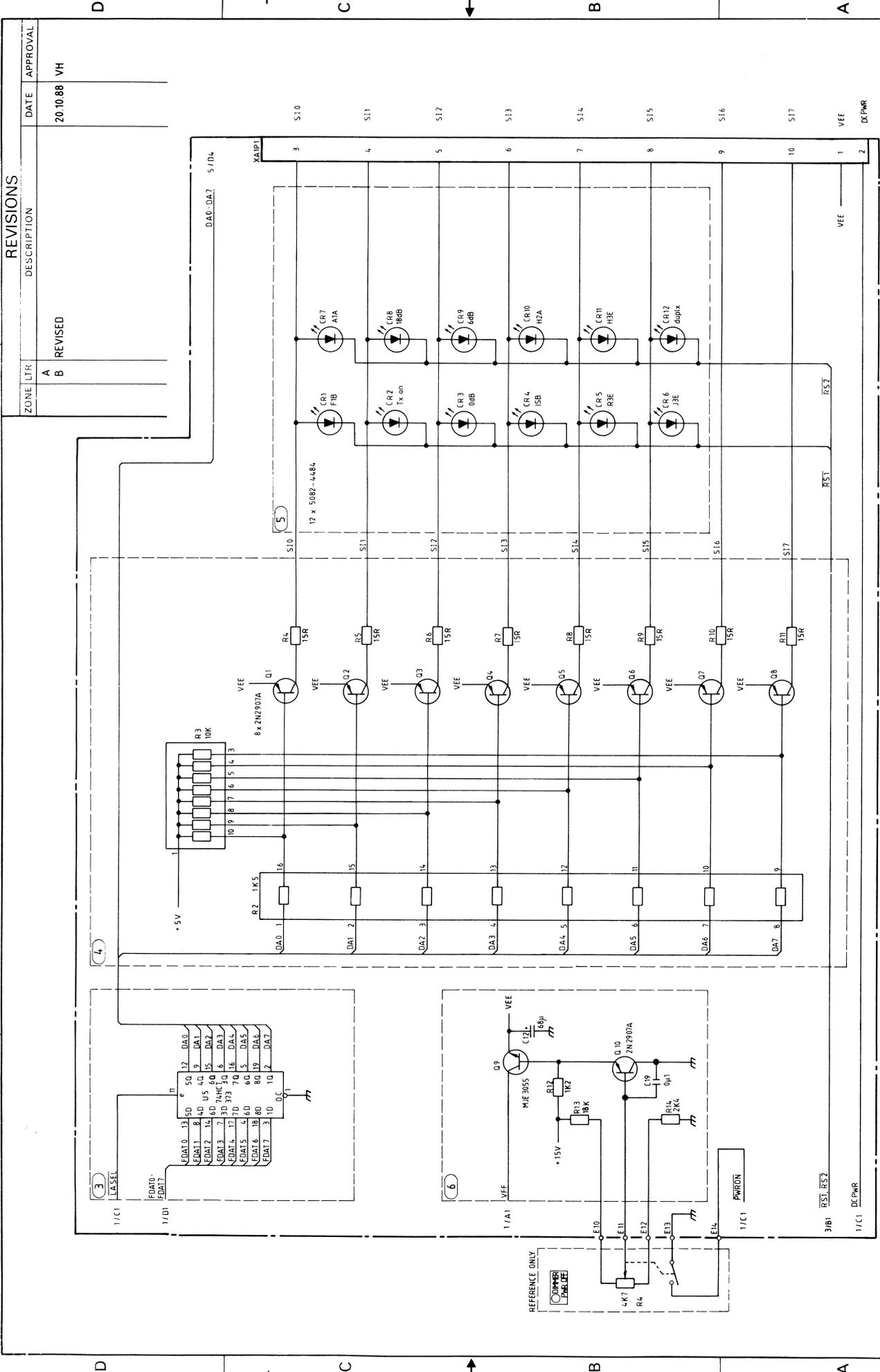
CR No.	Corresponding Switch
1	F1B
2	Tx on
3	0dB
4	ISB
5	R3E
6	J3E
7	A1A
8	18dB
9	6dB
10	H2A
11	H3E
12	duplx

6. Dimmer Circuit

The dimmer circuit controls the intensity of the light of displays, annunciators and light bar.

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVAL
A				
B		REVISED	20.10.88	VH



SIZE CODE IDENT NO DRAWING NO
 48 83 56

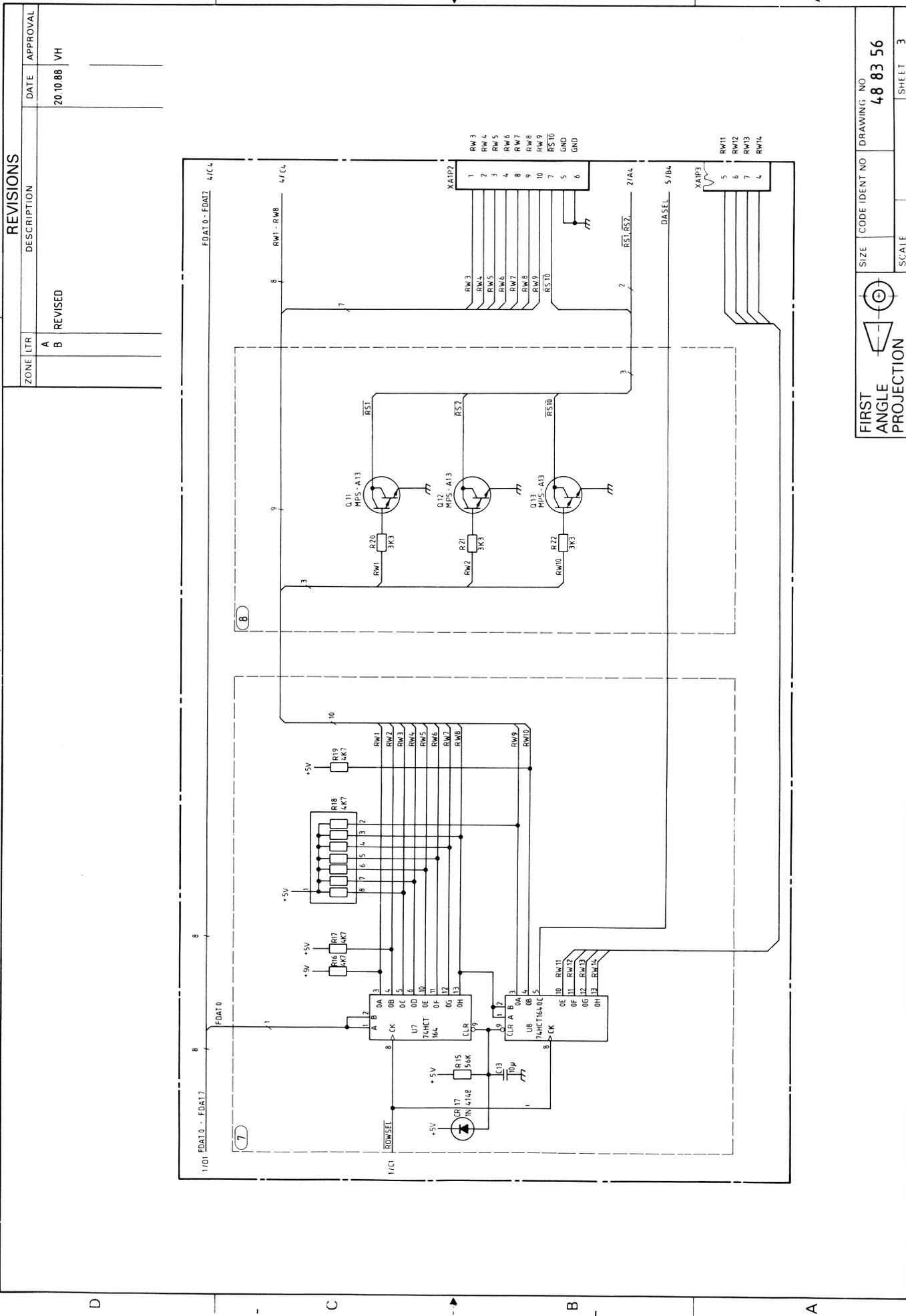
SCALE SHEET 2

FIRST ANGLE PROJECTION

7. Multiplex Shift Register

U7 and U8 are shift registers with associated pull-up network, used for multiplexing displays, LEDs and switches. They also select the sample and hold circuit 13. R15/C13 clear U7 and U8 during start-up.

8. Drivers for Multiplexing of LEDs



REVISIONS		
ZONE	LTR	DESCRIPTION
A		
B		REVISED

DATE	APPROVAL
20.10.88	VH

FIRST ANGLE PROJECTION

SIZE CODE IDENT NO DRAWING NO 48 83 56

SCALE SHEET 3

9. Output Data Buffer for Switches

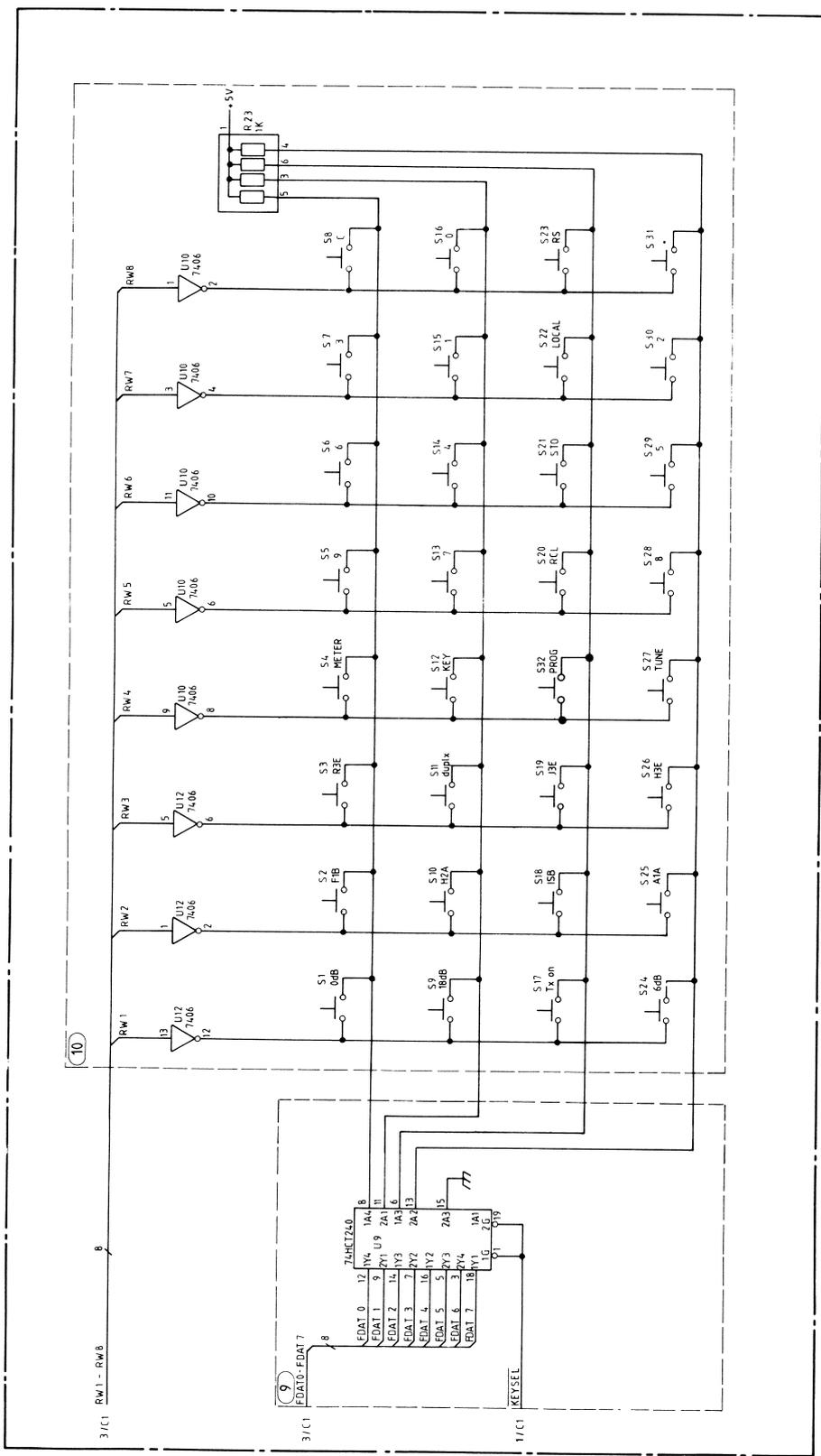
8 bit output buffer read by the microcomputer.

10. Switches

S1 to S31 are SPSTNO switches (Single Pole Single Throw Normally Open) with associated pull-up network and open-collector buffers.

REVISIONS		DATE	APPROVAL
A		13.9.88	VH
B	REVISED	20.10.88	VH
C	REVISED		

ZONE	ITR
B4	



FIRST ANGLE PROJECTION

SIZE CODE IDENT NO DRAWING NO 48 83 56

SCALE SHEET 4

11. D/A Converter

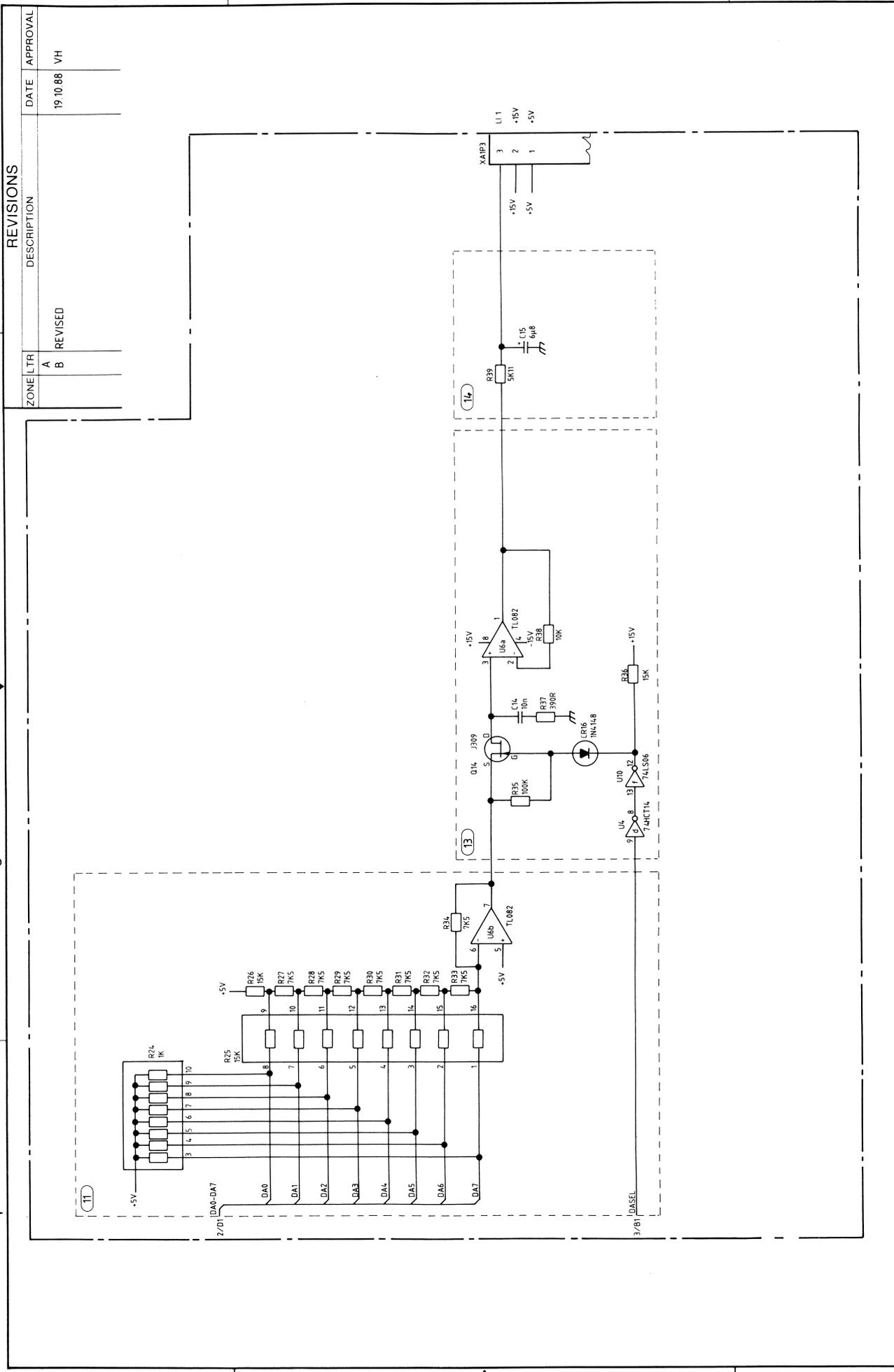
8 bit D/A converter. R24 is a pull-up network and R25-R33 are an R-2R network. U6b is an operational amplifier with an output range from 5V to 10V.

13. Sample and Hold Circuit

Sample and hold circuit used as a source generator to the LED-meter.

14. Lowpass Filter

Lowpass filter for meter voltage.



REVISIONS			
ZONE/LTR	DESCRIPTION	DATE	APPROVAL
A	REVISED	19.10.88	VH
B			

FIRST ANGLE PROJECTION

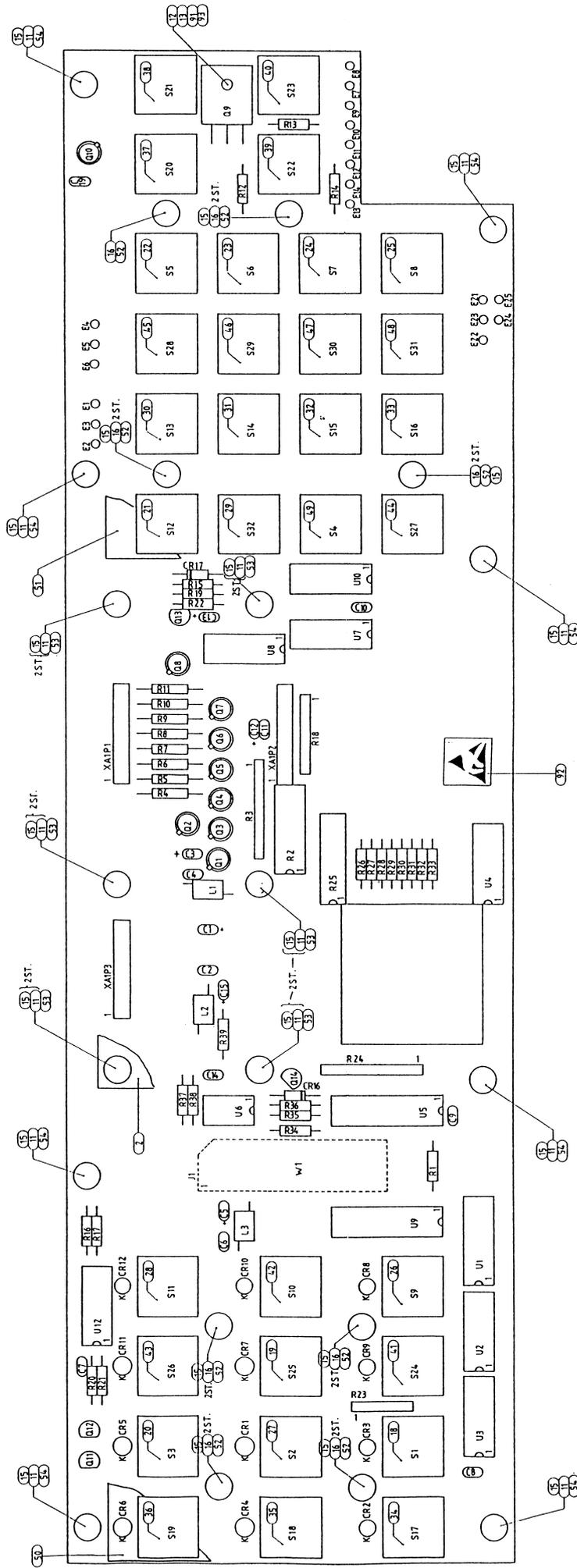
SIZE CODE IDENT DRAWING NO. 48 83 56

SCALE SHEET 5

1. ALLE SKRUEHOVERER MØD PRINT.
MONTERES HED FLAGSKIVE (15)
2. ALLE LYSØDDER MONTERES
HED (22) LÆNGDE 2,1cm
3. TRYKKNAPPER LØDDES IKKE
MONTERES HED FLAGSKIVE (15)
4. (1) OG (21) MONTERES LØST.

ESD BESVARELSE FOR
 **CAUTION**
 DEVICES ARE SUBJECT
 TO STATIC ELECTRICITY

ZONEL/TRI	DESCRIPTION	DATE	APPROVAL
A		13.9.88	VH
B	Årsked RS2, removed RS3 and C16	24.2.90	VH
D	ÅR04547	24.1.91	VH/GUS
E	ÅR09426	24.1.91	VH/GUS
F	ÅR09533		
			ggn/1/a



Dansk Radio AS		TITLE	
DR	VH 17.6.1988	COMPONENT LOCATION	
CH		FRONT PANEL CIRCUIT	
AP		SELV10	
AP		SIZE	CODE IDENT DRAWING NO
FIRST ANGLE	A1	48 85 34	48 83 56
PROJECTION		USED ON	
		APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075	
ANGLES	
LIN. DIM.	
MATERIAL	
48 85 34	SELV10
NEXT ASSY	USED ON
APPLICATION	

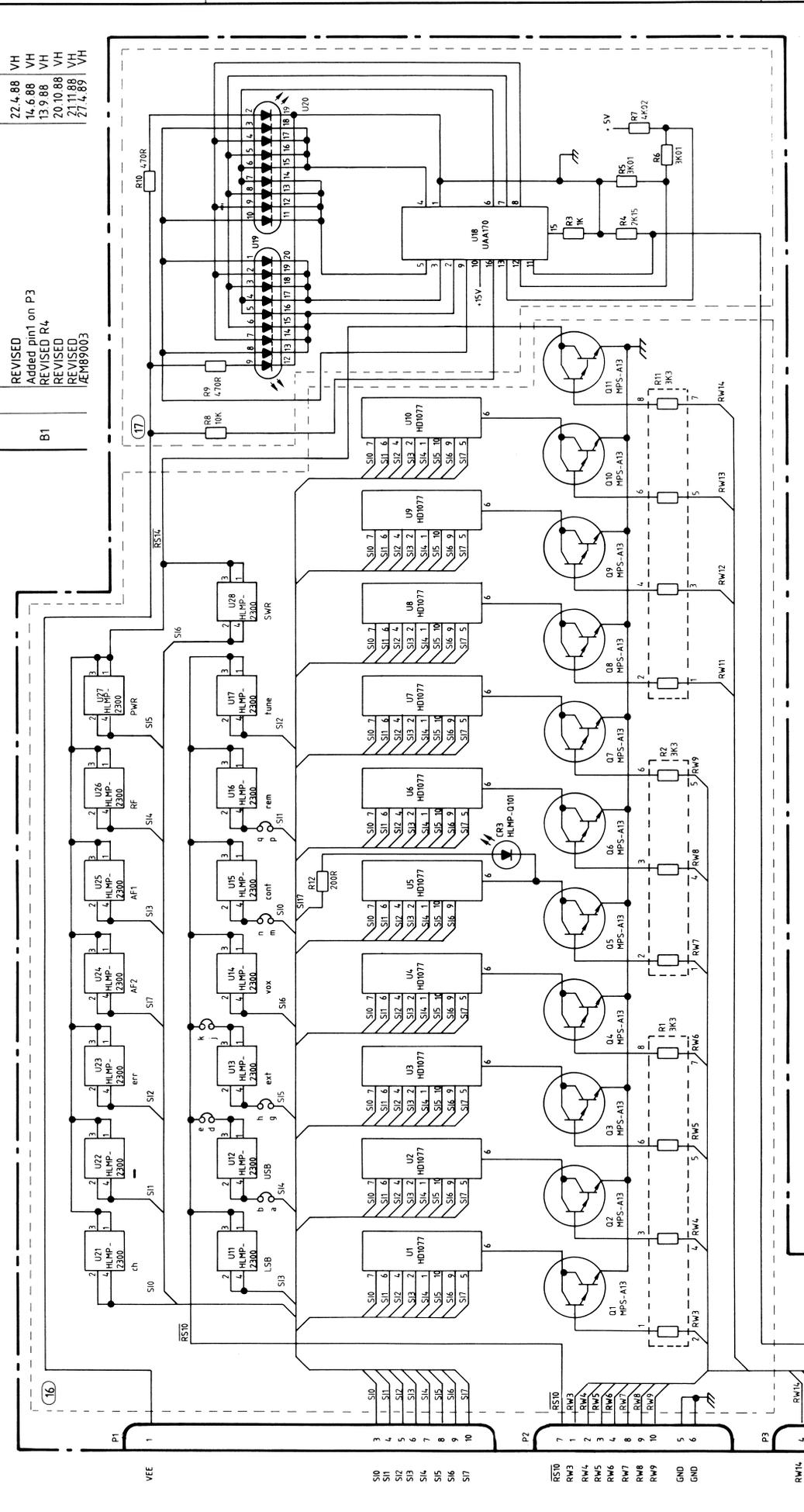
16. Displays and LEDs

U1-U10 are 7-segment displays, U11-U17 and U21-U28 are light bars and Q1-Q11 are drivers for multiplexing.

17. LED-Meter Circuit

U18 is the driver for LED-meter and U19 and U20 are light bars for the meter.

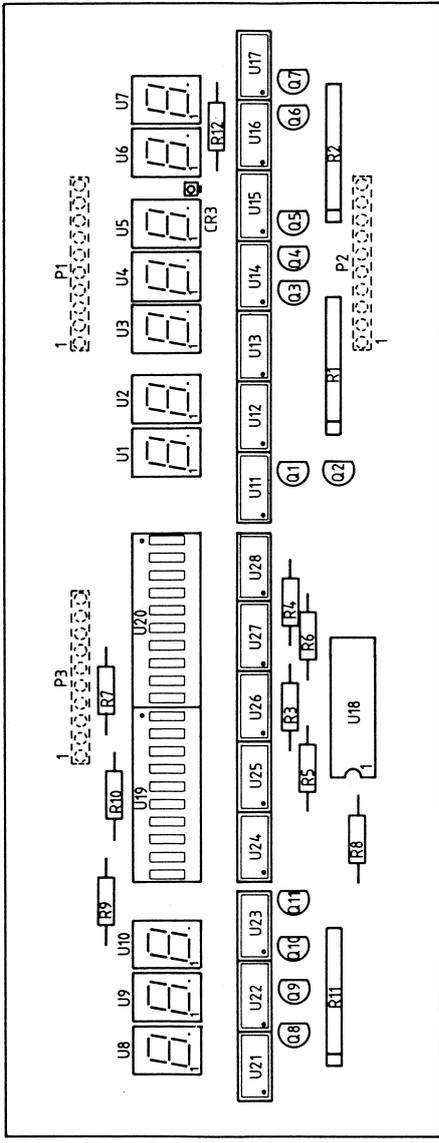
ZONE	LTR	REVISIONS	DATE	APPROVAL
B1		REVISED Added pin1 on P3 REVISED R4 REVISED REVISED REM95003	22.4.88 14.6.88 13.9.88 20.10.88 21.11.88 27.4.89	VH VH VH VH VH



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		DR		TITLE	
1	C	DR	VH	14.12.1987	DISPLAY BOARD A11A1A1 SE4010, TC4010
2	B	CH			
3	A	AP	CK	15.12.87	
		AP			SIZE
		AP			CODE IDENT
					DRAWING NO
					48 83 48-B
					SCALE
					SHEET 1 OF 1

APPLICATION	MATERIAL	ANGLES
USED ON	TC4010	
NEXT ASSY	SE4010	
	4.9 51 74	
	48 83 56	

1. NOTE: U8-9-10 SKAL HAVE SAMME BOGSTAVKODE.
 U19-20 SKAL HAVE SAMME BOGSTAVKODE.
 U1-2-3-4-5-6-7 SKAL HAVE SAMME BOGSTAVKODE.
 U21-22-23-24-25-26-27-28 SKAL HAVE SAMME BOGSTAVKODE.
 U11-12-13-14-15-16-17 SKAL HAVE SAMME BOGSTAVKODE.



REVISIONS		DATE	APPROVAL
ZONE	LTR		
A		3.9.91	VH
B	Æ08984		

Dansk Radio AS		dta	
TITLE		COMPONENT LOCATION	
DR. VH 14.6 1988		DISPLAY BOARD	
CH. CK /# 6.88		SE4010	
AP.		SIZE CODE IDENT DRAWING NO.	
AP.		A2 48 83 48	
FIRST ANGLE PROJECTION		SCALE 2:1	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		SHEET 1 OF 1	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075		APPLICATION	
ANGLES		48 85 34 SE4010	
LIN. DIM.		NEXT ASSY USED ON	
MATERIAL		APPLICATION	

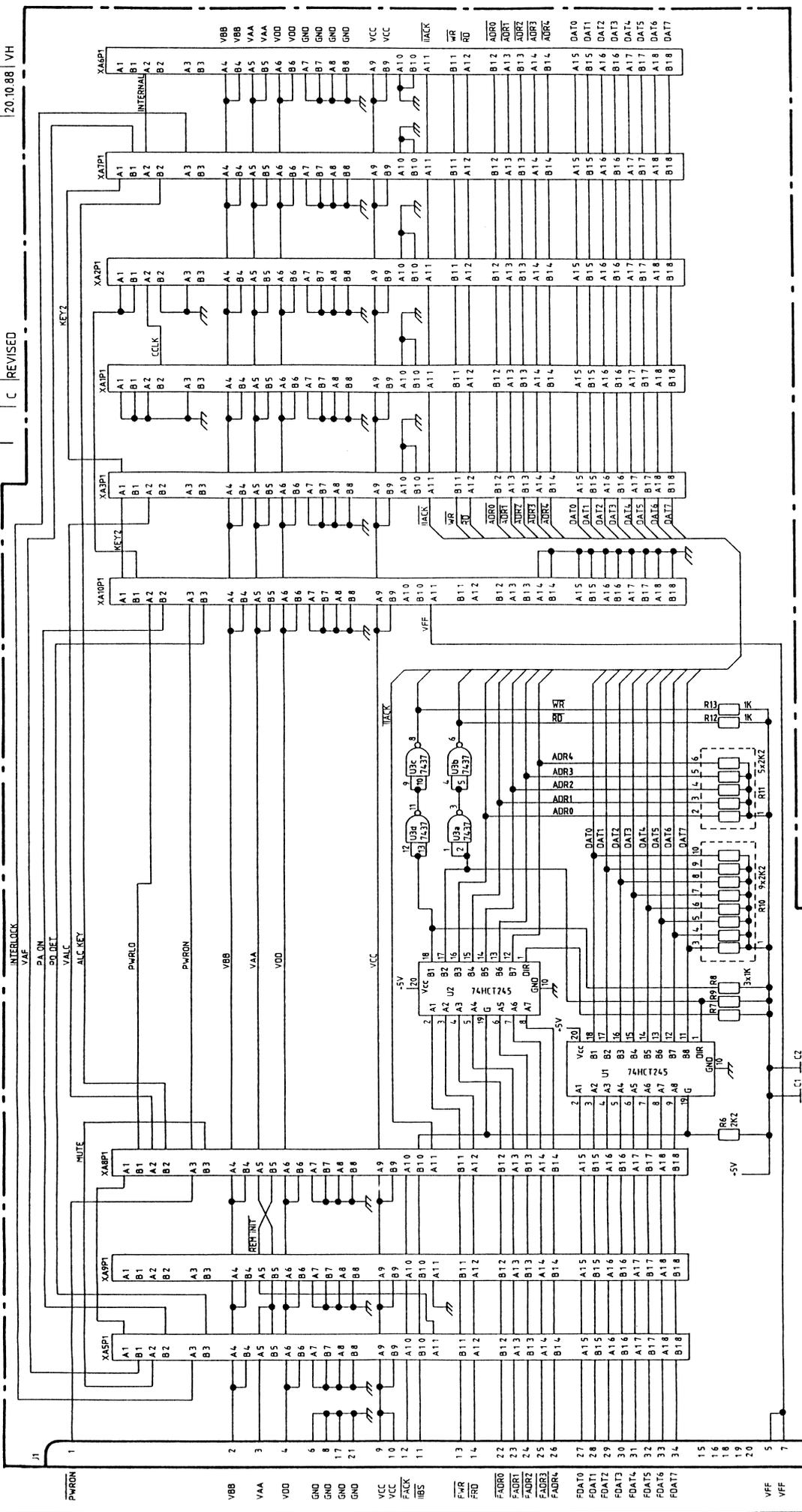
ASSY 487139, MOTHERBOARD ASSEMBLY

Service Sheet A12A1

1. Data Buffers

To avoid noise in the more sensitive parts of the exciter, two buffers U1 and U2 separate the internal interface bus from the function bus. The internal interface bus is only active when necessary.

REVISIONS		DATE	APPROVAL
ZONE/LTR	DESCRIPTION	28.11.89	VH
D / A04.511			
C	REVISED	20.10.88	VH



Dansk Radio AS

TITLE: MOTHER BOARD A12A1
SE4010

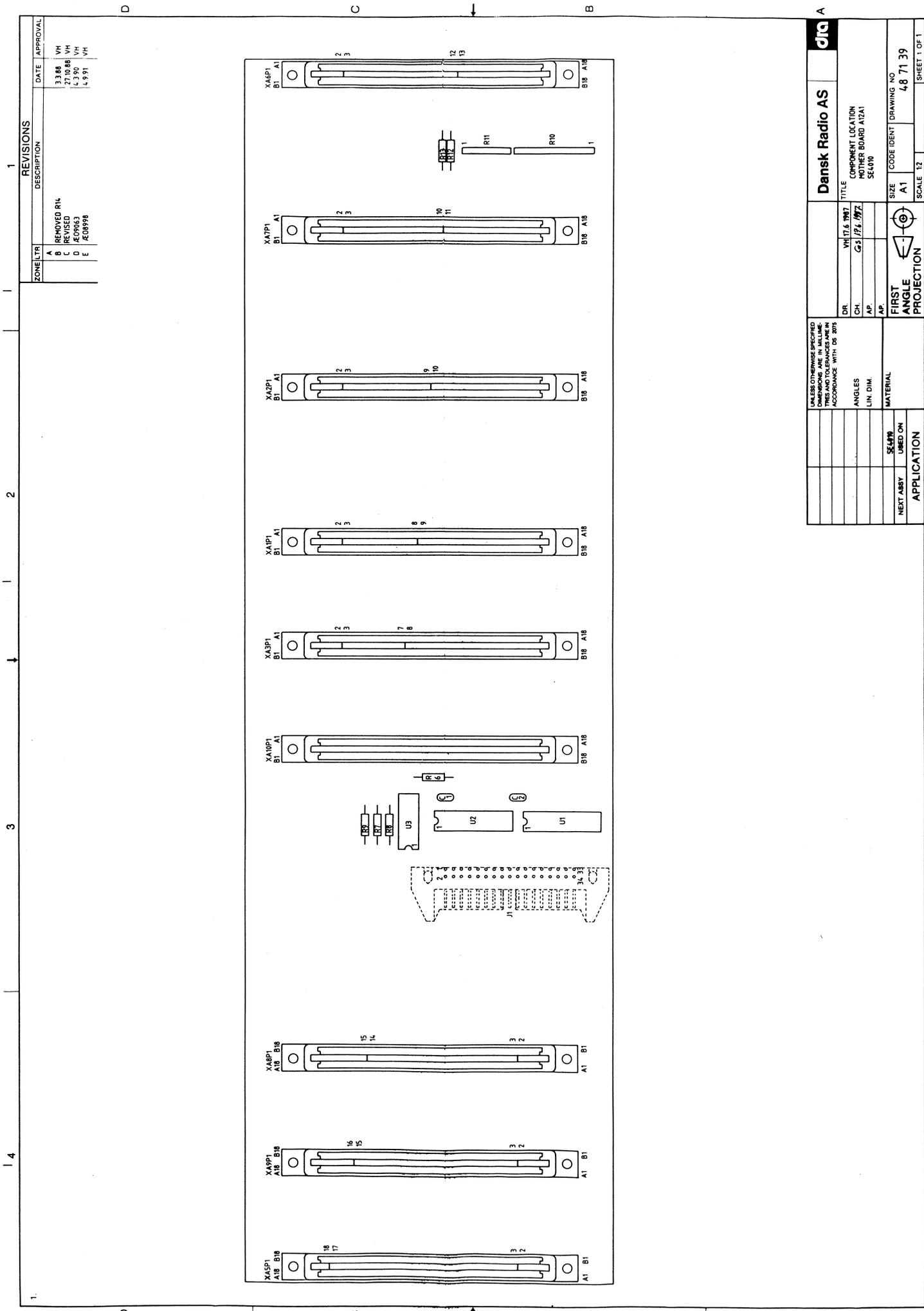
DR.	VH 16.6.1987	SIZE	A2	CODE IDENT	DRAWING NO.
CH.	GS 17.6.1987	AP.			48 71 39
AP.		AP.			
AP.		AP.			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075

ANGLES L.I.N. DIM.	MATERIAL	APPLICATION
	SE4010	USED ON

FIRST ANGLE PROJECTION

SCALE: SHEET 1 OF 1



REVISIONS

ZONE/LTR	DESCRIPTION	DATE	APPROVAL
A	REMOVED R14	3.3.88	VH
B	REVISED	27.10.88	VH
C	REVISED	4.3.90	VH
D	REVISED	4.3.90	VH
E	REVISED	4.9.91	VH

Dansk Radio AS		TITLE	
DR	VH/T.L. 1987	COMPONENT LOCATION	
CH	G.2 / 12.4 / 1972	MOTHER BOARD A12A1	
AP		SE4070	
AP		MATERIAL	
SIZE	CODE IDENT	DRAWING NO	
A1		48 71 39	
FIRST ANGLE PROJECTION		SCALE 1:1	
NEXT ASSY USED ON		APPLICATION	
SE4070			