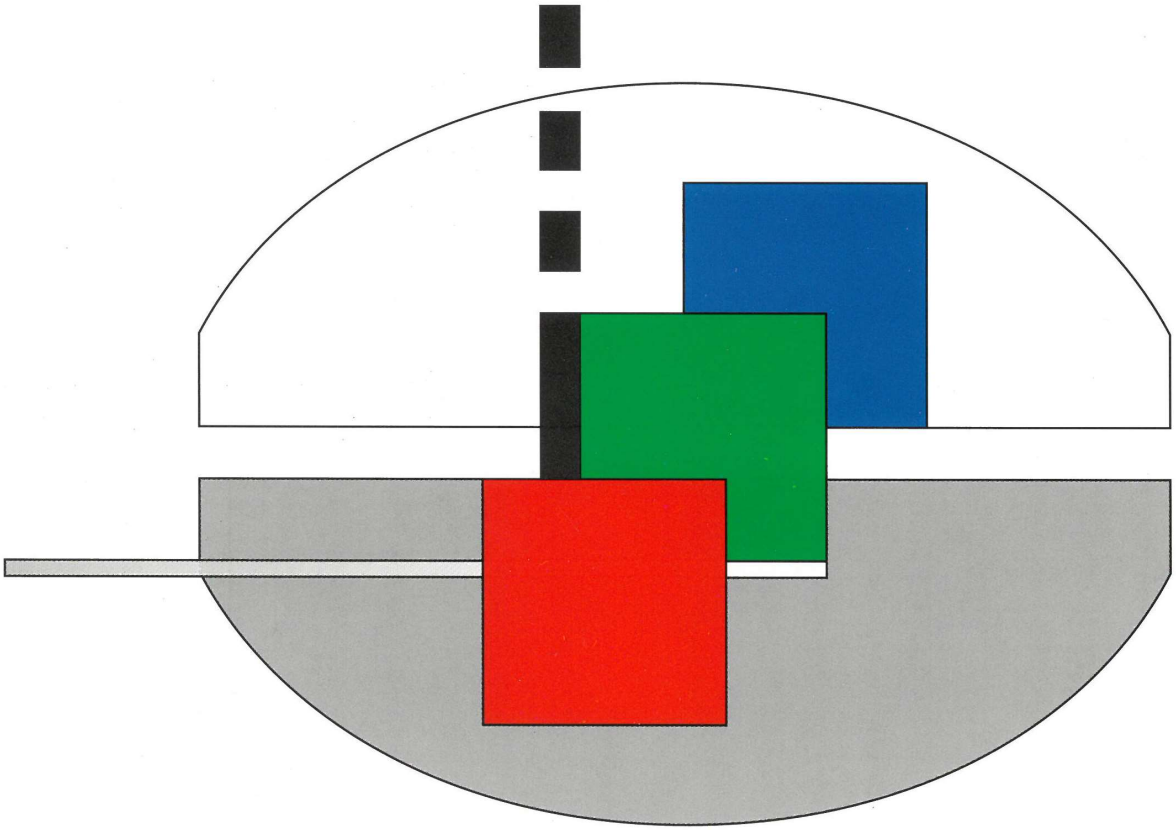
Instruction Manual



Philips TV Test Equipment

PHILIPS

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NICAM Monitor
PM 5689

Instruction Manual

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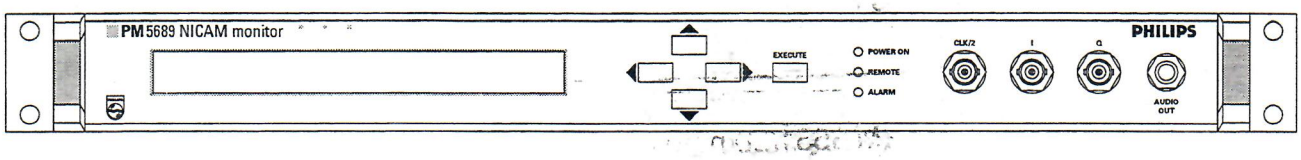

Philips
TV Test
Equipment

PHILIPS

Important

In correspondence concerning this instrument, please quote the full type and KU. number (serial number) as shown on the identification plate on the rear of the instrument.

Training

Courses of technical training on this, and other current PTV equipment are available either on a pre-planned basis, or to suit individual requirements.

These courses are held in English.

For details of location, time and duration of pre-planned courses, or the possibilities that exist for individually planned courses, please complete the form on the next page and return it to the Philips Customer Support Organization in your country.

Or contact:

Philips TV Test Equipment A/S
Kornmarksvej 21
DK - 2605 Brøndby
Denmark
Tel.: +45 3288 5911 - Fax: +45 4343 2390

Fault analysis

In the event of instrument failure, please complete the "Fault Analysis report" situated in Chapter - Service hints of this manual. After completion, please send it to the Philips Customer Support Organization in your country.

Request for Training

Recent advances in equipment design and our commitment to the use of leading edge technology has placed increasing demands on servicing personnel world-wide. While we make every effort to ensure that our manuals reflect these advances (at the same time remaining service oriented), the need for effective and regular training has become more and more necessary.
Tailor-made courses of instruction on current PTV instruments are therefore being made available to complement the information contained in our manuals. Participation will inevitably lead to reduced down-time and repair costs.
If you are interested in our training program or just require information, please complete the information sheet below, and send it to the Philips Customer Support Organization in your country who will contact you and provide more detailed information for your consideration.

We require information only : ☐

Company Name : _____

Address : _____

_____

_____

We like training on the following instruments :

PM _____ PM _____ PM _____ PM _____

PM _____ PM _____ PM _____ PM _____

Type of course required :

Systems/Applications ☐

Servicing/Faultfinding ☐

Other (please specify below) ☐

_____

Number of participants (max. 12): ☐

Time available (days): ☐

Location :

On my own premises ☐

At Philips Customer Support ☐

In Copenhagen ☐

Please send this request to the Philips Customer Support Organization in your country. Thank you.

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GUARANTEE STATEMENT

The Philips guarantee is in addition to all rights which buyer may have against his supplier under the sales agreement the buyer and the supplier and according to local legislation.

Philips guarantees this product to be free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of shipment. This guarantee does not cover possible required re-calibration and/or standard maintenance actions. This guarantee extends only to the original purchaser and does not apply to fuses, batteries or to any product or part thereof that has been misused, altered or has been subjected to abnormal conditions of operation and handling.

Philips - supplied software is guaranteed to be properly recorded on non-defective media. We will replace improperly recorded media without charge for 90 days after shipment upon receipt of the software. Our software is not guaranteed to be error free.

Philips' obligation under this guarantee is limited to have repaired or replace a product that is returned to an authorized Philips Service Centre within the guarantee period, provided that Philips determines that the product is defective and that the failure has not been caused by misuse, alteration or abnormal operation.

Guarantee service for products installed by Philips will be performed at the Buyer's facility at no charge within Philips' service travel area; outside this area guarantee service will be performed at the Buyer's facility only upon Philips' prior agreement and the Buyer shall pay Philips round trip travel expenses.

If a failure occurs, send the product, freight prepaid to the Service Centre designated by Philips with a description of the difficulty. At Philips' option, repairs will be made or the product will be replaced. Philips shall return the product, F.O.B. Repair Centre, transportation prepaid, unless the product is to be returned to another country, in which case the Buyer shall pay all shipping charges, duties and taxes.
Philips assumes NO risk for damage in transit.

DISCLAIMER

The forgoing guarantee is exclusive and is in lieu of all other guarantees, expressed or implied, including but not limited to any implied guarantee or merchantability, fitness, or adequacy for any particular purpose or use. We shall not be liable for any direct, indirect, special incidental, or consequential damages, whether based on contract, tort, or otherwise.
Some countries or states do not allow the foregoing limitations. Other rights may also vary.

GENERAL INFORMATION

1. Safety

Read this chapter carefully before installation and use of the instrument.

1.1 Introduction

The instrument described in this manual is designed to be used by properly-trained personnel only. Adjustment, maintenance and repair of the exposed equipment shall be carried out only by qualified personnel who are aware of hazards involved.

1.2 Safety Precautions

For the correct and safe use of the instrument, it is essential that both operating and servicing personnel follow generally accepted safety procedures in addition to the safety precautions specified in this manual. Specific warning and caution statements, where applicable, are found throughout this manual. Warning and caution statements and/or symbols are marked on the instrument where necessary.

1.3 Caution and Warning Statements

Caution
Used to indicate correct operation or maintenance in order to prevent damage to, or destruction of equipment or other property.

Warning
Used to indicate a potentional hazard that requires correct procedures or practices in order to prevent personal injury.

1.4 Impaired Safety Protection

1.4.1 Technical Specifications

This manual provides technical information important for safe operation of the equipment.

Please refer to the Chapter **Product Data** for information regarding technical specifications and the Chapter **Installation and Operating Instructions** regarding instructions for use.

Technical assistance may be obtained from your local Philips customer support organization or from:

Philips TV Test Equipment A/S
Kornmarksvej 21
DK-2605 Brøndby
Denmark
Tel. : +45 3288 5911
Fax : +45 4343 2390

1.4.2 Equipment Ratings

The instrument can be used with a mains voltage supply of:

Voltage:
100VAC, 120VAC, 220VAC, or 240VAC
(+10% / -15%, max. 250VAC)

Frequency:
48 - 65Hz

The power consumption:
does not exceed 40 VA.

The instrument is designed to operate within at least for the following environmental conditions:

- Indoor use
- Altitudes up to 2000m
- Temperatures between 5°C and 45°C
- Maximum relative humidity of 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 45°C
- Transient overvoltages according to installation category II (IEC1010)
- Pollution degree 1 (IEC664)

The instrument is equipped with a number of input and output terminals as described in the Chapter **Product Data**.

The terminals are protected from becomming hazardous live by means of basic insulation and protective screening.

Whenever it is likely that safe operation is impaired, the instrument must be made inoperative and secured against unintended operation. The appropriate servicing authority must be informed.

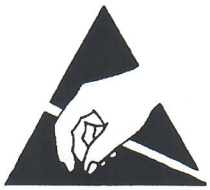
For example, safety is likely to be impaired if the instrument fails to perform the intended measurements or shows visible damage.

WARNING: Protection provided by the equipment may be impaired, if the equipment is used in a manner not specified by this manual.

1.5 Electrostatic Sensitive Devices

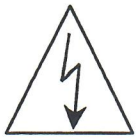
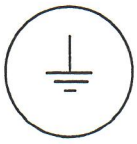
All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce lifetime drastically.

When repairing, make sure that you are connected to the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools also at this potential.



ATTENTION

1.6 Symbols

Symbol:	Color:	Explanation:
	Red	High voltage terminal: a terminal at which a voltage, with respect to another terminal or parts exists or may be adjusted to 1000V or more. (High voltage≥1000V).
	Black/Yellow	Live part shock risk of electric shock.
	Black/Yellow	To preserve the instrument from damage the operator must refer to an explanation in the instruction manual.
	White/Black	Protective earth (grounding) terminal
~	Black	Alternating current (*placed on the indetification plate*)
	White/Black White/Black	On (supply - *mains switch*) Off (supply - *mains switch*)

2. Introduction and Applications

2.1 General Information

The PM 5689 NICAM sound monitor is a professional demodulator offering two functions in a single unit: a cost-effective NICAM demodulator which combine monitoring functions with high-precision measuring.

The monitoring function check the performance of a NICAM transmission against customer pre-programmed quality parameters and output an alarm when a discrepancy is detected. A typical example of a monitoring function is the Eyeheight alarm, which outputs an alarm when the Eyeheight of the QPSK demodulated signal drops below an acceptable minimum value.

The combination of the precision demodulation function and the measuring functions allow the operator to make an in-depth analysis of a problem. A typical example is a periodical drop in the Bit Error Rate: the measuring functions allow the operator to analyze the fault and, in particular, to measure the time period between. An oscilloscope and the test outputs on the front panel can be used to generate and analyze Constellation and Eye-pattern as well.

The large number of versions and options included in the product program allows the user to tailor the instrument to his particular applications. The options include a selection of remote control-systems; IEEE and RS-232 modules can be ordered either as factory-installed units or at a later stage as customer-defined add-on.

The basic instrument has inputs for a QPSK baseband signal (Intercarrier Frequency) and a digital NICAM signal. The fully equipped instrument includes Intecarrier input, digital NICAM, and IF input functions as well. The IF functions offer both split and intercarrier downmixing.

- Splitcarrier:
  selective NICAM IF-carrier reception.
- Intercarrier:
  the NICAM carrier is converted by the vision carrier to an intercarrier signal for demodulation purposes.

For applications using QPSK subcarriers other than the standard terrestrial, the PM 5689 series can on request be modified to match nearly all known standards, e.g.: subcarriers used for microwave links and satellites.

Thanks to the excellent RF-screened cabinet, the instrument can be used at the transmitter site without problems with the high RF field.

Though the family of NICAM monitors includes a version for digital NICAM, the most common configuration of the instrument is for monitoring a NICAM QPSK-modulated signal. Depending on the option, the input is either a baseband signal at:

- 5.85MHz (40% roll off, systems B/G, L, and D/K)
- 6.552MHz (100% roll off, system I)
- an IF signal
- subcarrier signal

A switchable attenuator activated from the front panel adapts the input level to the range of the Automatic Level Control (*ALC*). The attenuator adds a 20 dB to the range of the ALC

A precise cosine filter suppresses out-of-band components and supports the quality of the demodulation, even if conditions for reception are poor.

The instrument checks the quality of the transmission by measuring the Eyeheight and detected parity errors. The result is displayed on the Liquid Crystal Display (*LCD*) found on the front panel.

The microprocessor system monitors the transmission quality by comparing the performance measured with preprogrammed customer operated alarms levels. Your favorite level of NICAM carrier can be stored and monitored with a ±3dB window.

The alarms are indicated on the front panel by a red LED diode together with an explanatory text on the LCD on the front panel.

2.2 Inputs

The signal could either be a QPSK modulated signal or a digital NICAM-728 signal. The QPSK signal is fed to the N connector ("QPSK INPUT") and the digital input is fed to the BNC connectors ("NICAM IN"), both located in the rear panel. The signal to be analyzed or monitored is selected via the front panel or the remote control.

The top of line product has following input functions:

- IF QPSK input.
  The input accepts a QPSK NICAM IF or a combined Vision/Mono Sound/NICAM IF signal.
- QPSK Baseband.
  (Intercarrier signal, e.g. System B/G 5.85MHz QPSK)
- Digital NICAM signal.
  The instrument accepts the NICAM-728 signal without an accompanying clock signal, a clock regenerator is an integrated part of the input circuit of the PM 5689.

Other versions:

- The instrument is available in a version intended only for baseband QPSK signal demodulation.
- Another version is for digital NICAM only; this version has no QPSK demodulator.

Note: IF and intercarrier frequencies depend on the version. See Chapter 3, "Product Data".

2.3 Outputs

The instrument has 2 Audio outputs (XLR connectors) in the rear panel for a high-quality audio stereo signal or two separate Audio channels (bilingual signal).

The headphone output in the front panel can be used for a fast check of the audio quality. The output level to the headphones can be adjusted and source-selected (e.g. stereo or left channel only) from the front panel, through one of the software menus.

On the rear panel are two BNCs for Data and Clock output.

The multi-pin connector in the rear panel outputs in a 'open' collector format all the alarm functions and information about NICAM modes. For pin configuration, see Chapter 6.

There are also two slots for options in the rear panel. One of the options is a Data Module, which outputs the A-bits of NICAM and the data information from the NICAM data modes.

Another function is the IEEE or RS-232 remote option, which is a combined input/output device for control and readout.

In the front panel are three connectors carrying the I and Q signals and QPSK clock signal. A suitable oscilloscope allows the outputs to provide Eye-height and Constellation displays.

2.4 The Measuring Functions

The instrument measures and displays on the Liquid Crystal Display the following NICAM quality parameters:

- NICAM modes:
  Stereo, Dual, Mono, and Data
- Eyeheight measured in the I and Q direction
- Bit Error Rate
- Number of Burst Errors that the instrument has detected after it has locked onto the NICAM signals. The instrument keeps track of the number until the instrument is reset.
- Length of last-detected Burst Error
- Time elapsed since last-detected Burst Error or, if no Burst Error time elapsed since valid NICAM was last detected.

2.4.1 Definitions

NICAM modes: Stereo, Dual, Mono and Data
Every Frame Alignment Word (FAW) is followed by a 5-bit digital code.

The first digital signal (Co) supports synchronization. The signal is logical high (1) during the first eight frames, then low (0) during the following eight. This signal is used by the TV receiver to check against false FAW and to distinquish between even- and odd- numbered frames.
The following 4 bits indicates:

C_1	C_2	C_3	Mode
0	0	0	Stereo
0	1	0	Dual
1	0	0	Mono
1	1	0	Data

C4=1 signalizes Sound 1 and Sound 2 (NICAM) are transmitting same program material.

Eyeheight
The demodulated QPSK signal is represented by an in-phase and a quadrature component. The NICAM data and clock signals are regenerated from the I & Q signals. When a transmission is viewed on an oscilloscope, the I and Q signals typically look as shown in Fig. 2-1.

The trigger for the oscilloscope is the clock/2 signal. In every positive transition, the I and Q signals are in the rest state, and logical '1' or '0' is detected. If the rest states are represented by a single point then the Eye is considered to be 100%. Normally, variations and rest states are seen as a circular area. The minimum distance between upper and lower rest states is measured on the oscilloscope and evaluated against the estimated center point, which theoretically represents perfect values. See Fig. 2-2.

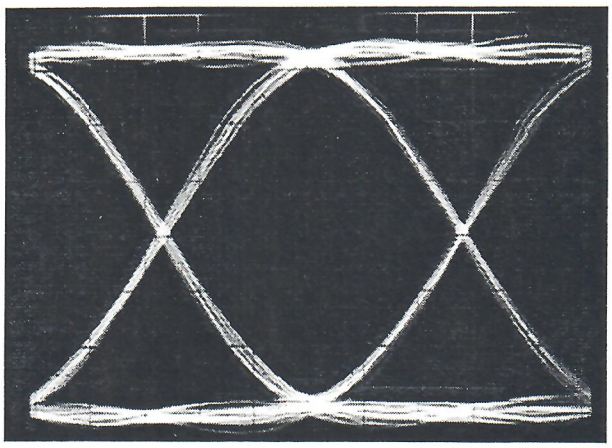


Fig. 2-1a 100% cosine filtering

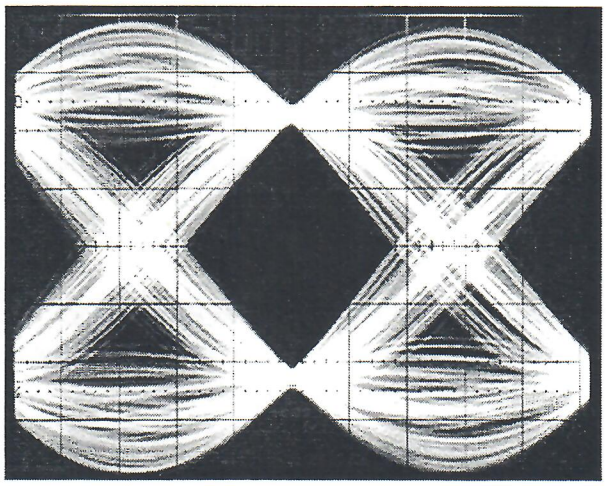


Fig. 2-1b 40% cosine filtering

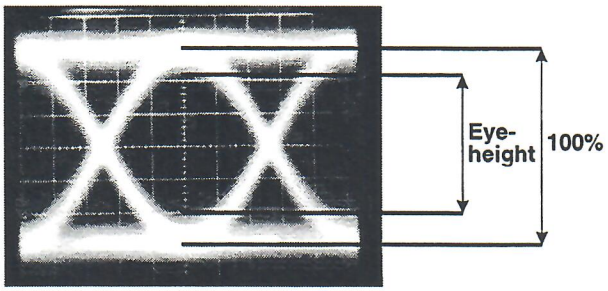


Fig. 2-2 Eyeheight definition, illustrated from 100% cosine filtering.

Bit Error Rate (BER)
Number of Bit Errors detected from t= T_0 measured relative to the number of received Bits.
T_0: Instrument has powered up and valid NICAM signal has been received.

Detection of errors is based upon the parity bits. 448 of 728 bits in a frame is protected by parity.

$$BER = \frac{Number\ of\ errored\ bits\ pr.\ seconds}{448\ x\ 1000\ bits}$$

Errors in a Burst (EB)
Evrytime a parity error is detected the EB module is activated. The EB module counts the parity errors in burst of errored samples, the total parity errors from the first detected parity error to a fault-free reception is displayed as the EB value.

Fault free reception is defined as 200msec. interval without any detected error.

Duration of Last Detected Burst Error (DLB)
The time equivalent to start of erroded frames until a faultfree reception has been detected.

Elapsed Time Since Last Burst Error (ETLB)
The timing circuit in the instrument counts and displays the time elapsed since the detection of a Burst Error.

2.5 I and Q / QPSK Measurements by Using an Oscilloscope

2.5.1 Eyeheight Display

Eyeheight is displayed by means of the set-up shown in Fig. 2-3. The I or Q output, located on the front panel, is connected to the Y input of an oscilloscope. The trigger signal is NICAM clock (728/2kHz, equal to the QPSK Clock).

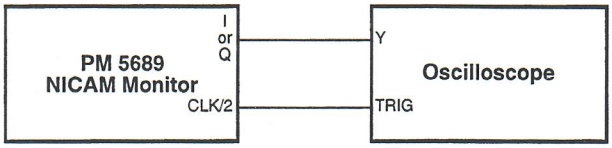


Fig. 2-3 Setup wiring.

(*Examples of Eyepattern are shown in Fig. 2-1*).

2.5.2 Constellation Display

The constellation display shows the four NICAM rest states. Fig. 2-4 shows the wiring of the test setup. The oscilloscope is set for XY display.

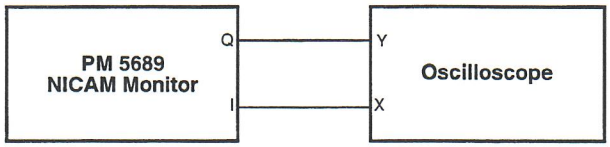


Fig. 2-4 Setup wiring.

(*Examples of a constellation displays are shown in Fig. 2-5)*

The constellation display is more difficult to interpret, but for the skilled operator it supplies additional information about frequency jitter, orthogonality, and linearity.

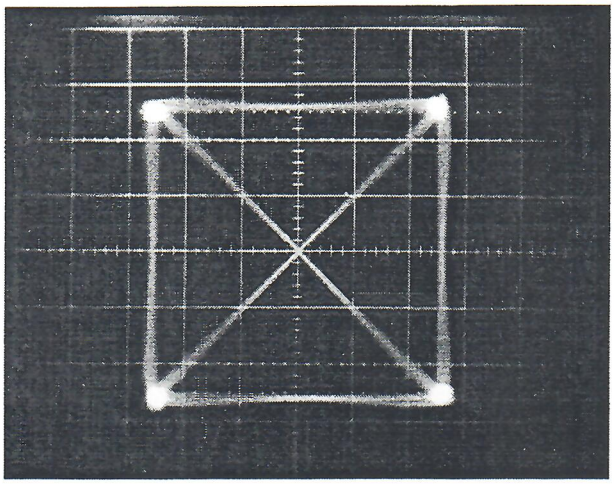


Fig. 2-5a Constellation display, 100% roll-off.

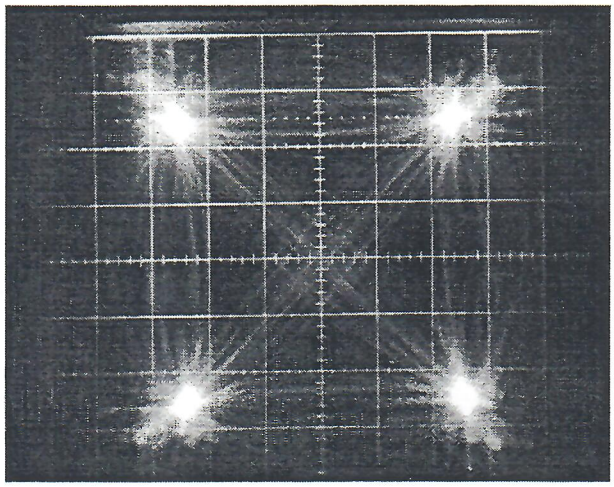


Fig. 2-5b Constellation display, 40% roll-off.

2.6 Limitations in Performance and Condition for Quality Demodulation

2.6.1 IF Inputs

The instrument has two modes for an IF signal. In the intercarrier mode, the instrument will make use of the received Vision IF carrier to convert the NICAM IF signal to the QPSK baseband signal (often called "QPSK Intercarrier"), where the demodulation takes place. In the split-carrier mode, the instrument makes use of an internal crystal-controlled oscillator to mix down the signal.

In the Intercarrier mode, the quality of the demodulated signal depends on the Vision carrier as well as of the NICAM carrier. Incidental phase modulation of the Vision carrier affects the demodulation margin and is clearly detected by an Eyeheight measurement.

For high-quality NICAM through the intercarrier mode, the following conditions are required:

- The Vision carrier [1] must be at least 14 dB above the NICAM carrier
- The Monosound carrier must be not more than 10dB above the NICAM carrier, except in systems L and D/K, where 20dB is acceptable.

The Vision carrier is relaxed with respect to the restrictions in the splitcarrier mode. The Monosound restriction is, however, the same. The splitcarrier mode requires an incoming signal accuracy of better than 10ppm and a phase stability equal to a phase jitter e.g. below 3^{o}_{RMS}.

The splitcarrier mode can be used to measure directly on the IF part of a transmitter. This measurement together, with the intercarrier mode, can provide important information about the quality of the transmitter. Some of the high-quality Nyquist demodulators (e.g. PM 5560A) have an IF output which supports the splitcarrier mode. The most common types of professional receivers and demodulators are only designed to operate within the quality level required for intercarrier processing.

1: Referring to sync level, except for System L, for which the reference is the 100% white level.

3. Product Data

3.1 Safety Characteristics

This instrument has been designed and tested in accordance with the safety requirements of the IEC publication 1010-1 including amendment 1 (safety requirements for electrical equipment for measurement, control, and laboratory use) and has been tested and inspected for safety before leaving the factory. This manual contains information and warnings which must be heeded during operation and service to ensure safe operation and service of the apparatus.

3.2 Performance Characteristics

Characteristics expressed in numerical values with tolerances are guaranteed under the specified environmental conditions. Specified non-tolerance numerical values indicate typical values at the nominal ambient temperature (25°C) and reflect average performance.

3.3 Versions

System/ Version	Input Type			Frequencies		
	IC	IF	NICAM	IC/Baseband	IF	NICAM
B/G/00	X	-	-	F_N=5.85MHz		
D/00	X	-	-	F_N=5.85MHz		
I/00	X	-	-	F_N=6.552MHz		
L/00	X	-	-	F_N=5.85MHz		
B/G/10	X	X	X	F_N=5.85MHz	F_N=33.05MHz F_V=38.9MHz	728kbit/sec.
L/10	X	X	X	F_N=5.85MHz	F_N=38.55MHz F_V=32.7MHz	728kbit/sec.
I/10	X	X	X	F_N=6.552MHz	F_N=32.348MHz F_V=38.9MHz	728kbit/sec.
D/10	X	X	X	F_N=5.85MHz	F_N=33.05MHz F_V=38.9MHz	728kbit/sec.
L/20	X	X	X	F_N=5.85MHz	F_N=33.05MHz F_V=38.9MHz	728kbit/sec.
B/G/30	-	-	X			728kbit/sec.
D/30	-	-	X			728kbit/sec.
L/30	-	-	X			728kbit/sec.
I(UK)/31	-	-	X			728kbit/sec.

3.4 Version for Baseband - QPSK Demodulation - PM 5689/00

3.4.1 Input

3.4.1.1 Intercarrier Input

Impedance:
50Ω input
Connector:
N-female (rear panel)
Return loss:
>20dB
Frequency:
5.85MHz (systems B/G, L, and D/K)
6.552MHz (system I)

3.4.1.2 Acquisition

Input level:
-27dBm to +16dBm
(due to the switchable 0-20dB attenuator activated from the front panel)
Automatic frequency pull-in:
±500Hz

3.4.2 Audio Outputs

3.4.2.1 Audio, Main Outputs

The outputs are the two audio channels (A & B), and they are balanced and located on the rear panel.
Connector:
2 x XLR, 3-pole male.

Terminal 1	: Ground
Terminal 2	: Positive
Terminal 3	: Negative

Impedance:
< 40Ω
Level :
Systems B/G, D/K, and L:
0.775V, 600Ω load (400Hz, 7.26dBm0)
I system:
0.775V, 600Ω load (440Hz, 4.98dBm0)

3.4.2.2 Audio, Monitoring Output

The output for headphones, controlled from the front panel, is either:
– the two audio channels (Left and Right)
– the A and B channel (in Dual)
– one of the audio channels (Left or Right).

The output is unbalanced and located in the front panel

Connector:
Jack receptor, 6.35mm
Impedance:
< 40Ω
Nominal level :
Systems B/G, D/K, and L:
0.775V, 600Ω load (400Hz, 7.26dBm0)
System I:
0.775V, 600Ω load (440Hz, 4.98dBm0)
Adjustable within:
+3dB to -20dB relative to the main audio output
Note: For system B/G, D/K, and L, the nominal level, (defined by a 400 Hz audio signal) equals a digital level 22dB below overload. For system I (UK), the nominal level equals a digital level 24.3dB below overload.

3.4.3 I and Q Signals

3.4.3.1 Outputs

Format:
QPSK-demodulated output
Connector:
2 x BNC, located in the front panel
Level:
Approx. 0.8V in 75Ω
Impedance:
75Ω

3.4.3.2 Clock/2 (QPSK Clock)

Frequency:
364kHz
Connector:
BNC, located in the front panel
Level:
Approx. 0/2.5V in 75Ω

Impedance:
75Ω

3.4.4 NICAM OUT

3.4.4.1 Output

Bit rate:
728 kBit/sec
Connector:
BNC, located in the rear panel
Level:
Approx. ±2.5V in 75Ω

3.4.4.2 Clock Output

Clock frequency:
728 kBit/sec.
Connector:
BNC, located in the rear panel
Impedance, output:
75Ω
Level:
Approx. ±2.5 V in 75 Ω

3.4.5 Demodulation

Frequency response, J17 de-emphasis:
20Hz to 14kHz : ≤ ±0.3dB
14kHz to 15kHz : <0.5dB, >-3dB
Phase difference between the channels in stereo, 20Hz to 15kHz:
$< 3^{o}$
Two tone IM (each test freq. 9dB below overload):
< -70dB
Harmonic distortion, up to 3dB below digital overload:
< 0.01%
Crosstalk:
< -70dB
S/N (Idle noise relative to 0 dBm/600Ω/1kHz, CCIR weighted) :
> 70dB

3.4.6 Measuring Functions

The instrument measures and displays Eyeheight and Bit Error Rate.

A report is displayed which is based upon the Bit Errors measured and which shows Burst Error duration, and time elapsed since the the last Burst Error.

The input level of the QPSK signal is measured and checked against a prestored value.

Input level (*see specified range*)**:**
measured within ±1dB relative to a prestored value
Eyeheight:
Accuracy better than ±2 at a 90% Eyeheight
BER:
with a perfect signal, the instrument indicates:
$< 10^{-6}$ after 2 sec.
$< 10^{-7}$ after 22 sec.
$< 10^{-9}$ after 37 min.

3.4.7 Alarms

An alarm function is indicated by a red LED diode on the front panel and an explanatory text on the front panel LCD display.

NICAM carrier levels:
Alarm is activated by a ±3dB deviation from the customer programmed alarm. The trigger level is 2dB ±1dB up or down from the stored value. The alarm can be disabled from the front panel.

Eyeheight:
Alarm level is activated when the Eyeheight drops below the customer programmed Eye value.

BER:
The programmed alarm is activated when the BER exceeds the customer programmed value.

3.4.8 Remote Monitoring

Logic levels :
open collector, can be used with TTL; an HCMOS interface, and small relays
Information:
all alarms and indicators on the front panel, including information about NICAM mode
I_{sink}:
max. 16mA for V_{ON} <0.4V
V_0 (open collector):
max. 16V

3.5 Version for IF and Baseband QPSK Demodulation (Intercarrier Frequency) - PM 5689/10/20

Versions for IF input feature IF demodulation in addition to baseband performance (Intercarrier and Digital NICAM). The IF downmixing to the intercarrier frequency used internally for demodulation can be programmed to one of two modes:

1. The splitcarrier demodulation is set internally for reception and demodulation of the IF NICAM carrier.
2. Intercarrier demodulating: the instrument is set for reception of a composite IF signal (vision, monosound and NICAM). The NICAM signal is demodulated by intercarrier mixing.

3.5.1 Input

3.5.1.1 IF Input

Impedance:
50Ω
Connector:
N-female
Return loss:
>20dB

Frequencies:
B/G system:
F_N : 33.05MHz
F_V : 38.9MHz
D/K system:
F_N : 33.05MHz
F_V : 38.9MHz
I system:
F_N : 32.348MHz
F_V : 38.9MHz
L system:
F_N : 38.55MHz
F_V : 32.7MHz
Note: The L system is available in version for:
F_N : 33.05MHz
F_V : 38.9MHz

3.5.1.2 Acquisition

Input level:
-26dBm to 19dBm with max. carrier sync level or -46dBm to 0dBm refering to the NICAM carrier, due to the switchable a 0 - 20dB attenuator
Automatic frequency pull-in:
±500Hz

3.5.1.3 Optimum Demodulation, Max Eyeheight.

Vision carrier/NICAM carrier ratio [1]:
between 17 and 23dB
between 23 and 30dB (L system)
Monosound carrier/NICAM carrier ratio:
max. 10dB
max. 19dB (L system)

3.5.1.4 Intercarrier Input

Impedance:
50Ω
Connector:
N-female (rear panel, same connector as for IF IN)
Return loss:
> 20dB
Frequencies:
B/G, D/K, and L systems:
5.85MHz
I system:
6.552MHz

1: B/G, D/K, and I systems RMS-level referring to sync level, L system RMS-level referring to white level

3.5.1.5 Acquisition

Input level:
-27dBm to +16dBm due to the switchable
0 - 20dB attenuator activated from the front panel
Automatic frequency pull-in:
±500Hz

3.5.2 Digital NICAM

3.5.2.1 DATA

Bit rate:
728 kBit/sec.
Connector:
BNC, located in the rear panel
Input level:
±2.5V, +6/-10dB in 75Ω
Impedance:
75Ω, but can be easily modified internally to a high impendance approx. 10kΩ

3.5.2.2 Clock NICAM

The instrument regenerates the clock signal from the incoming NICAM.
Clock frequency acquisition range:
728kHz ±10ppm

3.5.3 Audio Outputs

3.5.3.1 Audio, Main Outputs

The outputs are the two audio channels (A and B), and they are balanced and located in the rear panel.
Connector:
2 x XLR, 3-pole male

Terminal 1	: Ground
Terminal 2	: Positive
Terminal 3	: Negative

Impedance:
< 40Ω
Nominal level:
B/G D/K, and L systems:
0.775V, 600Ω load (400Hz, 7.26dBm0)
I system:
0.775V, 600Ω load (440Hz, 4.98dBm0)

Note: For systems B/G, D/K, and L, the nominal level, defined by a 400Hz audio signal, equals a digital level 22dB below overload. For system I (UK), the nominal level equals a digital level 24.3dB below overload.

3.5.3.2 Audio, Monitoring Output

The output for headphones, controlled from the front panel, is either:
– the two audio channels (Left and Right)
– the A and B channel (in Dual)
– one of the audio channels (Left or Right)

The output is unbalanced and located in the front panel.
Connector:
Jack receptor, 6.35mm.
Impedance:
< 40Ω.
Adjustable within a range of:
+3dB to -20dB relative to the Main Audio Output

3.5.4 I and Q Signals

3.5.4.1 Outputs

Format:
QPSK demodulated output
Connector:
2 x BNC, located on the front panel
Level:
approx. 0.8V in 75Ω
Impedance:
75Ω

3.5.4.2 CLOCK/2 (QPSK Clock)

Frequency:
364kHz
Connector:
BNC, located on the front panel.
Level:
approx. 0/2.5V in 75Ω
Impedance:
75Ω

3.5.5 NICAM OUT

3.5.5.1 Output

Bit rate:
728kBit/sec
Connector:
BNC, located on the rear panel
Level:
approx. ±2.5V in 75Ω

3.5.5.2 Clock Output

Clock frequency:
728 kBit/sec
Connector:
BNC, located on the rear panel
Impedance, output:
75Ω
Level:
approx. ±2.5V in 75Ω

3.5.6 Demodulation

Frequency response, J17 de-emphasis:
20Hz to 14kHz : ≤ ±0.3dB
14kHz to 15kHz : <0.5dB, >-3dB
Phase difference between the channels in stereo, 20Hz to 15kHz:
$< 3^{o}$
Two tone IM (each test freq. 9dB below overload):
< -70dB
Harmonic distortion, up to 3dB below digital overload:
< 0.1%
Crosstalk:
< -70dB
S/N (Idle noise relative to 0dBm/600Ω/1kHz, CCIR weighted):
> 70dB

3.5.7 Measuring Functions

The instrument measures and displays Eyeheight and Bit Error Rate.

A report is displayed which is based upon the Bit Errors measured and which shows Burst Error duration, and time elapsed since the the last Burst Error.

The input level of the QPSK signal is measured and checked against a prestored value.

Input level *(see specified range)*:
measured within ±1dB relative to a prestored value
Eyeheight:
Accuracy better than ±2 at a 90% Eyeheight
BER:
with a perfect signal, the instrument indicates:
$< 10^{-6}$ after 2 sec.
$< 10^{-7}$ after 22 sec.
$< 10^{-9}$ after 37 min.

3.5.8 Alarms

An alarm function is indicated by a red LED diode on the front panel and an explanatory text on the front panel LCD display.

IF Vision carrier level:
Out of range (*see item 3.5.1.3*)
NICAM carrier levels:
The alarm activated by a ±3dB deviation from the customer-programmed alarm. The trigger level is 2dB ±1dB up or down from the stored value. The alarm can be disabled from the front panel.
Eyeheight:
Alarm levels is activated then the Eyeheight drops below the customer-programmed Eye value.
BER:
The programmed alarm is activated when the BER exceeds over the programmed alarm.

3.5.9 Remote Monitoring

Logic levels :
open collector, can be used with TTL, an HCMOS interface, and small relays
Information:
all alarms and indicators on the front panel, including information about NICAM mode
I_{SINK}:
max. 16mA for V_{ON} <0.4V
V_0 (open collector):
max. 16V

3.6 Version for Digital NICAM Demodulation - PM 5689/30/31

This version is only NICAM-728 reception and demodulation.

3.6.1 Input for Digital NICAM

3.6.1.1 DATA

Bit rate:
728 kBit/sec.
Connector:
BNC, located in the rear panel
Input level :
±2.5V, +6/-10 dB in 75Ω
Impedance:
75Ω, but can be easily modified internally to a high impendance approx. 10kΩ

3.6.1.2 Clock NICAM

The instrument regenerates the clock signal from the incoming NICAM.

Clock frequency, aquisition range:
728kHz ±2ppm

3.6.2 Audio Outputs

3.6.2.1 Audio, Main Outputs

The outputs are the two audio channels (A & B), and they are balanced and located in the rear panel.
Connector:
2 x XLR, 3-pole male
Terminal 1 : Ground
Terminal 2 : Positive
Terminal 3 : Negative
Impedance:
< 40Ω
Nominal level:
B/G, D/K, and L systems (PM 5689/30):
0.775V, 600Ω load (400Hz, 7.26dBm0)
I/UK system (PM 5689/31):
0.775V, 600Ω load (440Hz, 4.98dBm0)
Note: For systems B/G, D/K, and L, the nominal level, defined by a 400Hz audio signal, equals a digital level 22dB below overload. For system I (UK), the nominal level equals a digital level 24.3dB below overload.

3.6.2.2 Audio, Monitoring Output

The output for headphones, controlled from the front panel, is either:
– the two audio channels (Left and Right)
– the A and B channel (in Dual)
– one of the audio channels (Left or Right)
The output is unbalanced and located in the front panel.
Connector:
Jack receptor, 6.35mm
Impedance:
< 40Ω
Adjustable within a range of:
+3dB to -20dB, relative to the Main Audio Output

3.6.3 Demodulation

Frequency response, J17 de-emphasis:
20Hz to 14kHz : ≤ ±0.3dB
14kHz to 15kHz : <0.5dB, >-3dB
Phase difference between the channels in stereo, 20Hz to 15kHz:
< 3°
Two tone IM (each test freq. 9dB below overload):
< -70dB
Harmonic distortion, up to 3dB below the digital overload:
< 0.01%
Crosstalk:
< -70dB
S/N (Idle noise relative to 0dBm/600Ω/1kHz, CCIR weighted):
> 70dB

3.6.4 Measuring Functions

The instrument measures and displays Eyeheight and Bit Error Rate.

A report is displayed which is based upon the Bit Errors measured and which shows Burst Error duration, and time elapsed since the the last Burst Error.

BER:
with a perfect signal, the instrument indicates:
< 10^{-6} after 2 sec.
< 10^{-7} after 22 sec.
< 10^{-9} after 37 min.

3.6.5 Alarms

An alarm function is indicated by a red LED diode on the front panel and an explanatory text on the front panel LCD display.

BER:
The programmed alarm is activated when the BER exceeds the programmed alarm.

3.6.6 Remote Monitoring

Logic levels :
open collector, can be used with TTL, an HCMOS interface, and small relays.
Information:
all alarms and indicators on the front panel, including information about NICAM mode.
I_{SINK}:
max. 16mA for V_{ON} < 0.4V
V_O (open collector):
max. 16V

3.7 Environmental Specifications

3.7.1 Environmental Conditions

Operational temperatures:
5°C to 45°C (41°F to 113°F)
Storage temperatures:
-30°C to 70°C (-22°F to 158°F)
Humidity:
Recommended below 80%, but tested for 90%

3.7.2 Mechanical Requirements

Vibration:
Limit range for storage and transport:
30min. in each of three directions, 10 to 150Hz;
0.7mm_{PP} and 50m/s^2 max. acceleration.
According to IEC-Publ. 68, test Fc.
NOTE: Unit mounted on vibrating table without shock absorbing material.

Bump:
Limit range for storage and transport:
1000 bumps of 100m/s^2 sine, 6ms duration in each of the 3 directions.
According to IEC-Publ. 68, test Eb.

Packaging:
According to UN-D-1400.
The test methods mentioned in the N.V. Philips Standard UN-D-1400 are in accordance with those of the relevant ISO-standards.

3.8 Safety & EMI (EMC)

Safety:
Tested in accordance with IEC1010-1
Electro-magnetic interference:
Interference and Radiation:
Accordance to CENELEC EN50081-1
Immunity:
in accordance with the CENELEC EN50082-1

3.9 Power Supply

Mains supply voltage:
100/120/220/240 VAC ±10%. max. 250V
Mains supply frequency:
48 to 65 Hz
Power consumption:
40VA / 220V AC (inclusive options)

3.10 Mechanical Data

19" rack/table cabinet, 1 rack units high.

Max. dimensions, inclusive handles and feet:

Height	: 50mm	(2.0")
Width	: 483mm	(19")
Depth	: 507mm	(20.0")

Dimensions for rack mount:

Height	: 44mm	(1.73")
Width	: 440mm	(17.3")
Depth	: 462mm	(18.2")

Weight:
5 kg

3.11 Options

3.11.1 PM 8551: Remote Interface, IEEE-488 /RS232

By means of the intelligent remote control options it is possible to control all the functions in the instrument; furthermore status information is available.

The remote control option can co-exist together with the built-in TTL control.

RS232:
9 pole male sub-D connector
Baud rate, stop and parity bits are programmable via dip switches.
IEEE-488:
24 pin female Amphenol connector in compliance with the IEEE-488 standard.
Address setting is software programmable via menu.

Misc.:
Local Lock prevents access to the instrument via the front plate controls.

Global lock out puts the interface in full control, overriding the functions of the simple TTL interface.

3.11.2 PM 8562: NICAM Data Output

A 25-pin Sub-D connector.

The PM 8562 outputs:
- NICAM Data
- Frame
- Clock
- 11 additional data bits
  A_0 - A_{10}
- 5 control bits
  C_0 - C_4

Data in the NICAM data modes is in the following formats:
– Data Out
– Clock Out
– Data Strobe

4. Accesories and Options

4.1 Accessories

Item:	Quantity:	Ordering Number:
Mains cable	1	5322 321 10594
Mains cable, US		5322 321 10123
Instruction manual	1	9499 493 09811
Rubber foot selfadh.	4	5322 462 44434

4.2 Options

Description		Ordering Number
PM 8551/20	: Remote Interface, RS232	9449 085 51201
PM 8551/30	: Remote Interface, IEEE-488	9449 085 51301
PM 8552	: Rack Mounting Kit	9449 085 52001
PM 8562	: NICAM Data Output	9449 085 62001

INSTALLATION AND OPERATING INSTRUCTIONS

5. Installation

5.1 Initial Inspection

Check the contents of the shipment for completeness and possible transport damage. If the contents are incomplete or damaged, a claim should be filed with the carrier immediately, and the Philips Sales or Service organization should be notified in order to facilitate the repair or replacement of the instrument.

5.2 Safety Instruction

5.2.1 Earthing

Before any other connection is made, the instrument must be connected to a protective earth conductor in one of the following ways:
– via the three-core mains cable
– via the protective earth teminal marked ⏚

Before connecting the equipment to the mains of the building installation, the proper functioning of the protective earth lead of the building installation needs to be verified.

WARNING: Any interruption of the protective conductor inside or outside the instrument, or disconnection of the protective earth terminal, is likely to make the instrument dangerous. Intentional interruption is prohibited.

5.3 Mains Voltage Setting and Fuses

Before inserting the mains plug into the mains socket make sure that the instrument is set to the local mains voltage.

NOTE: If the mains plug has to be adapted to the local situation it should only be done by a qualified person.

The mains connector of this instrument is specially constructed for safety. It is impossible to change the mains fuse or alter the operating voltage without removing the mains cable first.
The instrument can be used with a mains voltage supply of 100V, 120V, 220V or 240V AC +10%-15% (max. 250V AC).
– Remove the mains cable.
– Slide the protective plastic cover to the left to expose the fuse and coded mains plug. *See fig. 5-1.*

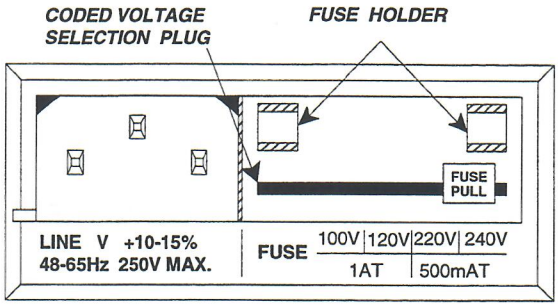


Fig. 5-1 Mains connector.

– Remove the fuse by pulling the black lever.
– The text printed on the coded mains plug is now visible.
– If the text does not agree with the local mains supply, insert a pointed instrument into the hole and remove the coded plug.
– Re-insert the plug so that the visible text agrees with the local mains voltage. (This is the number on the top-left portion of the card).
– Replace the mains fuse with one of the proper rating.
– Slide the protective cover to right.
– Re-insert the mains cable.

WARNING: If mains voltage has to be adapted to the local supply, it must only be done by a qualified person who is aware of the hazards involved. Make sure that only fuses of the required current rating and specified type are used for renewal. The use of repaired (jumpered) fuses and/or the short circuiting of the fuse holder is prohibited. Fuses must only be replaced by a qualified person who is aware of the hazards involved.

5.4 Rack Mounting

This Philips PTV instrument is delivered in a 19" cabinet. The instrument has 4 rubber feet mounted on the bottom plate for table operation. The feet can easily be removed with a screwdriver or small knife.

If there are several cabinets are mounted in a 19" rack, special attention must be paid to the temperature inside the rack. To avoid overheating, we recommend the following solutions.

5.4.1 Free Air Convection

Mount an air-flow unit (e.g. type PM 9799) between or underneath the cabinets. The dimensions of this unit is 1U high (=4.5cm/1$^3/_4$") and 19" wide.

5.4.2 Forced Circulation

Mount a ventilation unit (e.g. PE1373 mounted with 2 fans PE1374) between or underneath the cabinets. The dimensions of this unit are 1U high (=4.5cm/1$^3/_4$") and 19" wide.

5.4.3 Installation of Rack Mounting Kit PM 8552

The rack slides mount in any rack with a front-to-rear spacing between 18 and 27 inches. Reserve clearance between the rear panel of the instrument and the cabinet panel for connectors and to provide necessary air circulation.

Mounting of slide tracks.

1. Mount the chassis section of the rack slide kit to the instrument with the snap latch at the rear. Make sure that the screws are secured.
2. Mount the rails using the hardware shown in the figure. Align the stationary sections both horizontally and in level.

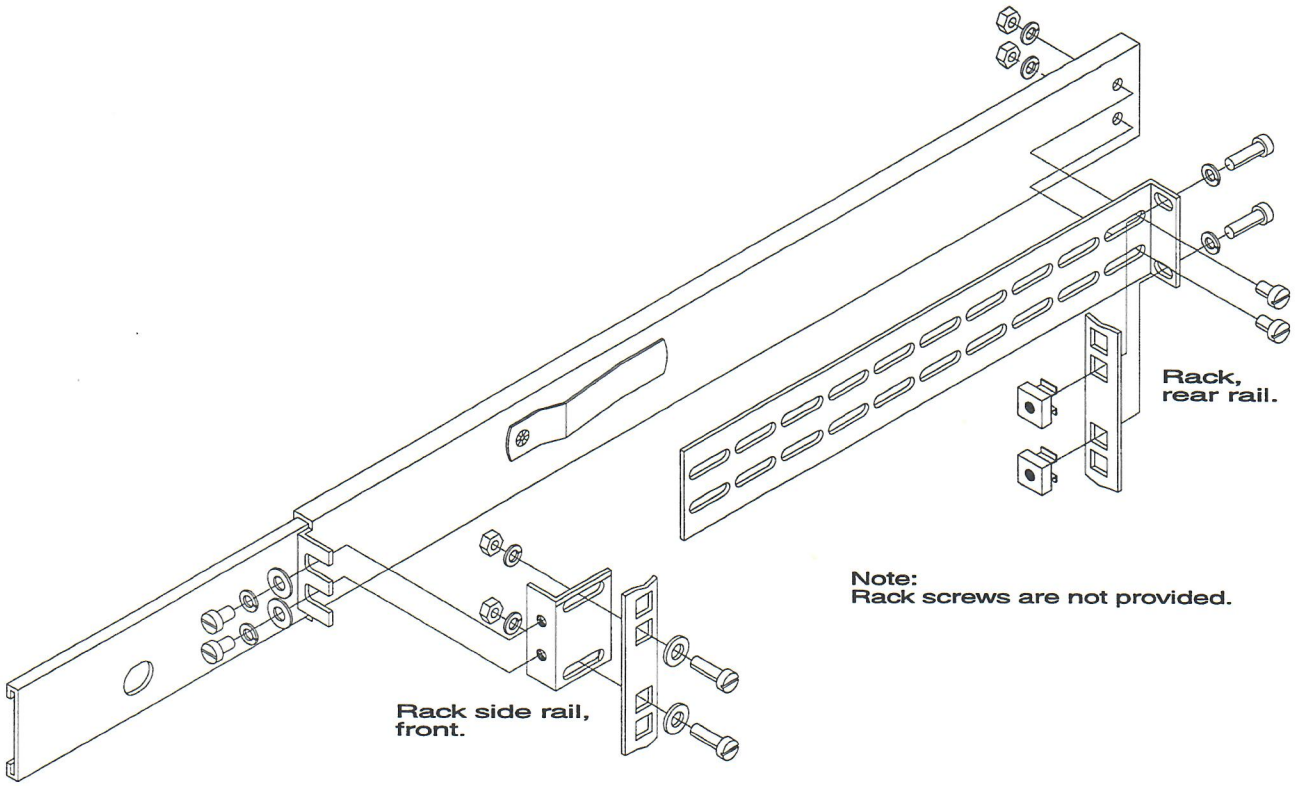


Fig. 5-2 Installation of Rack Mounting Kit

Installing of the instrument.

1. Pull the slide-out section to the fully extended position.
2. Insert the instrument chassis section into the slide-out sections.

3. Press the snap latches and push the instrument towards the rack frame until the latches snap into their holes.
4. Press the stop latches again and push the instrument totally into the rack.
5. Fix the instrument by means of the front panel screws.

After installation, the slide tracks might need to be slightly adjusted to ensure smooth operation. To do so, pull the instrument halfway out, slightly loosen the screws holding the tracks to the front rail, and allow the tracks to settle to an unbound position. Tighten the screws and by pulling the instrument in and out several times ensure smooth operation.

Removal of instrument.

1. Loosen the screws in the rack frame and pull the instrument forward until the stop latches snap into their holes.
2. Press the stop latches and remove the instrument. Be sure that all cabling is disconnected before removing the instrument.

5.5 Cleaning

- Disconnect the instrument from the mains voltage supply before cleaning .
- Use only a damp cloth.
- Make sure that no liquid is spilled inside the instrument, before it is reconnected to the mains voltage supply.

5.6 Access to and Replacement of Parts

5.6.1 Safety

The opening of covers or removal of parts, expect those to which access can be gained by hand, is liable to expose live parts.

The instrument must be disconnected from all voltage sources before performing any adjustment, replacement, maintenance, or repair which requires the instrument to be opened. If repair of the opened instrument is unavoidable, it must only be carried out by a skilled person who is aware of the hazards involved.

5.6.2 Access to the Units

To gain access to the units, remove the screws that secure the top cover of the instrument and lift the cover up.

5.7 Configuration

5.7.1 Programming Plug on Main Board

The programming plugs PP701 and PP702 can be used to adopt inputs for other digital transmitions formats.

Default is bipolar input ±2.5V/75Ω (*for location of programmings plugs see Fig. 5-3*).

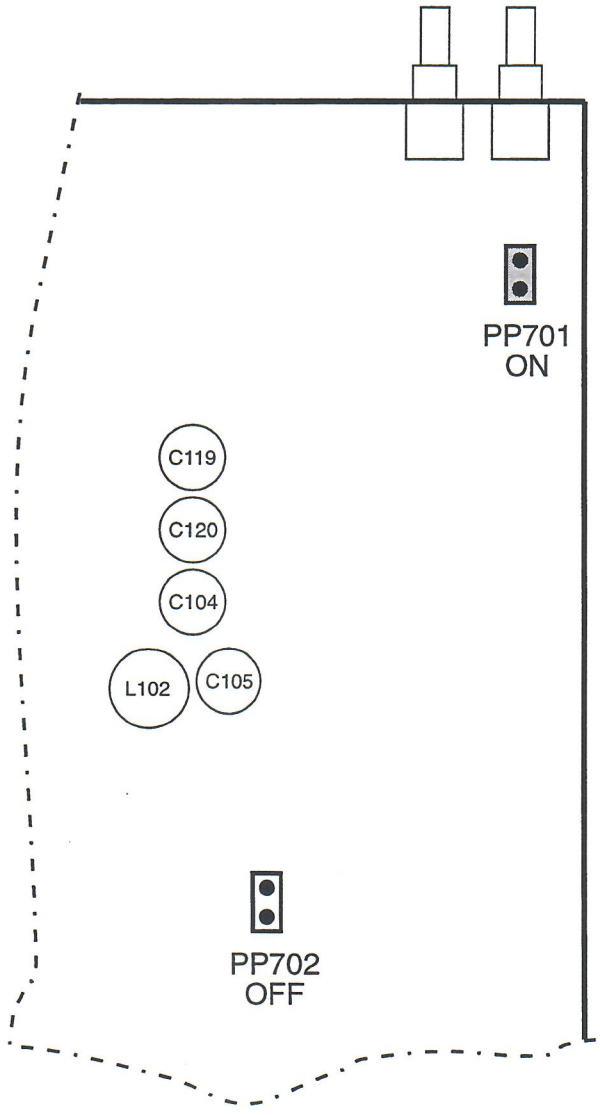


Fig. 5-3 Location of PP701 and PP702 - Main Board

5.7.2 Programming Plug Used for Test

The program plug shown in Fig. 5-4 is for testing and adjustment only. During normal operation programming plugs must be placed as indicated.

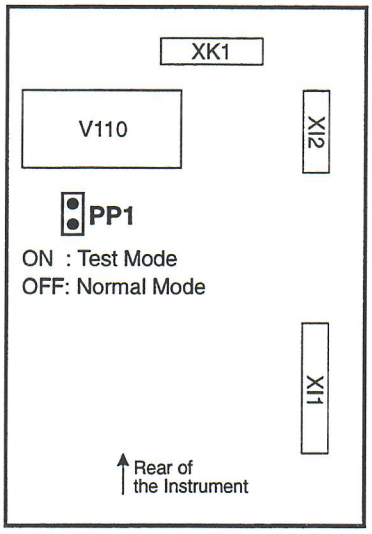


Fig. 5-4 Programming Plug on NICAM Decoder

6. Controls and Connections

Introduction

For easy reference between the text and the accompanying drawings, Figures 6-1 to 6-4, the following description is presented in a "location-oriented" rather than an "operation-oriented" sequence. The following information provides a quick guide to push-buttons, display, LEDs, and input/output connectors. An operation-oriented description is found in Chapter 7.

6.1 Front Panel

"DISPLAY"

The LCD display is based on liquid crystal technology and operates in a transparent mode supported by a backlight system made of green Light-Emitting Diodes. The backlight and contrast can be adjusted from the one of the software menus.

The LCD is used for displaying measuring results and as a media for the software control of the instrument.

◄ , ►

These two pushbuttons are used to scroll within the same level of functions: from one display to another (e.g. different information about measurements) or when moving the cursor in a display in order to open a selection among various functions (e.g. setting dispaly contrast and brightness). In the latter case these two pushbuttons are used together with the **EXECUTE** button.

▲ , ▼

These two pushbuttons are used to move up or down in the menus, e.g. from the status display (input info and measurements) to selection of input or setting of alarm limits.

EXECUTE

This pushbutton is used to select a function or to store a parameter value.

In the first mode, the ◄ / ► buttons are used to move the cursor to a certain function, and **EXECUTE** is used to make the selection.

In the second mode, ▲ / ▼ buttons are used to increase or decrease the value of a certain parameter (e.g. display brightness or headphone level) and then **EXECUTE** is used to store the value as a default value.

POWER ON

A green LED lights up when the mains power is switched on and the power supply is operative.

REMOTE

A yellow LED goes on when the instrument is operated via the remote interface.

ALARM

A red LED lights up when an alarm has been detected. An alarm indicates lost signals, or it indicates that a transmission parameter has dropped below a preset value, e.g. the alarm for low Eye-height. An alarm is followed by a message on the LCD display, and then the measuring functions can be used to have a look at the parameters.

CLK/2

A 75Ω BNC output for a 364kHz clock signal. 364kHz is half the clock rate of NICAM data but equal to the clock rate of the QPSK modulator, which transmits by using a phase shift of n*90°, a pair of bits. The positive going transition indicates the rest state of the QPSK modulator (the maximum Eye value).

I

A 75Ω BNC output for the In-phase component of the synchronous demodulated QPSK signal.

Q

A 75Ω BNC output for the Quadrature-phase component of the synchronous demodulated QPSK signal.

AUDIO OUT

A jack receptor for a headphone plug.

6.2 Rear Panel

QPSK IN

A 50Ω N connector for input of a QPSK signal at IF (Intermedia Frequency) or Baseband/IC (Inter-Carrier Frequency).

NICAM IN

A 75Ω BNC connector for a NICAM-728 digital signal (the function is only applicable for PM 5689 in versions /10, /11 and /30.

Audio A

An XLR male connector for channel A (left channel if the NICAM is carrying a stereo signal) audio output. The polarity is as follows:

Terminal 1 : Ground
Terminal 2 : Positive
Terminal 3 : Negative

Audio B

An XLR male connector for channel B (right channel if the NICAM is carrying a stereo signal) audio output. The polarity is as follows:

Terminal 1 : Ground
Terminal 2 : Positive
Terminal 3 : Negative

NICAM

A 75Ω BNC connector for output of a NICAM-728 digital signal. The output is bipolar: +2.5V for '1' and -2.5Vfor '0'.

Clock

A 75Ω BNC connector for output of a NICAM clock signal. The output is bipolar: +2.5V for '1' and -2.5V for '0'.

NICAM Data Option

A 25-pin Sub-D connector for the data mode output of the PM 8562. The PM 8562 outputs:

- NICAM Data
- Frame
- Clock
- 11 additional data bits
  A_0 - A_{10}
- 5 control bits
  C_0 - C_4

Data in the NICAM data modes is in the following formats:

– Data Out
– Clock Out
– Data Strobe

Pin alocation:

Pin no.:	Description	Pin no.:	Description
1	A10	14	A9
2	A8	15	A7
3	A6	16	A5
4	A4	17	A3
5	A2	18	A1
6	A0	19	C4
7	C3	20	C2
8	C1	21	C0
9	CIB	22	CIB1
10	FAW	23	Not used
11	Data Strobe	24	+5V/1kΩ
12	NICAM Data Out	25	GND
13	NICAM Clock Out		

Note: Additional data bits (A_0-A_{10}) and data bits in Mono/Data mode are unscrambled.

TTL Remote Interface

A 25-pin Sub-D connector for output of status and alarm functions. The outputs are active low open collectors.

Pin allocation:

Pin no.:	Description:
1	Ground
2	Ground
3	Stereo
4	Dual Sound (Bilingual mode)
5	Mono
6	Common
7	Common
8	Loss of QPSK synchronization (or no input)
9	No used
10	N.C.
11	Vision carrier alarm (for IF versions only, e.g. vision carrier too low or missing). The signal indicates that the intercarrier mixer is not working correctly.
12	BER alarm (Bit Error Rate is above the programmed value.
13	Eye alarm (The Eyeheight is below the programmed value).
14	N.C.
15	C_4 Reserve sound switch flag
16	Data mode
17	Indicates that one of the currently undefined mode has been activated (C_3=1).
18	N.C.
19	Common
20	High QPSK level (the NICAM QPSK signal has increased 3dB or more above the programmed level).
21	Low QPSK level (the NICAM QPSK signal has decreased 3dB or more below the programmed level).
22	N.C.
23	5V, 1kΩ source impedance.
24	No NICAM frames
25	Ground

Note: Common represents the "cathode side" of the voltage clamping diodes (protection circuit). The common terminal should be connected to the positve voltage of the receiving equipment.

Serial Remote Interface

The position is reserved for the PM 8551/20 (RS-232 Interface) or PM 8551/30 (IEEE Interface) options. For specification see Chapters 3 and 8.

The PM 8551/20 (RS-232 Interface) can be used for single-string communication. All measurements and functions can easily be performed from a PC. Even modem communication over public telephone is possible.

The PM 8551/30 (IEEE Interface), is better suited for control of a system of instruments. The IEEE remote system can address a number of instruments on an individual basis; the PM 8551/30 enables you to choose your own address codes as well.

An M4 stud which can be used to ground the cabinet of the PM 5689.

Mains Power

An inlet for power from the mains.

Before connecting the instrument, please be aware of the hazards involved. Always check the voltage setting of the "Inlet" before turning on the power.

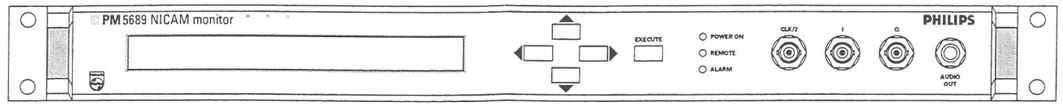


Fig. 6-1 Front Panel of the Instrument

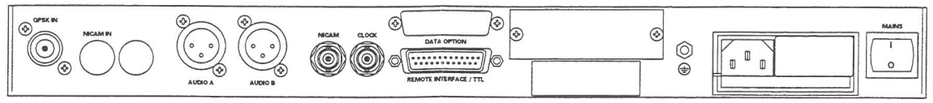


Fig. 6-2 Rear Panel of the Instrument, Version /00

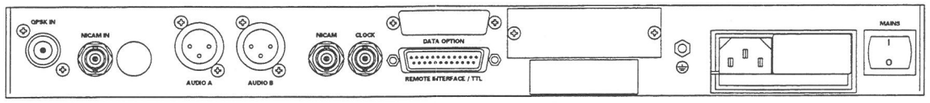


Fig. 6-3 Rear Panel of the Instrument, Versions /10 and /20

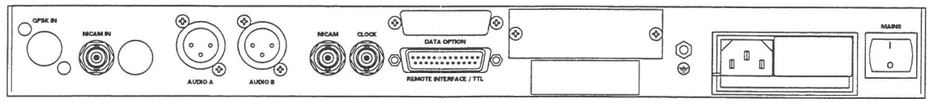


Fig. 6-4 Rear Panel of the Instrument, Versions /30 and /31

7. Operating Instructions

Before connecting the instrument to the mains power supply, please check the information on the mains inlet to ensure that the supply voltage is in accordance with the voltage used in your area.

7.1 Power-Up

The mains switch is located in the rear panel and is mainly intended for service. For most common applications, the instrument is built into a rack. The rack will normally have its own central mains switch.

During power-up, the instrument runs through a self-check procedure.

One to two seconds after powering up, the instrument will be ready for operation. If there is a fault somewhere the instrument will display on the LCD a short description and an error code. List of error codes is found in the Appendix A.1.

Normal startup:

```
PM5689 Monitor Power-up diagnose ...
```

This message is displayed for 1.5 seconds.

```
PM5689 Monitor Power-up diagnose ...
Internal test passed ...
```

or

```
PM5689 Monitor Power-up diagnose ...
E(xx) "error code text"
```

If no faults have been detected, the display will show a text describing the version of the instrument for five seconds or until a pushbutton is pressed. The example below illustrates the display of an IF version e.g. PM 5689/10.

PM5689 NICAM Monitor System: IF/xx Options: yy

"xx" indicates the system:
(BG, DK, L, or I).
"yy" indicates the name of an installed option:
RS (PM 8551/20)
IE (PM 8551/30)
DA (PM 8562)

Other examples for system information:
IC/xx (baseband input, e.g. 5.85MHz)
DIG/xx (Digital NICAM)

After powering up, the instrument will start up in the same mode and with the same active input as before the power was switched off.

The display will show the transmission quality of the incoming signal (in the following called the "Status Display").

To change the setting of the input function or to get more information about the measured values use the scroll functions (E-W: ◄ / ► and N-S: ▲ / ▼). Fig. 7-1 illustrates the principles.

7.1.1 Error Handling

Failure during startup:
If an error occurs during startup, the start sequency is halted. An error code (*for list of errors please see Appendix A.1*) will be shown on the display **until** a key is pressed (in the unlikely event of more errors they will be shown one after the other).

Failure during diagnose:
If an error is detected during diagnose the error will be shown for 1.5sec **or** until a key is pressed.

Failure during operation:
Selecting a menu:
An error code is shown for 1.5sec and the user will not be allowed to select a menu.

Leaving a menu:
An error code is shown for 1.5sec. and the user will not be allowed to leave the menu by means of SAVE or OK, only ESC and ▲ can be used.

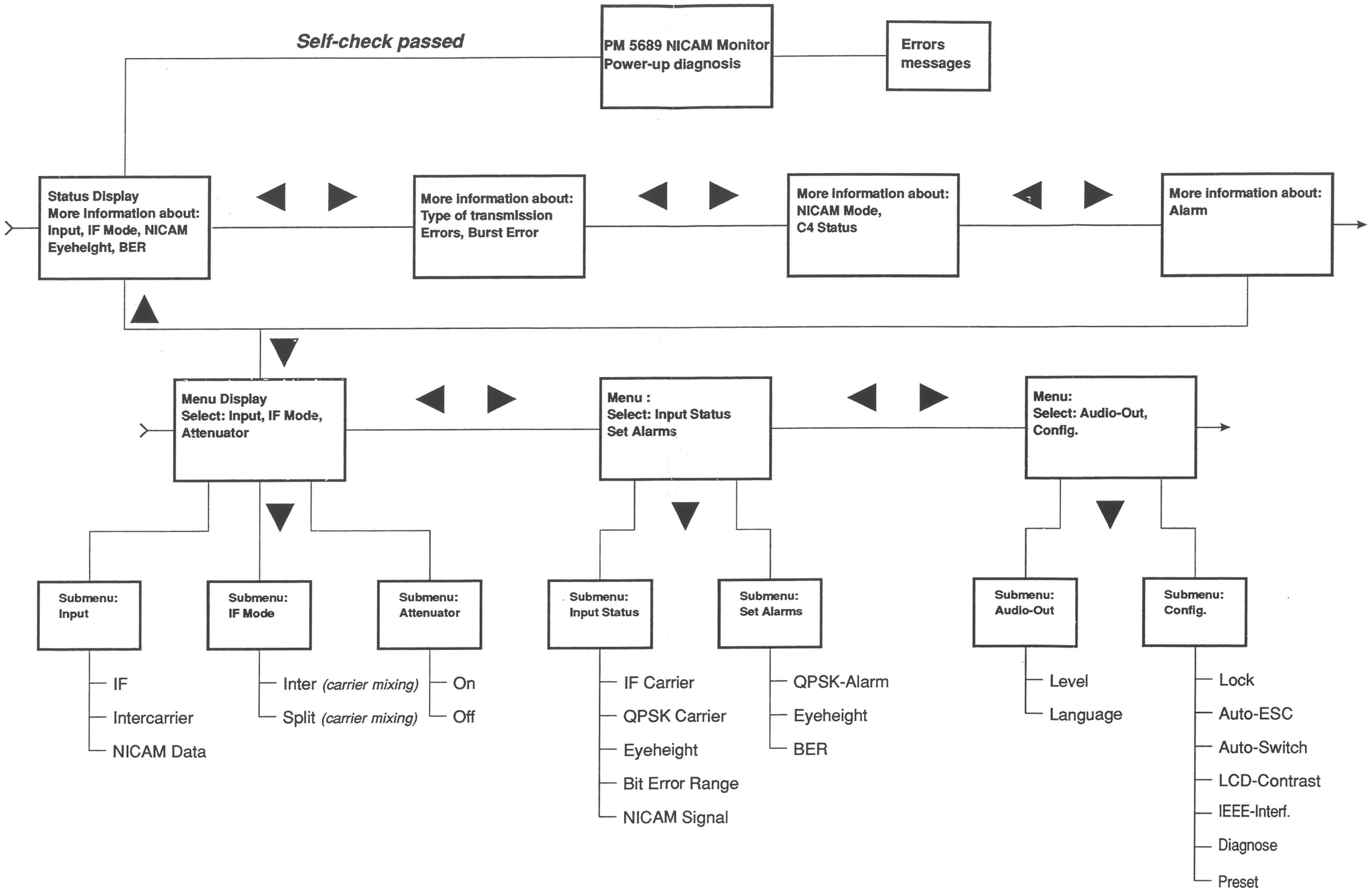


Fig. 7-1 Principles in selection of functions and menu's

7.2 Selection of Input Function

You can skip this paragraph and go to paragraph 7.3 if your instrument is a PM 5689/00 or PM 5689/30.

After powering up, the status display will be shown. To select input, use the ▼ to jump down to the menu displays.

Use ◄ and ► to move the cursor to the selection you want as shown below. The cursor is shown in the menu display as <...>.

```
IF IN  InterC mix          STEREO     S1≠S2
MENU :<INPUT>  IF-MODE  ATTENUATOR ...
```

```
MENU : INPUT-STATUS  SET-ALARMS  ..
MENU : AUDIO-OUT  CONFIG  ...
```

Selection of Input menu.

Pressing ▼ allows you to jump down to the Input menu, and ▲ takes you back again.

It is possible to scroll around available Input functions by pressing ▼ or ▲.

```
MENU : INPUT, select input
INPUT: <IF>                                SAVE   ESC
```

```
INPUT: <INTERCARRIER>                      SAVE   ESC
INPUT: <NICAM DATA>                        SAVE   ESC
```

Selection of Input function.

When you have located the desired input configuration, move the cursor to SAVE and press the **EXECUTE** If you decide to leave without a change select ESC, and press ▲.

The ESC + ▲ takes you to the previously selected menu.

SAVE + **EXECUTE** selects your modification, stores the selection as a default value, and leaves the menu.

SAVE appears only when a modification is applicable.

7.2.1 IF Mode

Selection of the IF mode is by nature linked to the IF input and only applicable for PM 5689/10/20 versions. The IF mode refers to the method used to convert of the IF NICAM QPSK signal to the intercarrier signal. The intercarrier signal (e.g. 5.85MHz for the B/G, L, and D/K systems) is used internally, and the QPSK filtering and demodulation takes place at this frequency.

The instrument can operate in one of the two following modes:
- ✦ Intercarrier Mixing
- ✦ Splitcarrier Mixing

In the Intercarrier Mixing IF Mode, the signal is converted to the intercarrier frequency by means of the signal's own vision carrier. In this mode, a complete composite signal must be used as input.

In the Splitcarrier Mixing IF Mode, the NICAM signal is selectively bandpass filtered and then converted to intercarrier by an internal crystal controlled local oscillator.

To select IF mode, use the ▲ go back to the Menu display, move the cursor to the IF MODE, and use ▼/▲ to scroll through the alternatives and locate your selection.

MENU : IF-MODE, select input IF-MODE: <Inter>	SAVE	ESC
IF-MODE: <Split>	SAVE	ESC

Selection of IF mode.

Move the cursor to SAVE and press **EXECUTE** , if you want to activate your selection. ESC + ▲ leaves the menu without any changes.

7.2.2 Input Attenuator

The input range of the PM 5689 exceeds the regulation range of the internal Automatic Gain Control (AGC). To cover the highend a switchable attenuator (0/20 dB) can be activated from the front panel.

To activate the attenuator, go back to the Input Function Mode menu and press ▶ to move the cursor to ATTENUATOR.

Use ▼ to scroll through your options.

Select your choice by moving the cursor to SAVE and press **EXECUTE** .

MENU : ATTENUATOR, select status ATTENUATOR:<Off>	SAVE	ESC
ATTENUATOR:<On>	SAVE	ESC

Attenuator On/Off

7.3 Measurements

In the PM 5689/00/30 and /31 versions the instrument will after powering up return to status display.

In the PM 5689/10 and /20 when the input function has been defined, by selection, the instrument should return to the status display mode.

The status display showns a. o. NICAM modes and the applicable measurements.

All Status display combinations are shown in figure below.

IF IN InterC mix	STEREO	S1≠S2	◀▼▶
EYE I: 23 % EYE Q: 24 % BER: 1E-9			

IF IN InterC mix	DUAL	S1≠S2
IF IN InterC mix	MONO	S1≠S2
IF IN InterC mix	DATA	
IF IN InterC mix	NOT DEFINED	
IF IN InterC mix	----------	
IF IN SplitC mix	STEREO	S1≠S2
IF IN SplitC mix	DUAL	S1≠S2
IF IN SplitC mix	MONO	S1≠S2
IF IN SplitC mix	DATA	
IF IN SplitC mix	NOT DEFINED	
IF IN SplitC mix	----------	
INTERCARRIER IN	STEREO	S1≠S2
INTERCARRIER IN	DUAL	S1≠S2
INTERCARRIER IN	MONO	S1≠S2
INTERCARRIER IN	DATA	
INTERCARRIER IN	NOT DEFINED	
INTERCARRIER IN	----------	
NICAM DATA IN	STEREO	S1≠S2
NICAM DATA IN	DUAL	S1≠S2
NICAM DATA IN	MONO	S1≠S2
NICAM DATA IN	DATA	
NICAM DATA IN	NOT DEFINED	
NICAM DATA IN	----------	

Note: S1≠S2 could also be S1=S2.

Status Display no.1.

Description

Line 1 displays the input ***selected*** and the sound ***detected*** sound information.
Line 2 displays the two Eyeheights (EYE I, Q), and the Bit Error Rate, BER, where
EYE I, Q: 1 - 99% or "--" if not valid
BER : <1E-9, 1E-9 - 9E-1 or "-----" if not valid

These values are the displayable values, but not necessarily the value range of the monitor.

During an alarm, the "ALARM" LED will be lit and:
– If the automatic display of alarms, AUTO SWITCH, is enabled, the display will switch to the Alarm Status.
– If the automatic display of alarms is disabled, nothing else happens, only the "ALARM" LED will be activated. If you want to check the alarms status display, you must do so manually.

Error Burst

IF IN InterC mix STEREO S1≠S2	◀▼▶
EB: 367 DLB: 786ms ETLB: 12h 59m	

Status Display 2.

This display contains additional information about the BIT ERROR RATE, where:
EB : 0 - 9999, (Error Bursts)
DLB : 0 - 999ms or
1.0 - 65.5s, (Duration of the Last Burst)
ETLB : 0h 0m - 999h 59m or
0m 0s - 999m 59s, (Elapsed Time Since Last Burst)
These values are displayable values, but not necessarily the value range of the monitor.

NICAM modes

IF IN InterC mix	STEREO	S1≠S2	◀▼▶
MODE:	STEREO	C4: 0	

MODE:	DUAL	C4: 0	LANGUAGE: A/A
MODE:	DUAL	C4: 0	LANGUAGE: B/B
MODE:	DUAL	C4: 0	LANGUAGE: A/B
MODE:	MONO	C4: 0	
MODE:	STEREO	C4: 1	
MODE:	DUAL	C4: 1	LANGUAGE: A/A
MODE:	DUAL	C4: 1	LANGUAGE: B/B
MODE:	DUAL	C4: 1	LANGUAGE: A/B
MODE:	MONO	C4: 1	
MODE:	DATA		
MODE:	NOT DEFINED		
MODE:	----------		

Status Display 3.

This display contains information about the NICAM-sound measured and the language selected in the headphone set.

Alarms

```
IF IN  InterC mix          STEREO      S1≠S2
ALARMS: IF  QPSK  EYE  BER  FRAMES
```

◄ ▼ ► E

```
ALARMS:  NO ALARMS ACTIVE
```

Status Display 4.

The seconds line of the display is a complete alarm/status display indicating all the alarms:

IF	:	IF VISION CARRIER level alarm
QPSK	:	QPSK CARRIER level alarm or QPSK CARRIER not available
EYE	:	EYEHEIGHT alarm
BER	:	BIT ERROR RATE alarm
FRAMES		NICAM STATUS alarm

NO ALARMS ACTIVE - NO alarms

E - shortcut key to enter the INPUT STATUS menu

7.4 How to Set Alarm Limits

Use the ▼ to jump from the Status display down to the Menu display.

Use ◄ and ► to locate the display and function shown below.

```
IF IN  InterC mix          STEREO      S1≠S2
MENU  :INPUT-STATUS  <SET-ALARMS>  ...
```

◄ ▲ ▼ ►

Selection of Set-Alarms menu

Use ▼ the operator is able to jump down to the SET-ALARMS menu. Press ▲ to return to the display shown above.

7.4.1 Menu: SET-ALARMS

In IF and IC versions (PM 5689/00/10 and /20):

```
MENU : ALARMS, select submenu
SUBMNU: <BER>  EYE HEIGHT  QPSK ALARM ...
```

SUBMNU: QPSK LEVEL ...

Set Alarms menu.

In the DIGITAL-Input version (PM 5689/30 and /31):

```
MENU : ALARMS, select submenu
SUBMNU:<BER>
```

Set Alarms menu.

These menus allow you to set of all the alarm limits. Select the submenus you want by pressing ◄ or ► . Each submenu deals with a specific alarm.

It is possible to return to the Main Menu display by pressing ▲. By pressing ▼ it is possible to open the sub-menu for modification of alarm values.

7.4.2 Submenu: BER

Use the ◄ / ► to select the BER alarm function.

```
SUBMNU: ../BER, set limit
BER LIMIT: <3E-5>                    SAVE    ESC
```

BER alarm

When the display shown as above has been activated, the ▲ / ▼ keys change function and operate as up/down keys for the alarm value. Once the alarm has been set, move the cursor to SAVE and press **EXECUTE** , if you want to activate your selection. ESC + ▲ leaves the submenu without any changes.

The limits for the settings are dynamically specified, but the displayable limits are: **1E-9 to 9E-1**.

Note: SAVE appears only if a modification has been carried out.

7.4.3 Submenu: Eyeheight

Note: The Eyeheight alarm can only be used with the QPSK versions of the PM 5689 (IF and IC demodulation).

SUBMNU: ../EYE HEIGHT, set limit		◄▲▼►
EYEHEIGHT LIMIT:<67>	SAVE	ESC

Eye Alarm.

When the display as shown above has been activated, the ▲ / ▼ keys change function and operate as up/down keys for the alarm value. Once the alarm has been set, move the cursor to SAVE and press **EXECUTE** , if you want to activate your selection. ESC + ▲ leaves the submenu without any changes.

The limits for the settings are dynamically specified, but the displayable limits are: **1-99**.

Note: SAVE appears only if a modification has been carried out.

7.4.4 Submenu: QPSK Alarm

Note: The QPSK carrier alarm is only available in the QPSK versions of the PM 5689 (IF and IC demodulation).
The QPSK alarm uses two submenus to define and activate the alarm.

QPSK Alarm ON/OFF
The QPSK alarm operates from a measured value. An IF or IC signal is fed to the input of instrument and the signal level information is stored as the default value. The value of this information depends much on the application, and the software allow the user to disable or enable the function.

SUBMNU: ../QPSK-ALARM, select status		◄▲▼►
QPSK Level alarm:<Enabled>	SAVE	ESC
QPSK Level alarm:<Disabled>	SAVE	ESC

QPSK alarm status.

When the display as shown above has been activated, the ▼ / ▲ can be used to scroll between Enabled and Disabled. When the cursor is on the desired function, use ◄ / ► to move the cursor to SAVE and press **EXECUTE** , if you want to activate your selection. ESC + ▲ leaves the submenu without any changes.

Note: SAVE appears only if a modification has been carried out.

QPSK Level

SUBMNU: ../ QPSK-LEVEL, select store		◄ ▲ ►
STORE: Actual QPSK level	OK	<ESC>

QPSK Level

When the display as shown above has been activated, apply the IF (Composite or IF NICAM only, depending on the IF mode) or IC signal to the QPSK input. To store the QPSK level information move the cursor using ◄ / ► to OK and press **EXECUTE** to store the level. ESC + ▲ leaves the submenu without any changes.

After the level information has been stored, the instrument is able to output an alarm at a value which is 3dB higher or lower than the stored value.

7.5 Input Status: More Information About Alarms

From the Status display, press the ▼ to jump down to the Menu display.

Use ◄ or ► to locate the display and function desired (*see below*).

IF IN InterC mix	STEREO	S1≠S2	◄ ▲ ►
MENU :<INPUT-STATUS>	SET-ALARMS ...		

Selection of Inputs Status menu.
You can jump down to the Input Status submenu by pressing ▼ and return to the display as shown above with ▲.

7.5.1 Menu: Input Status

IF Vision Carrier Level
An alarm/status display of the IF vision carrier level.

MENU : INPUT-STATUS, IF CARRIER	◄ ▲ ►
LEVEL: Ok	...

LEVEL: Out of range

IF vision carrier in IF-input/intercarrier mode.

QPSK Carrier Level

An alarm/status display of the QPSK carrier level status.

MENU : INPUT-STATUS, QPSK CARRIER
LEVEL: Within min/max levels

LEVEL: Below min level
LEVEL: Over max level

QPSK SIGNAL NOT AVAILABLE

QPSK Carrier Status.

This display contains two types of information:

- Availabilty of the QPSK signal
- Whether or not the level is within specified levels

Eyeheight

An alarm/status display indicating the state of the eyeheight signals.

MENU : INPUT-STATUS, EYEHEIGHT
EYE I: Acceptable EYE Q: Poor

EYE I: Acceptable EYE Q: Acceptable
EYE I: Poor EYE Q: Acceptable
EYE I: Poor EYE Q: Poor

Eyeheight Status.

Bit Error Rate

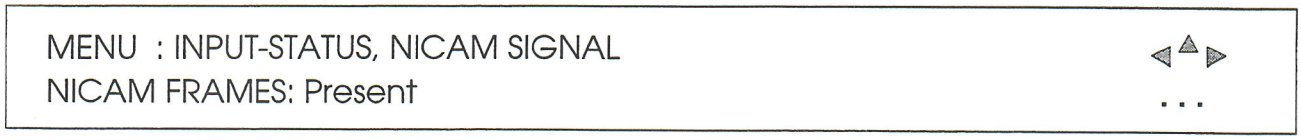
An alarm/status display of the bit error rate.

MENU: INPUT-STATUS, BIT ERROR RATE
BER: Acceptable

BER: Poor

Bit Error Rate.

NICAM Signal
An alarm/status display indicating whether the NICAM signal is present or not.

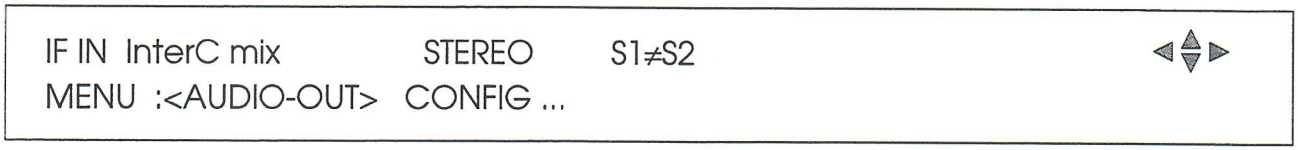


NICAM status.

7.6 Audio Output

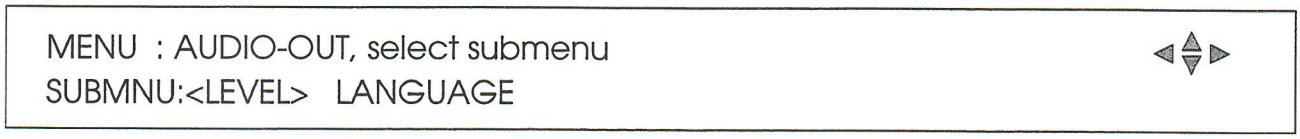
Use ▼ to jump from the Status display to the Menu display.

Use ◄ and ► keys to go to the display and function shown below.



Selection of Audio menu.

Press ▼ to step down into the Audio menu. The Audio submenu display is shown below.



Audio menu.

- The first function in the display is setting the headphone audio level.
- The second function, LANGUAGE, refers to output of the audio channel or channels in the NICAM Dual (Bilingual) mode.

Use ◄ / ► to move the cursor to the function you want and and press ▼ to activate the submenu.

Audio Level

The setting of the headphone level is activated by pressing the ▼ key. The submenu (see below) will immediately pop up.

SUBMNU: ../LEVEL, set level	◄▲▼►
<########_____>	ESC

Changing audio level.

Use ▲ and ▼ keys to change the audio level (it is an instant function). Move the cursor to ESC and press ▲ to return to the Audio menu.

Audio Language

Language selection for the headphones. A/B specifies that both channels are fed to the headphones. The audio output has two channels: Channel A and Channel B.

SUBMNU: ../LANGUAGE, select output		◄▲▼►
LANGUAGE:<A/A>	SAVE	ESC
LANGUAGE:<B/B>	SAVE	ESC
LANGUAGE:<A/B>	SAVE	ESC

Selection of audio channel in Dual mode.

Once the language has been set, use ◄ / ► to move the cursor to SAVE and press **EXECUTE**, if you want to activate your selection. ESC + ▲ leaves the submenu without any changes.

7.7 Configuration

From the Status Display, press ▼ to jump down to the Menu display. Press the ◄ and ► keys to go to the display and function shown below.

IF IN InterC mix STEREO S1≠S2	◄▲▼►
MENU :AUDIO-OUT <CONFIG> ...	

Config. menu selection

Press ▼ to go to the Config. menu. The Config. menu display is shown in figure below.

MENU : CONFIG, select submenu	◄▲▼►
SUBMNU: <LOCK> AUTO-ESC AUTO-SWITCH ...	

SUBMNU: LCD-CONTRAST IEEE-INTERF ...
SUBMNU: PRESET DIAGNOSE ...

Config. menu.

To select a function, press ◄ / ► to move the cursor to desired function and press ▼ to activate the submenu.

7.7.1 Submenu: Lock

Lock the front panel via the Lock menu to prevent operation mistakes.

With the IF version of the instrument which has many input functions, we recommend using the function whenever the instrument is in a monitoring mode.

It is best, however, to choose the lock function rather than locking the front panel. It is possible to 'Lock' the diagnose menu, which is helpful during service. But it could cause difficulties, especially if the operator is not used to working with the instrument. In order to protect the instrument, the alarm level of a QPSK signal must be locked in other parameters when changing the menu.

Select the Lock submenu by pressing ▼/▲ and then pressing ▼ to scroll through the options.

SUBMNU: ../LOCK, act. Panel(Off)			◄▲▼►
SELECT:<Panel>	Off	SAVE	ESC
SELECT:<Diagnose>	Off	SAVE	ESC
SELECT:<QPSK>	Off	SAVE	ESC

Lock functions.

As with other functions use, the ◄ / ► keys to move the cursor to SAVE and press **EXECUTE** to activate. ESC + ▲ leaves the submenu without any changes.

Panel lock
If the panel lock has been activated, a padlock will be shown in the top right-hand corner when the instrument is in menu mode.

Menus available when the panel is locked:
- ✦ the Status displays
- ✦ the Input status menu
- ✦ the Config. lock submenu

When the panel is locked the DOWN arrow disappears.

Panel lock default: **OFF**.

The panel lock setting is stored in EEPROM when SAVE is activated.

Diagnose lock
If it is ON, then the Diagnose submenu cannot be chosen. Place the cursor on the DIAGNOSE to lock the instrument. The DOWN arrow will disappear and a padlock will be shown in the right-hand corner when the instrument is menu-mode and Diagnose is highlighted.
Diagnose lock default: **OFF**.

The the diagnose lock setting is stored in EEPROM when SAVE is activated.

QPSK lock (IF and IC versions only)
If it is ON, then the QPSK Level submenu can not be chosen. Place the cursor on the QPSK LEVEL to lock the instrument. The DOWN arrow will disappear and a padlock will be shown in the right-hand corner when the instrument is in menu-mode and QPSK level is highlighted.

QPSK lock default: **OFF**.

The QPSK lock setting is stored in EEPROM when SAVE is activated.

7.7.2 Submenu: Auto ESC

To select the 'AUTO ESC' function, use ◄ / ► to move the cursor to the Config. menu display. Use ▼ to activate the submenu.

SUBMNU: ../AUTO-ESC, select status AUTO RETURN TO STATUS:<On>	SAVE	◄▲► ESC
AUTO RETURN TO STATUS:<Off>	SAVE	ESC

Auto Status.

Press ▼ / ▲ to scroll, use ◄ / ► to move the cursor to SAVE and press **EXECUTE**, if you want to activate your selection. ESC + ▲ leaves the submenu without any changes.

When 'AUTO RETURN' is on:
All menu modes will return to the last active STATUS DISPLAY when no key has been activated for 60 seconds.

Default for this setting: **ON**.

The OFF function disables the automatic return.

The auto escape setting is stored in EEPROM when SAVE is activated.

7.7.3 Submenu: Auto Switch

In this mode, it is possible to switch off the automatic alarm functions. 'Off' is a function which can be used when the instrument is used in a laboratory as a measuring device. The function is activated by moving the cursor to AUTO-SWITCH in the Config. menu display. Activate the submenu by pressing ▼.

SUBMNU: ../AUTO-SWITCH, select AUTO SWITCH TO ALARMS:<On>	SAVE	◄▲► ESC
AUTO SWITCH TO ALARMS:<Off>	SAVE	ESC

AUTO Alarm Switch over.

AUTO SWITCH "ON":
Can be selected in Status mode (NOT menu mode). This enables the automatic switch when an alarm goes off.

Default for this setting: **ON**.
Press ▼ / ▲ to scroll, use ◄ / ► to move the cursor to SAVE and press **EXECUTE**, if you want to activate your selection. ESC + ▲ leaves the submenu without any changes.

7.7.4 Submenu: LCD-Contrast

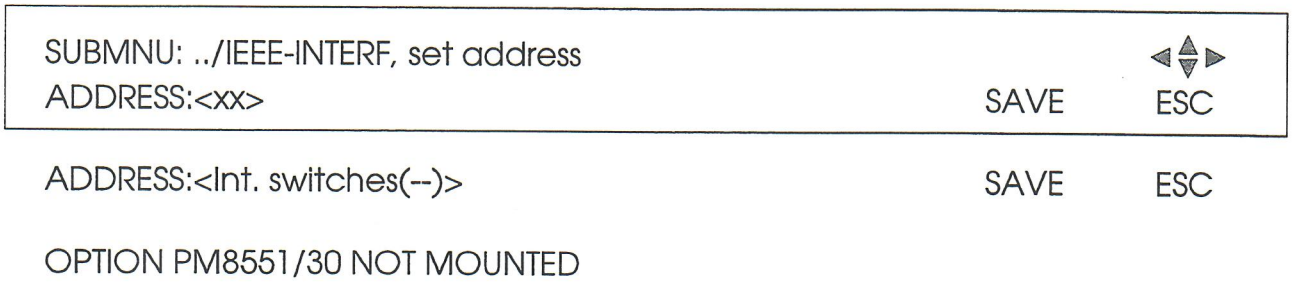
The contrast of the LCD display can be set by using this function. The function is activated by moving the cursor to LCD-CONTRAST in the Config. menu display and then pressing ▼ to activate the submenu.

Contrast of the LCD.

Use ▲ and ▼ keys to change the LCD contrast (it is an instant function). Move the cursor to ESC and press ▲ to return to the Config. menu.

7.7.5 Submenu: IEEE Interf

This function can be used to set the address of the IEEE interface. The function is activated by moving the cursor to IEEE in the Config. menu display and then pressing ▼ to activate the submenu.



IEEE Interface
Note: xx indicates a number.

Once the submenu shown as in figure above has been activated, the ▲ and the ▼ keys change function and serve as up/down keys for address specification.

Use ◄ / ► to move the cursor to SAVE and press **EXECUTE** , if you want to store your selection. ESC + ▲ leaves the submenu without any changes.

The limits for the address (xx) are dynamically specified (typically between 0-30).
The message "Int. switches" will have two dashes beside it, indicating that the user must reset the monitor to activate the internal switches.

This menu is only available if an IEEE interface option is mounted; otherwise, a message will appear.

7.7.6 Submenu: PRESET

This function can be used to preset the instrument to factory default standard settings. The function is activated by moving the cursor to PRESET in the Config. menu display and then pressing ▼ to activate the submenu.

SUBMNU: ../PRESET, select		
PRESET: Standard settings	OK	◀ ▲ ▶ <ESC>

PRESET function

Use ◀ / ▶ to move the cursor to OK and press **EXECUTE** , if you want to activate your selection. ESC + ▲ leaves the submenu without any changes.

7.7.7 Submenu: Diagnose

The communications between various modules in the instrument can be checked using this function. The function is activated by moving the cursor to DIAGNOSE in the Config. menu display and then pressing ▼ to activate the submenu. ▲ can be used to return to the previous menu.

SUBMNU: ../DIAGNOSE, select test			◀ ▲ ▶ E
SELECT:<Comm.>	Memory	Circuits ...	
SELECT: Display	Master	All ...	
SELECT: Version	Configuration ...		

Diagnosis.

This submenu gives access to a series of non-destructive tests and some monitor information. Use ◀ / ▶ to select the test you want, then activate by pressing **EXECUTE** .

When running any of the tests, AUTO ESCAPE will be disabled during testing.

For list of error codes please see Appendix A.1.

DIAGNOSE: Comm.

TEST : PM5689 Communication	▲
Testing all units ...	>>>>
Testing completed ...	>>>>

Communication test.

DIAGNOSE: Memory

```
TEST : PM5689 Memory/Back-up                    ▲
Testing all units ...                           >>>>

Testing completed ...                           >>>>
```

Memory tests.

DIAGNOSE: Circuits

```
TEST : PM5689 Circuits                          ▲
Testing all circuits ...                        >>>>

Testing completed ...                           >>>>
```

Communications various circuits modeles.

DIAGNOSE: Display

```
TEST : PM5689 Display                           ▲
abcdeghijklmnopqrstuvwxyz-1234567890+,.
```

```
ABCDEFGHIJKLMNOPQRSTUVXYZ_!"#$%&/()=?;:
abcdeghijklmnopqrstuvwxyz-1234567890+,.
```

Display test.

During this test, the above two displays will alternate at a frequency of about 1.5 seconds. It is a visible test only.

DIAGNOSE: Master

```
TEST : PM5689 Master                            ▲
Testing master ...                              >>>>

Testing completed ...                           >>>>
```

Test of Master processor.

DIAGNOSE: All

TEST : PM5689 All ▲
Testing all units ... >>>>

Testing completed ... >>>>

Test of both memory and circuit communication.

DIAGNOSE: Version
This function provides information about the software.

TEST : PM5689 Software versions
Master: xx.y Front: zz.u

Software version.

DIAGNOSE: Configuration
This function provides information about the hardware version of the instrument.

TEST : PM5689 Configuration
System: IF/xx Options: yy

System: IC/xx Options: yy
System: DIG/xx Options: yy

Hardware configuration.

where xx is : L, BG, DK, or I
and yy is: NONE, IE, RS, IE/DA, or RS/DA

7.8 General Information

Factory preset:

During power-up press ◄ ► simultaneously.

PM5689 Monitor Factory-reset ...

Reset to factory settings.

This message is displayed for 1.5 seconds.

Prepare monitor for factory settings.

Set default values for:

AUTO ESCAPE	: **On**
AUTO SWITCH	: **On**
PANEL LOCK	: **Off**
QPSK LOCK	: **Off**
DIAGNOSE LOCK	: **Off**
CONTRAST	: **17**

Proceed to normal startup.

8. Remote Control

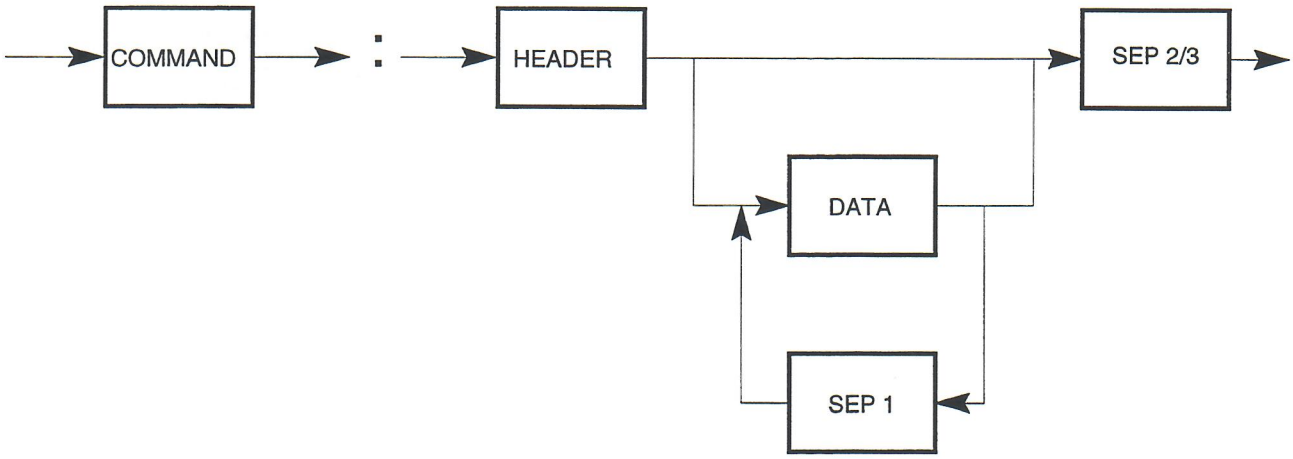
8.1 Programming Syntax

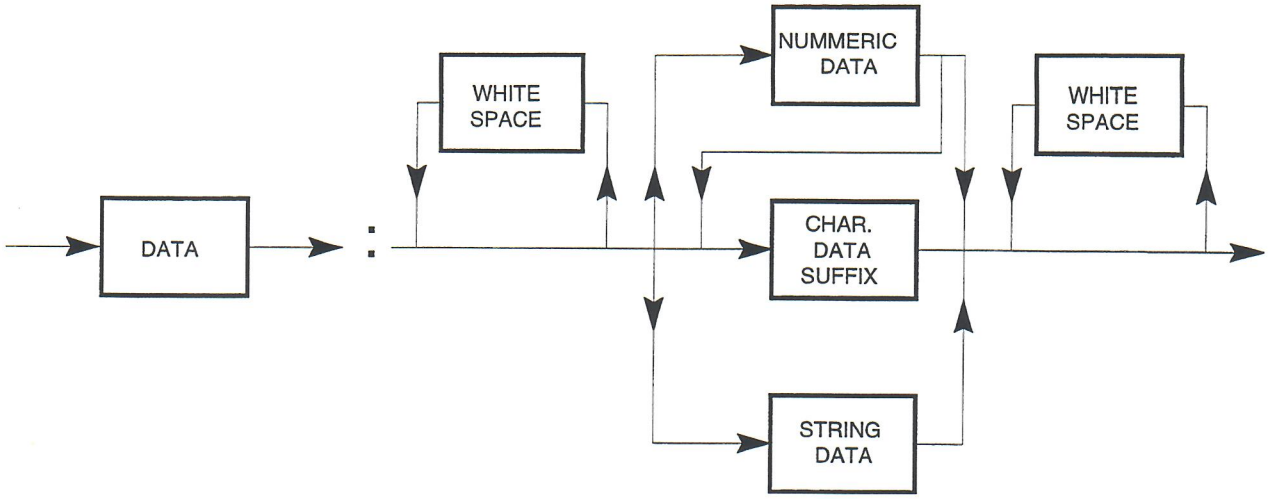
Commands for programming the instrument consist as a minimum of a "HEADER" and a "Message Terminator".

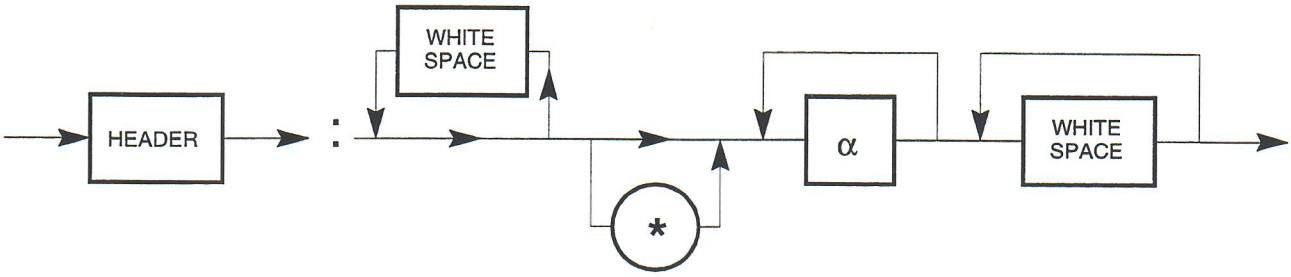
Most commands accept one or more data elements to form the complete command.

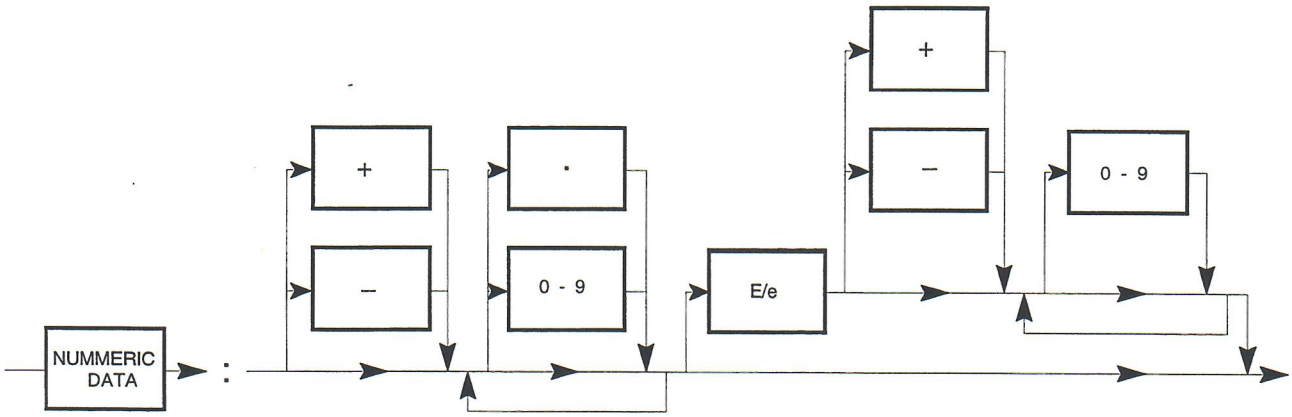
A Query form is allowed for most commands fro returning programmed and measured data.

The are 3 different types of programming data:
– Nummeric Data,
– Character Data, and
– String Data.



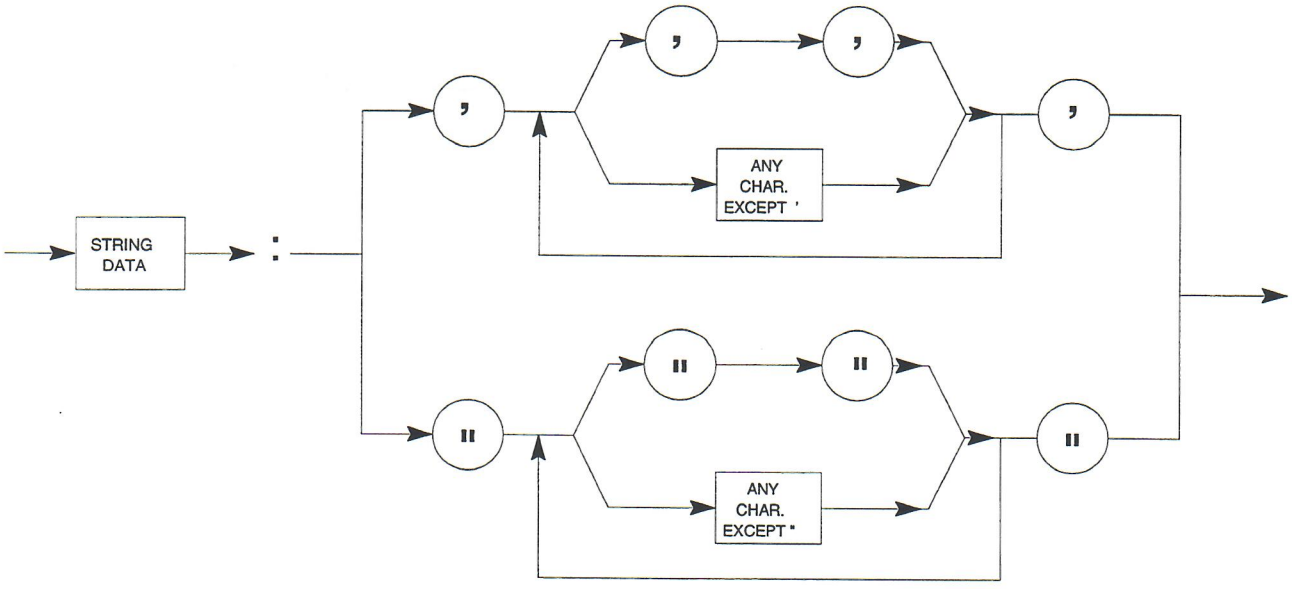

DATA
:
WHITE SPACE
NUMMERIC DATA
CHAR. DATA SUFFIX
STRING DATA
WHITE SPACE

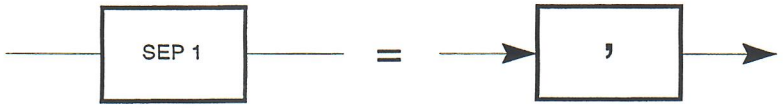

HEADER
:
WHITE SPACE
*
α
WHITE SPACE

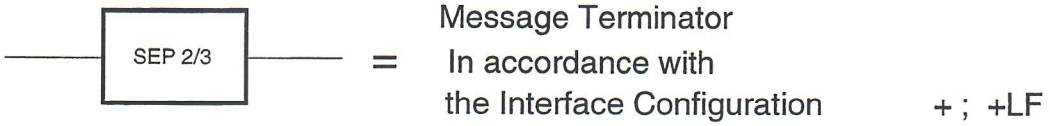

NUMMERIC DATA
:
+
–
.
0 - 9
E/e
+
–
0 - 9

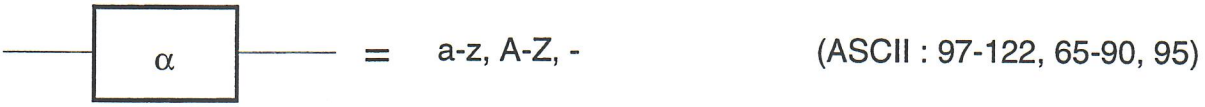

SUFFIX
CHAR.
DATA
:
α


WHITE
SPACE
:
ASCII 32
or <32
except
ASCII=10


STRING
DATA
:
'
'
'
'
ANY
CHAR.
EXCEPT '
"
"
"
"
ANY
CHAR.
EXCEPT "







All instrument programming commands are listed in a table with the following information:

HEADER with alternative spellings, **DATA** with limits, resolution etc., for Nummeric Data the default **SUFFIX** in () and other suffixes. And the format of **RETURN**ed data is shown.

The interface can provide an idenfication of the device in which it is installed.

Device Indentification

HEADER	DATA	SUFFIX	RETURNS
ID ***IDN**	**None**		**"Philips,** **PMXXXX/XXX,0,Z.Z,eos"**

Note: XXXX/XXX : Instrument Indentification.
Z.Z : Software version.
eos : Valid output seperator(s).

8.2 IEEE Operation

8.2.1 Hardware Configuration

The interface comes with a 24-pin female AMPHENOL connector that complies with the IEEE-488 standard. If your controller cabling is of the IEC-625 type, connection can be made using the IEEE to IEC adapter PM 9483/50 (to be ordered separately, not included as accessory).

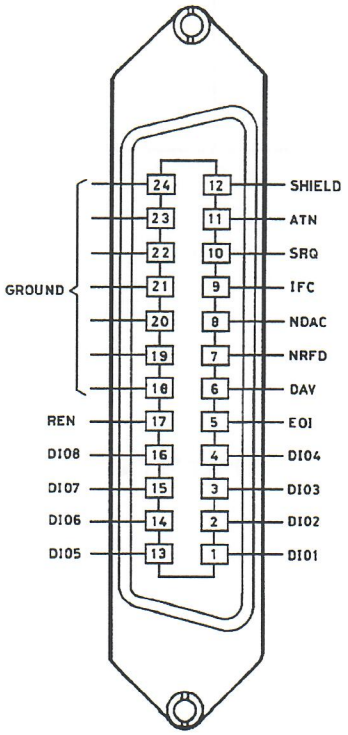


Fig. 8-1 Connector pin-out, IEEE

The hardware configurationals include:
- Device address
- Interface mode
- Shielding

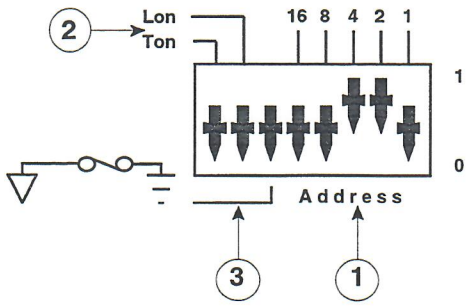


Fig. 8-2 Hardware programming, SW1

1:

The device address is set using the five decimal weighted switches. All address settings except "31" and the "[controllers address]" are acceptable (standard factory setting is "6").

Example:

	16	8	4	2	1
0	X	X			X
1			X	X	

Address = 4 + 2 = 6

2:

Mode Switches

Lon	Ton	Mode
0	0	Addressable mode (*standard factory setting*)
0	1	Talk only
1	0	Listen only

3:

Logic 0 may be disconnected from the shielding in order to eliminate unwanted currents.

Switch position	Shield condition
0	Logic "0" connected (*standard factory setting*)
1	Logic "0" disconnected

8.2.2 Interface programming

The IEEE remote interface can via the controller be configured with regard to:
- Record separator
- Service request mask

Furthermore, it can provide 'device indification'. The programming of the interface must follow the syntax illustrated on page 8-1.

Note: When programming the interface, before every header/body combination, the listen address of the interface must be send (MLA).

1. Separator programming

The interface can be programmed to accept single and double separators. At power on the single separator "LF" is default setting (ISO code 10). When the interface sends data to the controller, the data stream is concluded with the programmed separator(s), and the EOI line is activated concurrent with the transmission of the (last) separator.

Definition of record separator(s).

HEADER	DATA	SUFFIX	RETURNS
SPR	n1 (,n2) Separator 1 : n1 Separator 2 : n2 n1 and n2 are the decimal quivalent (ISO code) of the desired separator(s). ESC (ISO 27) is not allowed as separator. Default separator at power on is "LF" (ISO 10).	none	

Table 8-1 Programming, separator(s)

Example:

a) "SPR 03" defines "ETX" as input/output separator.

b) "SPR 13, 10" defines the sequence "CR LF" as input/output separator.

2. Service request mask

The interface can be programmed to request service for one or more of the conditions that are reflected in the status byte.

Bit	Condition
7	EXT
6	RQS
5	AB
4	BSY
3	EF3
2	EF2
1	EF1
0	EF0

Table 8-2 Status byte

EXT:

not used

RQS:

service request

AB:

Abnormal condition

AB	
0	Normal (no error)
1	Abnormal (error condition as specified by EF0-EF3))

BSY:
Busy

EF0-EF3:
Message flags

AB	EF3-EF0	Dec.	Message
0	0001	1	Message string available
1	1100	12	Number error
1	1101	13	Execute error
1	1110	14	Head/suffix error
1	1111	15	Syntax error

Table 8-3 Message flags EF0-EF3

At power on all service requests are masked (disabled). Thus, if an error condition occurs, no service request will be generated. The instrument status can, however, always be checked by reading the status byte via a serial poll. The service request facility can be enabled for the following qualifying conditions:

Qualifying condition	Decimal equivalent
EF0 changed from 0 to 1 and AB=0 (DAV)	1
EF1 changed and AB=0 (not used)	2
EF2 changed and AB=0 (not used)	4
EF3 changed and AB=0 (not used)	8
EF0 changed from 0 to 1 and AB=1	16
EF1 changed from 0 to 1 and AB=1	32
EF2 changed from 0 to 1 and AB=1	64
EF3 changed from 0 to 1 and AB=1	128
BUSY changed from 1 to 0	256

Table 8-4 Qualifying conditions

At the generation of a service request the RQS bit will be set and the SRQ line activated. RQS and SRQ are reset again, when the controller polls the status byte. To specify one or more qualifying conditions, the decimal equivalent of the condition(s) must be send to the interface using the MSR command ("MSR 0" masks (disables) all interupts):

Definition of service request mask

HEADER	DATA	SUFFIX	RETURNS
MSR	n Mask : n = [0 - 511]	none	

Table 8-5 Programming, service request mask

Example 1:
The interface shall request service for 'data available' only. The mask bit for 'data available' has the decimal value "1". The resulting command is "MSR 1".

Example 2:

The interface shall request service for 'data available' and for all the possible error conditions reflected by the error flags EF3-EF0. The EF3 bit be active in all four possible error conditions. The decimal value for the desired qualifying conditions is 129 (128+1) as shown in table 6-6. The resulting command is "MSR 129".

Note: The status byte can not simultaneously indicate conditions related to AB=0 (normal) and AB=1 (abnormal). The various combinations available, result in four possible service request/serial poll sequences:

a) All service request qualifyers are masked (disabled):
The first serial poll will show the error flags EF3-EF0 for the abnormal condition (if one exists). At the following serial poll, the AB bit will be cleared and the 'normal' status is indicated by EF3-EF0.

b) One or more AB=1 conditions are enabled. All AB=0 conditions are masked (disabled): If the enabled Abnormal condition qualifyer occurs, a service request is generated and the abnormal condition is indicated in the status byte.

c) All AB=1 conditions are masked (disabled). One ore more AB=0 conditions are enabled: If the enabled 'normal' condition qualifyer occurs, a service request is generated. The first serial poll will show the error flags EF3-EF0 for the 'normal' condition that caused the service request. A following serial poll will set AB to 1 and indicate the 'abnormal' status.

d) Some or all 'normal' and 'abnormal' qualifying conditions are enabled: If the enabled 'abnormal' condition occurs, a service request is generated and the reason is indicated in the status byte. If the enabled 'normal' condition occurs a service request will be generated and the reason is indicated in the status byte. However, if an 'abnormal' condition occurs before the pending 'normal' request is polled, the 'abnormal' condition will be indicated in the status byte (the reason for the 'normal' condition is lost!!!).

8.5 RS232/V24 Operation

8.5.1 Hardware Configuration

The interface comes with a 9-pin male D-connector, that via a DB-9 female to DB-25 male adapter, complies with the RS232(EIA)- and the V24 (CCITT) standard.

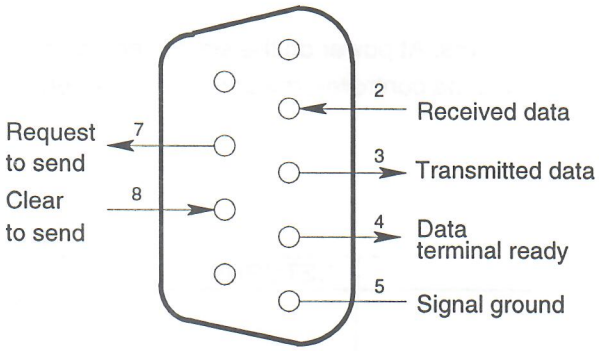


Fig. 8-3 Connector pin-out, RS232/V24

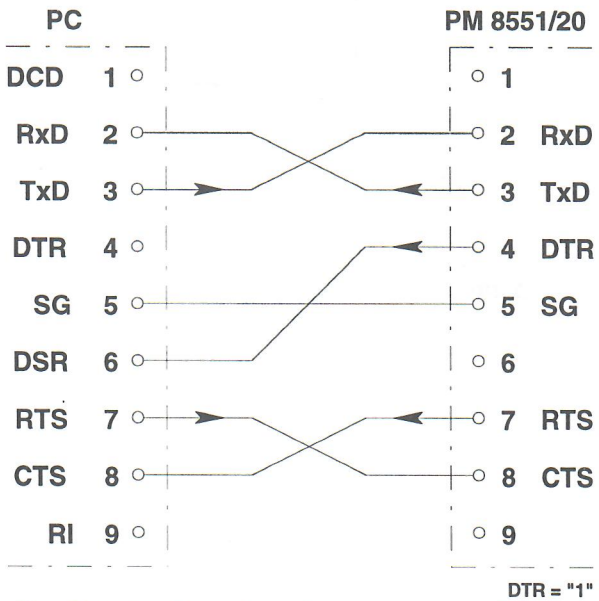


Fig. 8-4 Configuration of cable between PC and PM 8551/20.

The hardware configurationals include:
Communication settings:
- Baud rate
- Character length
- Parity selection

1. Communication settings:

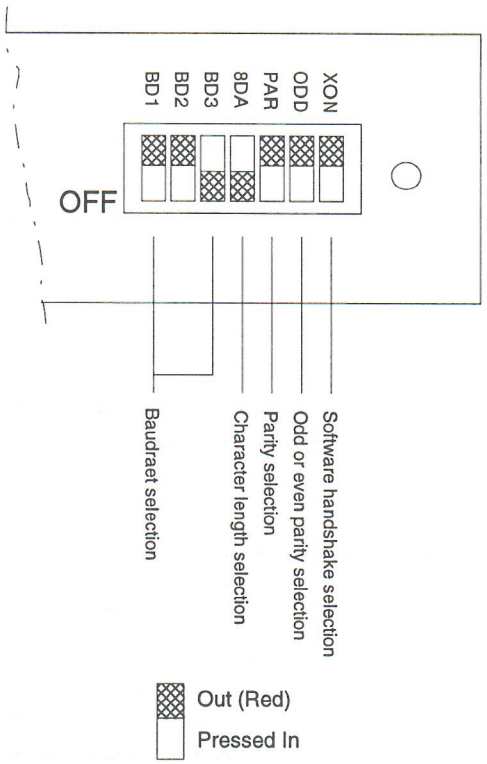


Fig. 8-5 Communication setting, SW1

BD1	BD2	BD3	Baudrate
off	off	off	110
on	off	off	150
off	on	off	300
on	on	off	600
off	**off**	**on**	**1200**
on	off	on	2400
off	on	on	4800
on	on	on	9600

Table 8-6 Baudrate setting

SWITCH	FUNCTION
8DA	**on : 8 data bits character length** off : 7 data bits character length
PAR	on : Parity on **off : Parity off**
ODD	on : Odd parity **off : Even parity**
XON	**Must be in *off* position**

Table 8-7 Character length, Parity and Handshake setting.

Bold = Standard Factory Setting

8.5.2 Interface Programming

The RS232/V24 remote interface can via the controller be configured with regard to:
– Record separator

Furthermore, it can run a number of 'Escape functions'.

The programming of the interface must follow the syntax illustrated on page 8-1.

1. Separator programming

The interface can be programmed to accept single and double separators. At power on the single separator "LF" is default setting (ISO code 10). When the interface sends data to the controller, the data stream is concluded with the programmed separator(s).

Definition of record separator(s).

HEADER	DATA	SUFFIX	RETURNS
SPR	n1 (,n2) Separator 1 : n1 Separator 2 : n2 n1 and n2 are the decimal quivalent (ISO code) of the desired separator(s). ESC (ISO 27), ETX (ISO 03) and EOT (ISO 04) are not allowed as separator. Default separator at power on is "LF" (ISO 10).	none	

Table 8-8 Programming, separator(s)

Example:
a) "SPR 13" defines "CR" as input/output separator.
b) "SPR 13, 10" defines the sequence "CR LF" as input/output separator.

2. Escape functions

ESCAPE (n)	Function
1	Goto local
2	Goto remote
3	Goto local and unlock
4	Device clear
5	Local lock out
7	Status request
8	Device trigger

Table 8-9 Escape functions

When using the "ESCAPE 7" function, a status byte will be send to the controller:

Bit	Condition
7	EXT
6	RQS
5	AB
4	BSY
3	EF3
2	EF2
1	EF1
0	EF0

Table 8-10 Status byte

EXT:
not used

RQS:
not used

AB:
Abnormal condition

	AB
0	Normal (no error)
1	Abnormal (error condition as specified by EF0-EF3)

BSY:
Busy

EF0-EF3:
Message flags

AB	EF3-EF0	Dec.	Message
0	0001	1	Message string available
1	1100	12	Number error
1	1101	13	Execute error
1	1110	14	Head/suffix error
1	1111	15	Syntax error

8.5.3 Device programming, RS232/V24

A list of the available programming commands and a description of the programming syntax to be used can be found in paragraph 8.4

8.4 Programming Commands

HEADER:	DATA:	SUFFIX:	COMMENTS/RETURNS:
ID request			
ID		?	PHILIPS, PM5689,,1.1
Input select			
INPUT		IF IC DIG ?	Select IF input Select IC input Select NICAM Digital input IF I IC I NICAM
IF Splitcarrier			
IF		SPLIT	Change mixing mode for IF
IF Intercarrier			
IF		INTER IC ?	Change mixing mode for IF INTER I SPLIT
Input attenuator			
ATTEN	<n>	?	0 / 20 (-4 to +24 without error) 0 I 20
Request mode			
STATUS		?	"NO NICAM" or "S1 < > N" I"S1 = N" + MUTED STEREO DUAL MONO DATA UNDEF
Set Eyelimit			
EYELIMIT	<n>	?	<n> : 20-90 <n> : actual limit
Request actual eyeheight			
EYEHEIGHT EYE		?	<n> : actual eyeheight
Set BER limit			
BERLIMIT	<n>	?	<n> : >=1e-10 <=1e-2 <n>
Request BER			
BER		?	<n>

HEADER	DATA	SUFFIX	COMMENTS/RETURNS
Request Error Burst			
ERRORBURSTS		?	<n>
Request Errorfree Time			
ERRORFREE		?	<n> 0.02 - 999.98 minutes
Preset QPSK level			
SETLEVEL			
Enable disable QPSK level			
SETLEVEL		ON OFF ?	 ON I OFF
Ask for alarms			
ALARMS		?	<n> : all alarms coded into a singel number. 1 : Vision/Sound 2 wrong 2 : QPSK unlocked 4 : Eyeheight alarm 8 : BER alarm 16 : No NICAM FRAMES 32 : QPSK carrier to LOW 64 : QPSK carrier to HIGH
Set audio out			
AUDIOSOURCE **AUDIO** **LANGUAGE**		A B AB ?	 A I B I AB
Set audio level			
AUDIOLEVEL	<n>	 ?	<n> : >-65 <+7 <n>
Request factory preset			
***RST** **PRESET**		?	

SERVICE INSTRUCTIONS

9. General Information

9.1 Use of the Service Instructions

Troubleshooting is best carried out on a functional level using block diagrams. Reference is made to Chapter - "Block diagram description" for an overall description of the instrument. The block diagrams of each individual unit are described in the chapters to follow. These diagrams contain sufficient information for a skilled technician to carry out performance checks, adjustments, maintenance, and fault finding down to stage level. Fault finding to component level will however, require the use of appropriate circuit diagrams.

9.2 Safety

The opening of covers or removal of parts, except those to which access can be gained by hand, is liable to expose live parts. Accessible terminals may also be live.

The instrument must be disconnected from all voltage sources before performing any adjustment, replacement, maintenance, or repair which requires the instrument to be opened. If adjustment, maintenance, or repair of the opened instrument is unavoidable, it must only be carried out by a skilled person who is aware of the hazards involved.

9.2.1 Electrostatics Sensitive Devices

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).

Careless handling during repair can reduce life drastically.

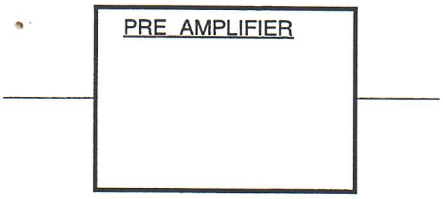
ATTENTION

When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools also at this potential.

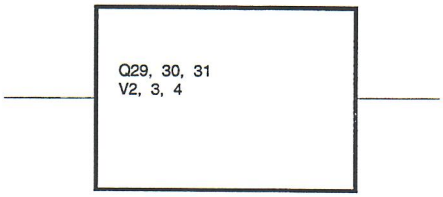
9.3 Block Diagram Symbols Description

Various symbols and conventions are used in the block diagram and a short description of these is given below.

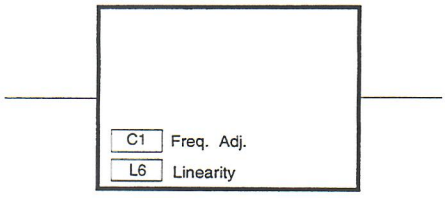
Functional Block Information



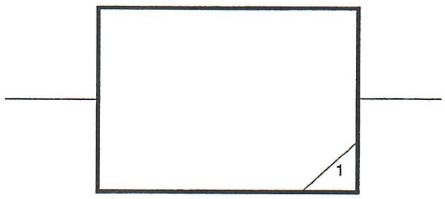
The underlined text within the block gives the function provided by the block.



Text shows the major components in the block or stage.

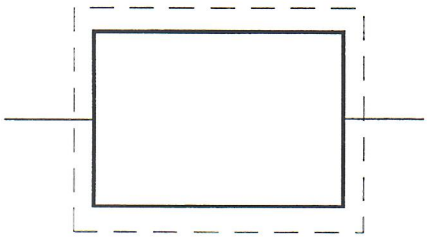


Inside some of the functional blocks, there are other smaller blocks. These show the adjustable components within the stage and what they adjust. An explanation of their use is given in the appropriate adjustment procedure.



The number in the lower right hand corner of the block shows on which sheet of the appropriate circuit diagram the block may be found.

The Dotted Line



A dotted line around a functional block (or stage) means that the block is either an option or not used in all versions of the instrument.

The Numbered Diamond

A number in a small diamond refers to a measuring point in the test and adjustment procedures. These symbols are cross-referenced both on the block diagram and its corresponding checkpoint sheet.

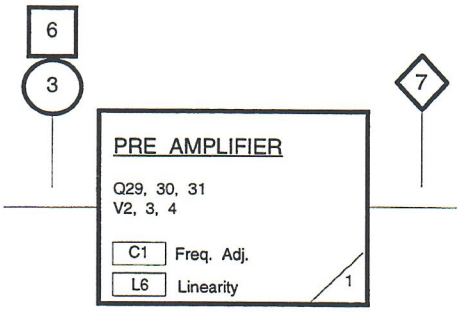
The Numbered Square

A number in a small square refers to an oscillogram number. These symbols are cross-referenced both on the block diagram and its corresponding checkpoint sheet.

The Numbered Circle

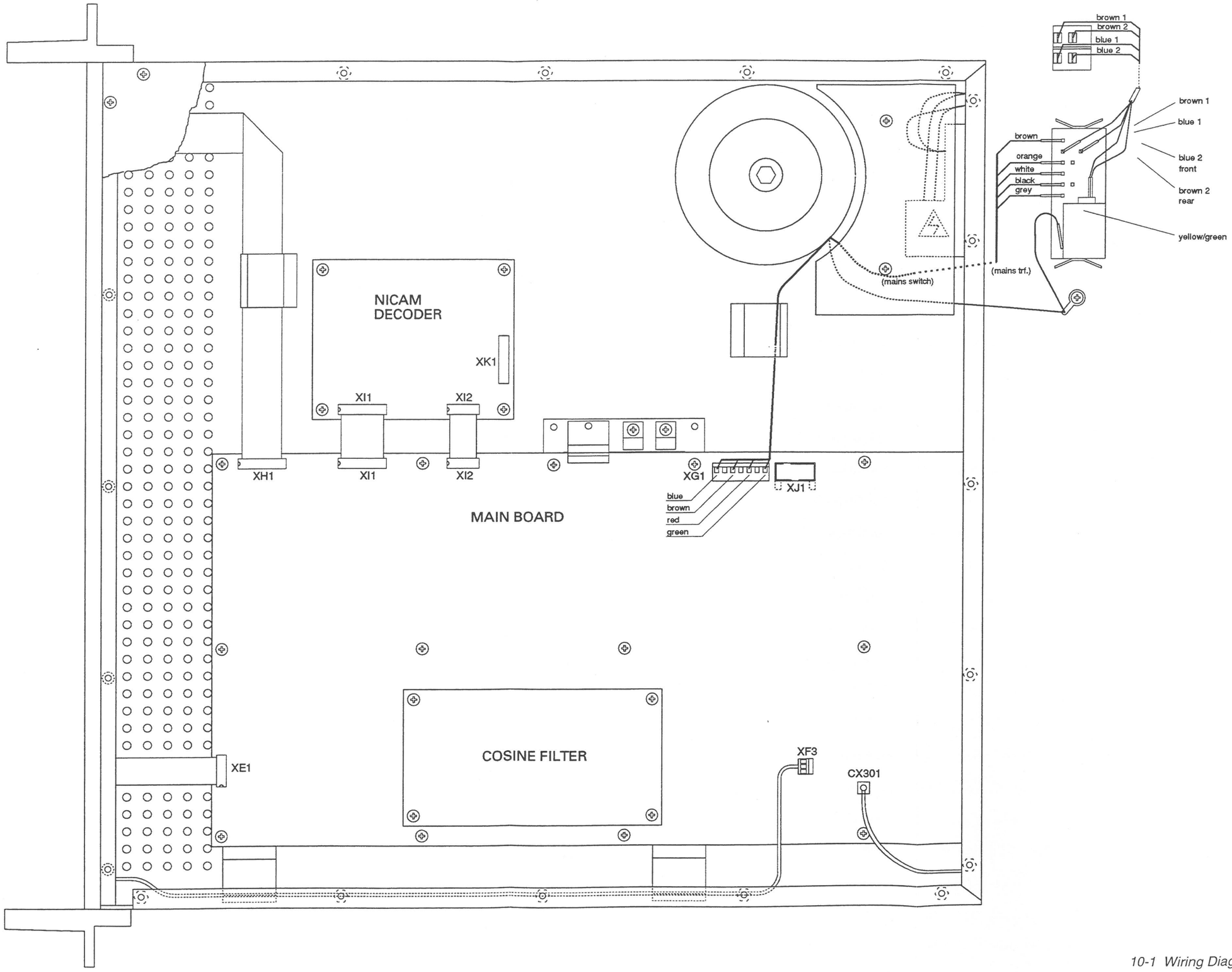
A number in a small circle refers to a test point physically provided on the PCB. These symbols are cross-referenced on the checkpoint sheet, its corresponding block diagram, and the circuit diagram.

Example:



NOTE: All circuit diagrams shows values for the G-version. Where values differ in other version an * indicates this. Make sure when replacing a component that one of same value is re-installed as is removed. Values for other versions are found in "List of Electrical Parts".

10. Wiring Diagram



10-1 Wiring Diagram

11. Instrument Block Diagram

11.1 General Information

The circuitry of the PM 5689 can be divided into a number of functional blocks.

The QPSK Input and IF/IC Conversion Section, which via an input attenuator receives an analog-modulated NICAM sound signal. The signal is modulated either as a baseband intercarrier signal or as an IF signal. The IF QPSK signal is converted to baseband before further signal processing.

The Digital Input, which receives a NICAM sound signal as a bit stream. After a suitable buffering in a line receiver, the signal is regenerated before being decoded in the NICAM decoder.

The QPSK Demodulation Section, where the QPSK signal after conversion is demodulated in the QPSK demodulator. The I and Q signals together with the clock/2 signal are available from the front panel. These signals can be used for an Eyeheight measurement. The QPSK demodulator also delivers a digital NICAM data signal and a NICAM clock signal to be used by the NICAM decoder.

The Eyeheight Measurement Block, which measures the modulation quality of the I and Q signals internally.

The NICAM Decoder, which decodes the digital NICAM data signal into a digital audio signal. The decoder also delivers NICAM synchronization signals and control signals to be used by the Data output option.

The Audio Output, which converts the digital audio signal to a high quality stereo audio signal available from the rear panel. This signal can be monitored from the front panel.

The Master Controller, which controls the functional blocks and transfers information to and from the front panel. Most of the information flow makes use of an internal I^2C bus. Alarms and instrument mode indications are also controlled by this functional block.

The Power Supply, which from the main supply generates the DC voltages needed by the functional blocks.

The Front Panel, from which the instrument can be controlled and where the signal qualities can be displayed or monitored.

For Instrument Block Diagram please refer to Figure 11-7 on page 11-11.

11.2 IF/IC Converter Section

11.2.1 General Information

This section converts the IF signal from the QPSK input to an intercarrier frequency signal by mixing with either a regenerated vision carrier or an internal crystal oscillator. Most of the components in this section are only mounted on versions with IF input capability.

11.2.2 Circuit Description

The signal from the QPSK input connector passes a 0/20dB attenuator (RE301), which can be activated by selecting it on the front plate. The signal is then amplified in the QPSK input amplifier (Q305), which isolates the input from the IF filter, thus improving the return loss.

The signal is split into two paths. Intercarrier signals are fed directly to the IF/IC selector (bypassed in versions with IC input only) and IF signals are fed to the IF filter (L307-L313). The IF filter has two branches: a sound branch and a vision branch. When splitcarrier conversion is selected, the vision branch is disconnected to keep the vision carrier from beating with the internal oscillator.

From the IF filter, the signal is fed to the intercarrier mixer (V304, L314). It mixes the sound carriers with the vision carrier if intercarrier conversion is selected, or with an internal splitcarrier local oscillator (Q302, Q303) if splitcarrier conversion is selected. It is also a part of the AGC circuit, since the IF gain is regulated either by an internal level detector in V304 or by a control signal supplied by the QPSK demodulator.

The IF/IC selector (V305) switches between the signals from the QPSK input and the intercarrier mixer output. In versions with IC input capability only, V305 is bypassed with a wire.

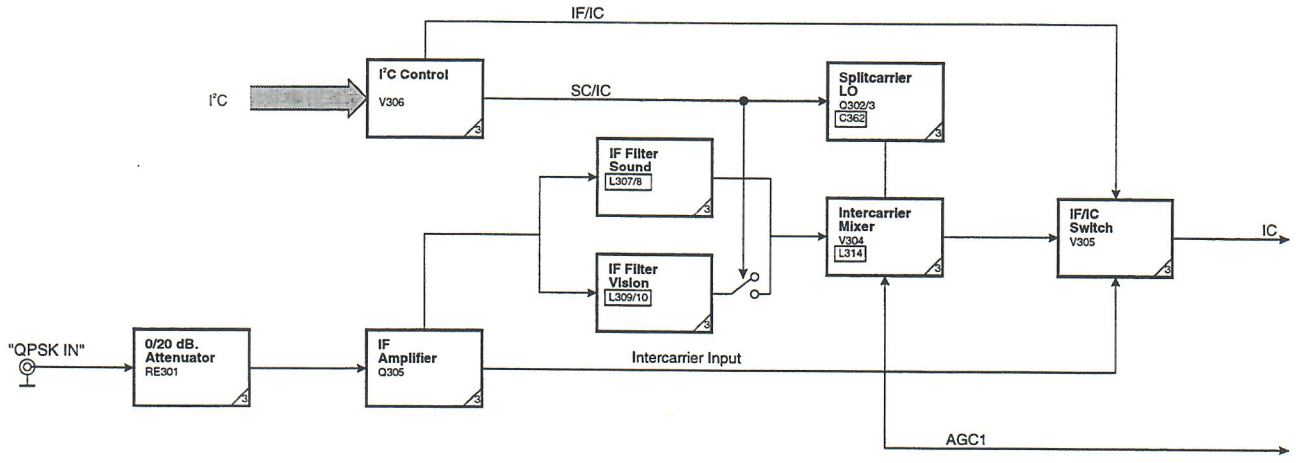


Fig.11-1 Block Diagram, IF/IC Converter Section

11.3 NICAM Digital Input

11.3.1 General Information

The NICAM digital input converts a NICAM-728 data signal in digital form to an HCMOS-level signal that can be decoded in the NICAM decoder. Jitter in the input signal is also attenuated.

11.3.2 Circuit Description

The functional unit can be divided into the following sections:

- Line receiver
- Input clock regenerator
- Output clock generator
- FIFO

The NICAM-728 data signal is received in the comparator (V709). The input impedance is 75Ω. The nominal input level is either symmetrical (±2.5V) or asymmetrical (0-5V). The detection level may be set by using programming plug PP701. Data may be inverted in V710 by using programming plug PP702.

The input clock signal is derived from the input data signal in the regenerator. The LC oscillator is built around V702 and V710. Transitions in the input signal are detected in V702 and V710, and the oscillator phase is sampled.

The output clock signal is generated in an x-tal oscillator that is built around V711. The clock signal divided by 8 is locked onto the input clock signal divided by 8; this takes place in the phase detector (V706).

The FIFO consists of a serial to parallel conversion, an 8-bit latch and a parallel to serial conversion. The input signal is clocked into a serial shift register (V703) and whenever eight bits of data have been stored in the register they are latched into the 8-bit latch (V704). The latch function is controlled by the input clock signal.

The parallel-to-serial conversion is controlled by the output clock signal. The content of the latch is loaded into the 8- bit serial output register (V705), from where the NICAM data signal is shifted out to the NICAM decoder.

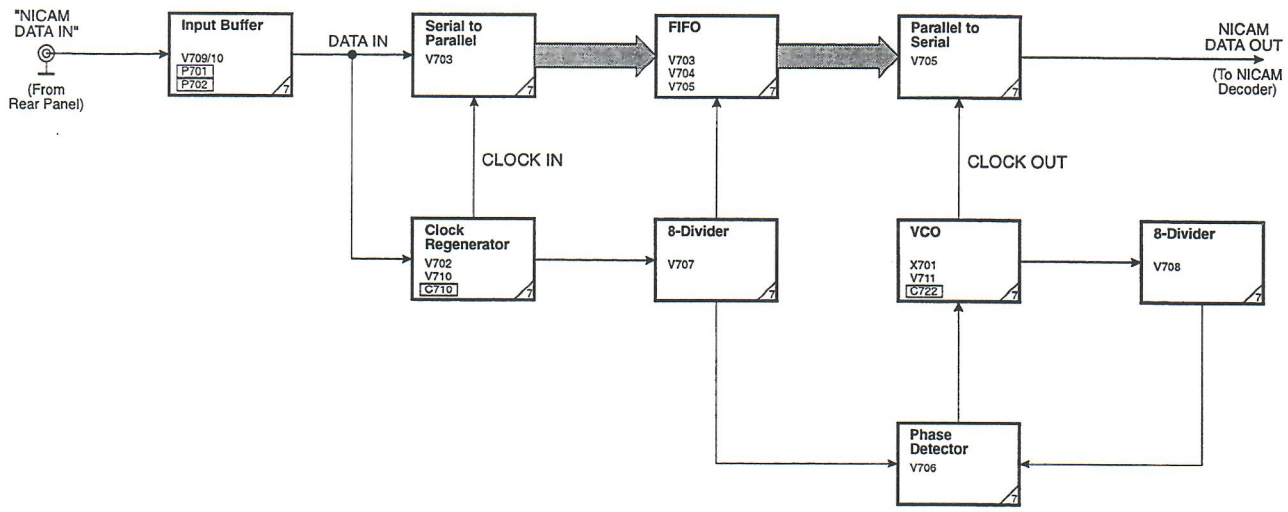


Fig. 11-2 Block Diagram, NICAM Digital Input.

11.4 QPSK Demodulator Section

11.4.1 General Information

This section filters the QPSK intercarrier signal and demodulates it to baseband I and Q signals. It also reconstruct the NICAM data used in the NICAM decoder and the rear output.

The components in this section are not mounted on NICAM data input versions.

11.4.2 Circuit Description

Cosine Intercarrier Filter

The intercarrier signal from the IF/IC selector passes through the cosine intercarrier filter. It band-limits the signal and the pulse-shapes of the demodulated signal.

Level Detector

The filtered intercarrier signal is applied to a level detector (Q401, V403) which outputs the QPSK level (approximated RMS) to the A/D converter (V405). This level is used, together with the AGC1 voltage from the intercarrier mixer, to determine the QPSK input level for alarm purposes. The A/D converter (V405) measures these voltages and transmits them to the master controller.

QPSK Demodulator

The filtered intercarrier signal is also applied to the QPSK demodulator (V406). The QPSK demodulator mixes the QPSK signal with in-phase and the quadrature-phase components of the regenerated QPSK carrier, thereby creating the I and Q signals. It contains an AGC circuit, a carrier regenerator, a QPSK demodulator circuit, and a clock regenerator. After the "I" and "Q" signals are demodulated, they are filtered in two LP filters and fed back to V406 for data slicing.

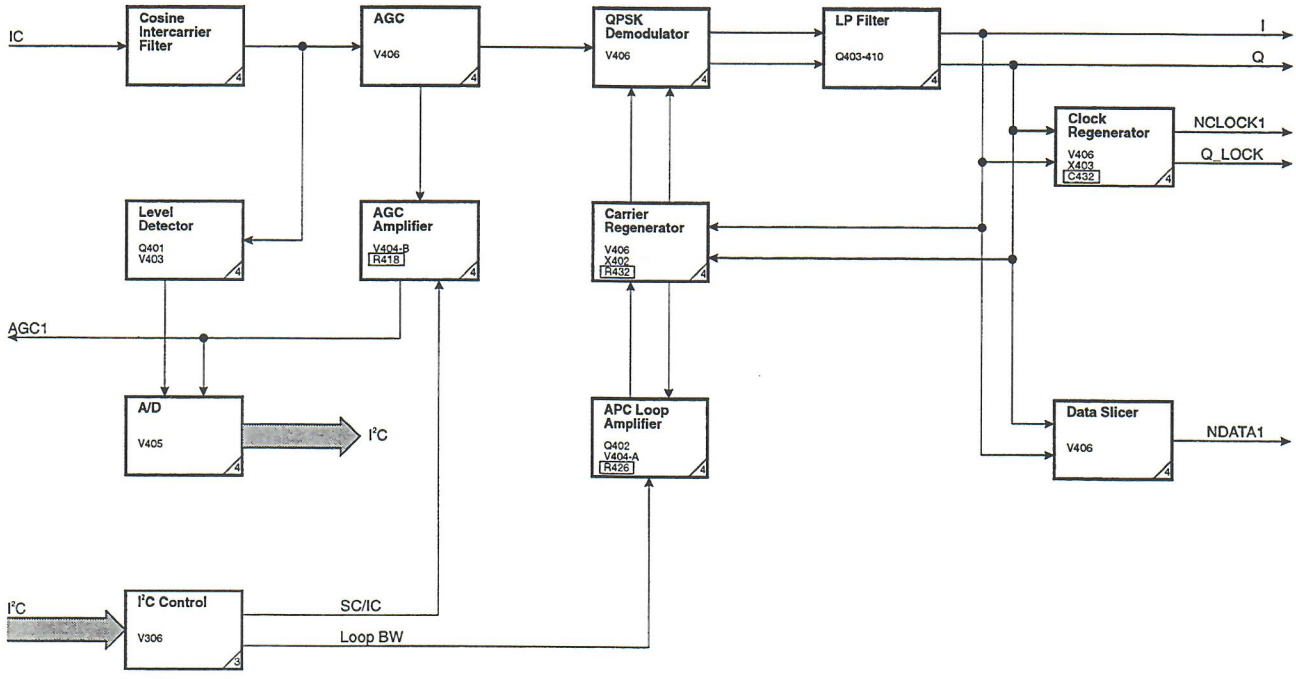


Fig. 11-3 Block Diagram, QPSK Demodulator Section

AGC
In IF input versions where splitcarrier conversion is selected or in System L, the AGC circuit in V406 controls the gain in the intercarrier mixer (V304) via the AGC amplifier (V404-B).

Carrier Regenerator
The carrier regenerator locks X402 onto the QPSK carrier. To allow for input frequency variations without phase error, an external APC loop amplifier (V404-A) is used. The APC loop is switched from wide bandwith during lock-in to narrow bandwith during operation.

Clock Regenerator
The clock regenerator locks X403 to the data rate. It suppliers the clock for the digital circuits in V406 and the NICAM clock output signal.

11.5 Eyeheight Measuring Circuit

11.5.1 General Information

The circuits measures the Eyeheight of baseband signals I and Q. The measuring circuit consists of:
- ✦ an analog loop to control the sampling time
- ✦ an A/D converter followed by a microcontroller, which processes the samples to get the actual Eyeheight.

The circuit also includes drivers for I and Q signals and a clock/2 oscilloscope trigger signal to external connectors.

11.5.2 Circuits Description

I/Q Selector
V508-B is used to select between I or Q for the measuring circuits. The selected signal is buffered by V506-A before it is fed to the A/D converter, differentiator, and polarity detector.

Differentiator
The loop is locked onto the zero-slope point. V506-B extracts the slope from the signal.

Polarity Detector
The slopes from positive samples and the slopes from negative samples must be sampled separately. V505-A does the polarity check and V507 splits the sample pulses into two different sampling circuits.

Sampling Circuits
Sampling of slopes is done by switches V508-A and V508-B buffered by V509.

Loop Filter
The loop filter built around V510 adds signals with the correct polarity and outputs a control voltage for the oscillator.

VCXO
The X502 crystal and V511 are parts of the oscillator. Frequency loop control is varicap D502 and center frequency is adjusted by C523. The VCXO supplies two sample pulses: one for the loop and another for the A/D converter.

A/D Converter
V502 performs the analog-to-digital conversion; sampling time is controlled by the VCXO sample pulse.

Signal Processing
The digital samples of I and Q signals are processed in V503 in order to extracting the Eyeheight. V504 is used to interface the microcontroller with the I^2C bus (SDA/SCL).

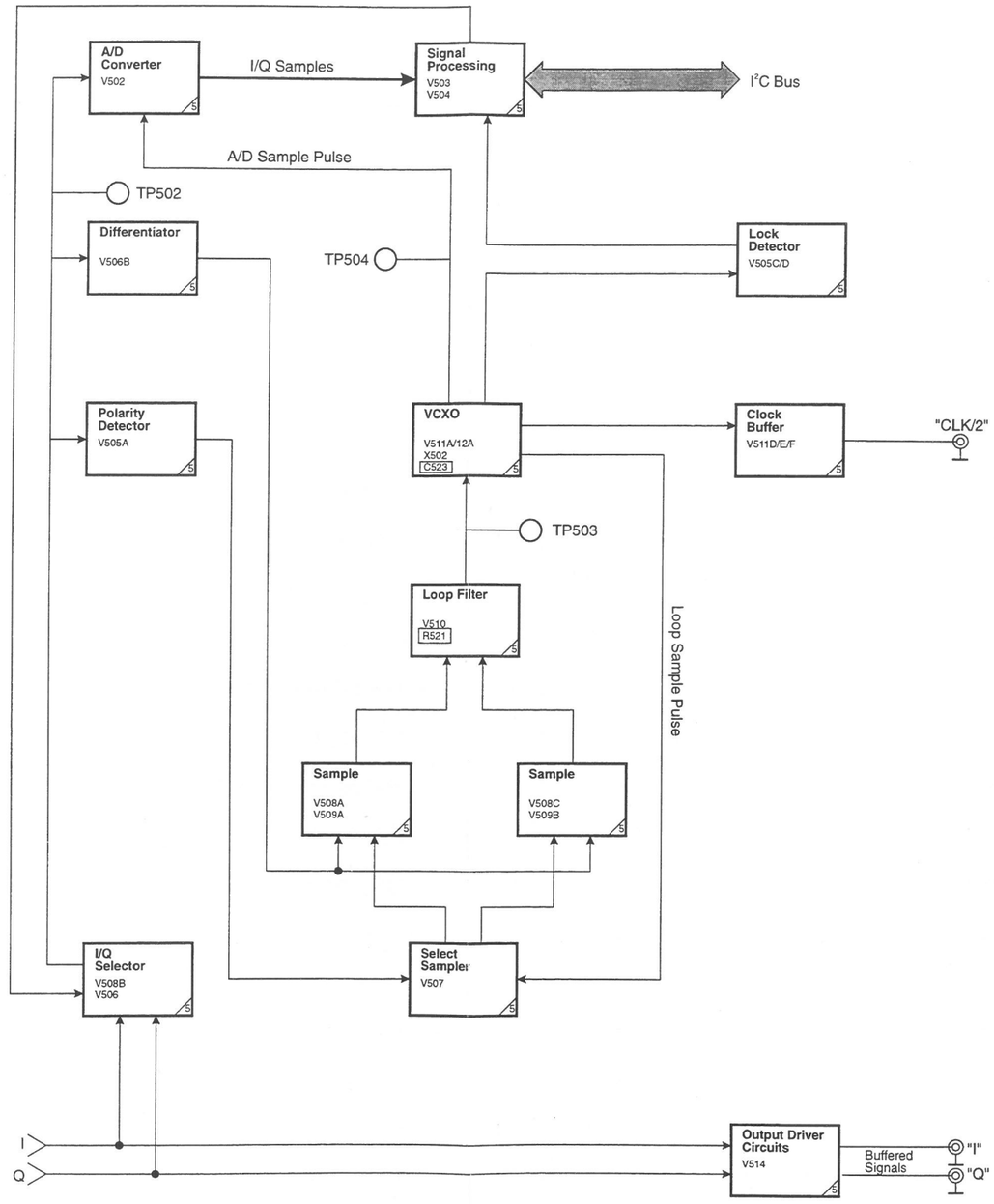


Fig. 11-4 Block Diagram, Eyeheight Measuring Circuit

11.6 NICAM Decoder - Unit 3

11.6.1 General Information

The NICAM decoder converts the incomming digital NICAM signal into a digital audio signal ready for D to A convers. Most of the NICAM decoding process is done in software in a DSP (*Digital Signal Processor*).

11.6.2 Unit Description

Input Select

The decoder unit selects one of two digital NICAM sources by means of V101. The selected signal is outputted through a gate (V2/V3B) which can mute the signal.

Serial Input

The serial input is converted to parallel by a shift register (V102) followed by a latch (V103). The timing is controlled by a programmable divider (V105).

Signal Processing

When the digital signal processor (V109) is reset, the circuit around V1 sets up the mode lines, allowing the processor to load a program from the EPROM (V110). The PP1 program plug is removed for normal operation. When PP1 is inserted, the processor will load an alternative program for testing purposes.

Audio Output

The audio output generates I^2S format digital audio with the timing derived from the VCXO. The data part of the I^2S comes directly from a built-in audio interface in the DSP. The signals are syncronized and buffered by V9.

Phase Detector

The phase detector locks the audio output reference clock to the input signal. It operates on 8kHz by dividing a 728kHz input by 91 (V4, V5) and use the 8kHz output from the VCXO divider (V108). Phase detection is performed by two flip-flops (V6) and filtered by C8, C9, and R9.

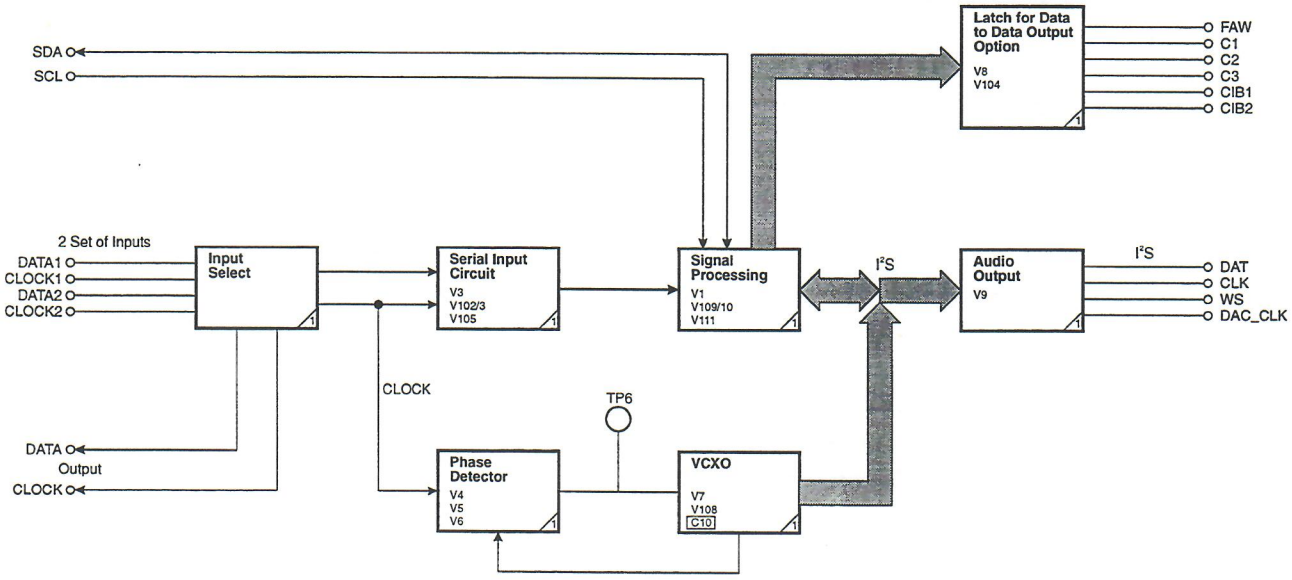


Fig. 11-5 Block Diagram, NICAM Decoder - Unit 3

VCXO
The X1 crystal and V7 are parts of the oscillator. Frequency loop control is varicap D5 and center frequency is adjusted by C10. The VCXO uses the divider (V108) to supply different frequencies.

Data Latch for the Data Output Option
Data for the data option is outputted from the processor to V104 and synchronized with the input serial signal by V8.

11.7 Audio Output

11.7.1 General Information

The audio output converts the digital output from the NICAM decoder to an analog high-quality stereo audio signal. After conversion the signals are put through a suitable de-emphasis circuit in order to establish a flat frequency response. The audio signals are present as balanced LEFT and RIGHT signals from the rear panel. The signal can also be monitored from a plug in the front panel.

11.7.2 Circuit Description

The functional unit can be divided into the following sections:
- D/A conversion
- De-emphasis
- Balanced audio output
- Monitor output

The NICAM decoder supplies the LEFT and RIGHT audio signals according to the I^2S serial data protocol. These signals in serial form are converted in an integrated D/A converter (V601). After conversion, the analog audio signals are LEFT and RIGHT stereo signals.

The LEFT and RIGHT signals are passed on to the J.17. de-emphasis amplifiers (V602 and V610), which are low-impedance sources for the output and monitor amplifiers. The audio levels in the two channels are adjusted by means of R601 and R612.

From the de-emphasis circuitry, the two stereo signals are amplified in audio amplifiers (V603/604 and V605/606). The amplifiers are pairwise coupled in parallel in order to provide low-impedance balanced audio outputs.

To allow monitoring of the audio signals, the LEFT and RIGHT signals are amplified in V607. This amplifier also serves as the "language select" control and volume control for the monitor output. The information from the front panel to the amplifier goes via the internal I^2C bus.

There is a jack plug connector for a headphone in the front panel.

11.8 Master Controller

11.8.1 General Information

The master controller is the microprocessor system that controls the instrument functions. Interfaces with other parts of the instrument are via four serial busses. There are separate busses for the front panel and the remote interface. Of the remaining two buses, one accesses circuits on the mainboard and the other accesses other units in the instrument (NICAM decoder and Data Output Option).

11.8.2 Circuits Description

Microprocessor
The microprocessor is a general-purpose microcontroller (V201) with a latch (V202) for the lower part of the address bus.

Memory
The microprocessor has a PROM (V203) with the program and a RAM with a built-in battery backup (V204) for data.

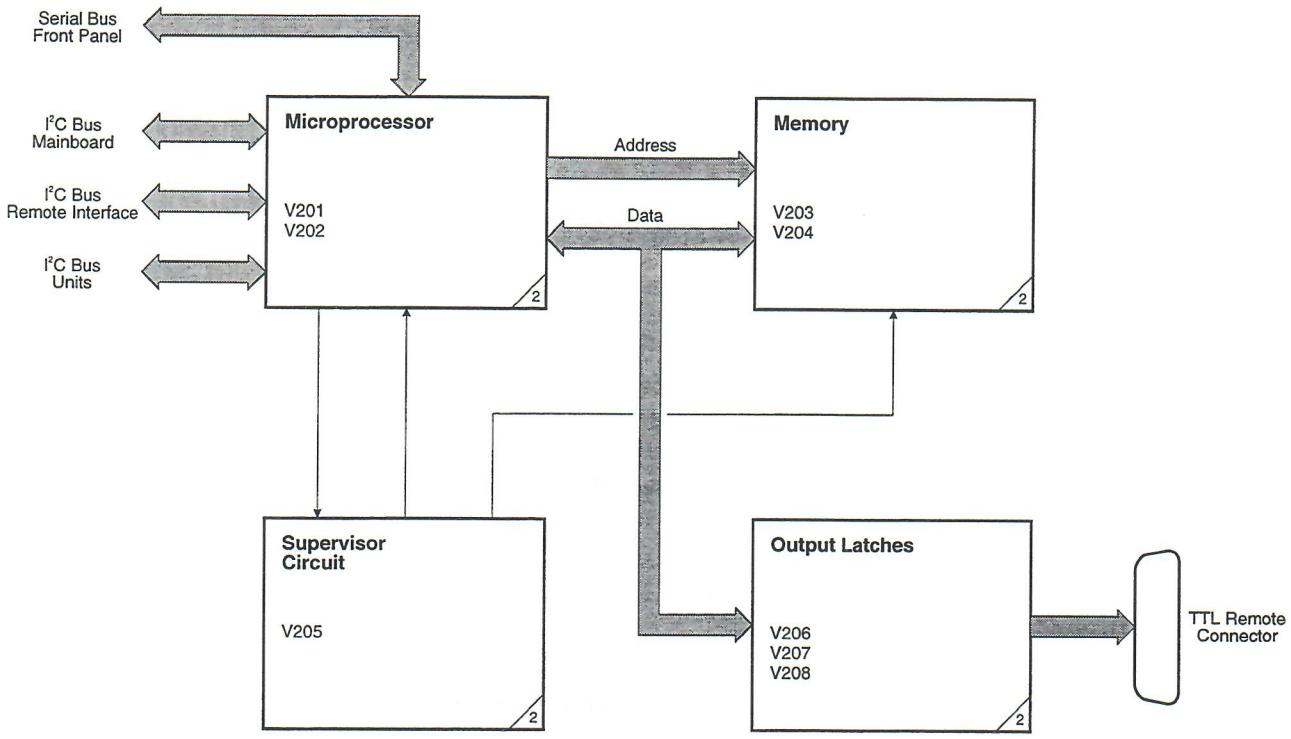


Fig. 11-6 Block Diagram, Master Controller

Supervisor Circuit

The IC V205 includes a number of functions that make the microcontroller and the RAM memory operate properly, even under power-up and power-down conditions.

This includes:

- watchdog circuit
- voltage detector
- chip enable switch
- reset generator.

When the voltage detector detects low voltage, the chip enable for the RAM is disabled. If the microcontroller is not running correctly for some reason, then the watchdog will detect the missing trigger pulses and reset the controller.

Output Latches

The output latches (V206 and V207) is directly memory-mapped (V208) to the microcontroller databus. The TTL remote interface has additional protection diodes to support direct relay driving from connector pins. Two drivers from the latches are used internally as relay drivers for the input attenuator.

11.9 Power Supply

11.9.1 Circuit Description

The Power supply consists of:
- ✦ Mains inlet and transformer
- ✦ Voltage rectifiers and regulators
- ✦ Local voltage regulators

The mains inlet contains a mains filter and a program card that can be set to the correct mains voltage. The mains transformer includes a screen between the primary and the secondary windings.

The rectifier for the +5V supply consists of two diodes (D101 and 102) followed by a filter. From this the voltage is regulated in a switch mode regulator (V101). The regulated +5V is filtered before use throughout the instrument.

The rectifier for the ±12V supply is a bridge rectifier (D103). After the rectifier the ± voltages are filtered before regulation in the linear regulators (V102 and 103). The regulated ±12V is used on the analog circuitry of the instrument.

Wherever an accurate or a smooth DC voltage is needed, it will be regulated by a separate linear voltage regulator. A number of these local regulators are positioned close to the special circuitry that needs these voltages.

11.10 Front Panel Unit

11.10.1 General Information

The front panel unit handles the user - interface of the PM 5689 via the master controller. It controls and displays the various status and settings of the PM 5689. The front panel unit consist of three parts:

1. A Controller Unit built around a 80C52 microcontroller (V1) supported by an address - latch (V2), a ROM (V3) and an EE-PROM (V7). Furthermore, the unit contains a read/write - control (V4) for the LCD-module, a contrast - control (V5 & V6) and a backlight setup (R5-7).
2. An LCD - module (2-lines by 40-characters), complete with drivers and an LED backlight.
3. A Keyboard Unit containing a keyboard - port (V21), all switches, an LED - port (V22) and the LED - indicators.

11.10.2 Circuits Description

The function of the front panel unit is controlled by the controller, whose ROM contains the program code for the microcontroller. The EE-PROM is used for storage of vital information such as contrast level, etc.

After reset at power-up (MRES) and reception of requested instrument - status and data, the controller enters a diagnostic - mode in which any detected errors will be displayed in the LCD - module. If no errors are detected, the controller will enter normal - mode.

Unit Interface
Communication with the rest of the instrument is performed by a serial - interface (FRONT-BUS) using the built-in serial - interface of the microcontrller (TxD/RxD). All operational control and some configuration is carried out via menus by means of four cursor- and an execute - key in conjunction with the LCD - module.

LCD - Module
Update of the LCD - module connected to the microcontroller is performed via the eight - bit data bus and the read/write - control (DISP-EN). For temperature - compensation of the contrast - level, the microcontroller reads the temperature at ADC-1 of V5 using a two-line IIC - interface (DISP-SCL/ DISP-SDA).

The backlight level (VBL) is set by the resistors (R5-7).

Keyboard Unit

Scan and update of the keyboard unit is performed via an IIC - interface (KEYB-SCL/KEYB-SDA), using V1 to read actual switch - status (S1-5) and update the REMOTE and ALARMS LEDs.

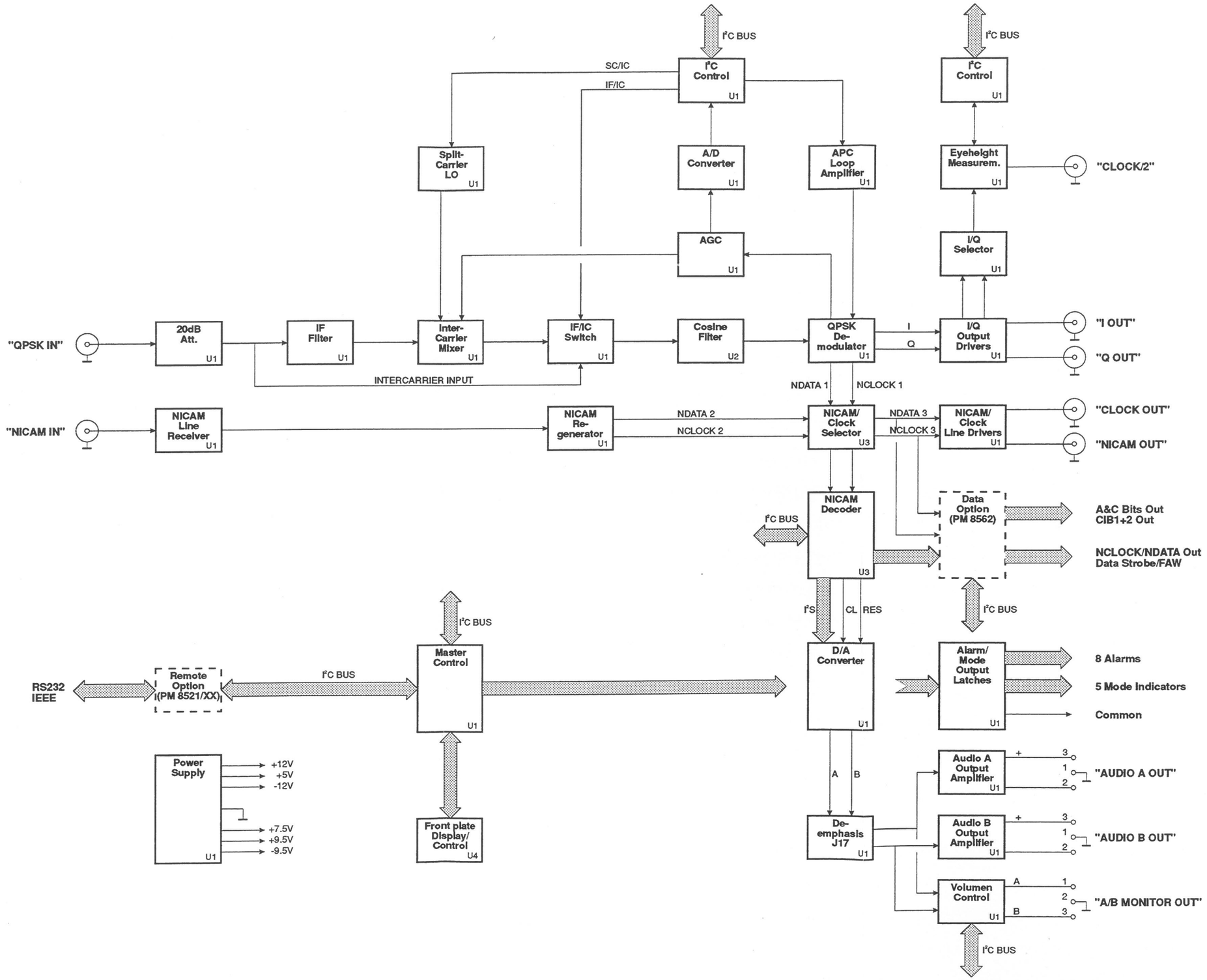


Fig. 11-7 Instrument Block Diagram

12. Test and Adjustments

Measuring equipment:

Digital Voltmeter	: e.g. PM 2525
Oscilloscope	: e.g. PM 3082
Frequency Counter	: e.g. PM 6671
Network Analyzer	: e.g. HP3577A
Video Generator	: e.g. Philips PM 5640A
IF Modulator	: e.g. Philips PM 5680
NICAM Modulator	: e.g. Philips PM 5687

12.1 Functional Checks

1. Internal Test

- Select the menu:
  CONFIG/DIAGNOSE/ALL
- Press **EXECUTE** .
- A self test is now running continuously.
- If no errors are indicated, press ▲.

- Apply a NICAM Data, QPSK, or IF Signal to "NICAM IN" or "QPSK IN" (depending on the version) in the rear plate.
  On IF versions select the menu: INPUT/IF.

2. NICAM Clock and Data Out

- Using an oscilloscope, check for the presence of a 728kHz clock at CX201 and NICAM data at CX202.
  The level should be ±2.5V ±0.5V at a load of 75Ω.

3. Audio Out

- Connect an oscilloscope to the "AUDIO OUT" connectors in the rear panel and terminate with 600Ω.
- Apply a 1kHz sine wave audio from the NICAM source and check that the audio out signal is present and undistorted. The nominal level at a 0dBu0 level at XF1 and XF2 with a 600Ω load is 336mV in Systems G/L/D and 439mV in System I.

4. Intercarrier Input (except /3x versions)

- Select the menu:
  INPUT/INTERCARRIER
- Apply a NICAM QPSK intercarrier signal to "QPSK IN" connector.
- Connect an oscilloscope to "I" and "Q" output connectors terminated with 75Ω and trig on "CLK/2".
  The output should be as shown in Fig. 12-1 or Fig. 12-2.

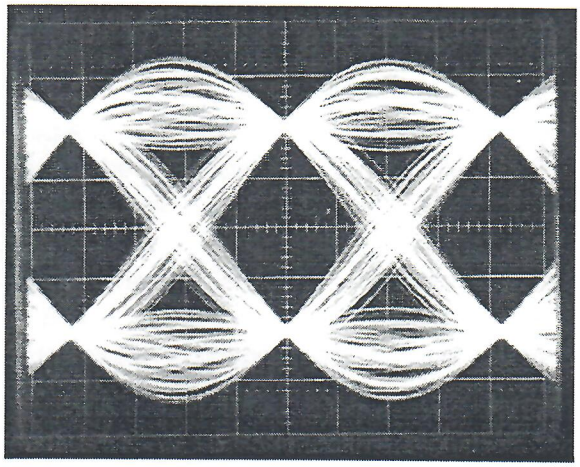


Fig. 12-1 40% rolloff, I-version.

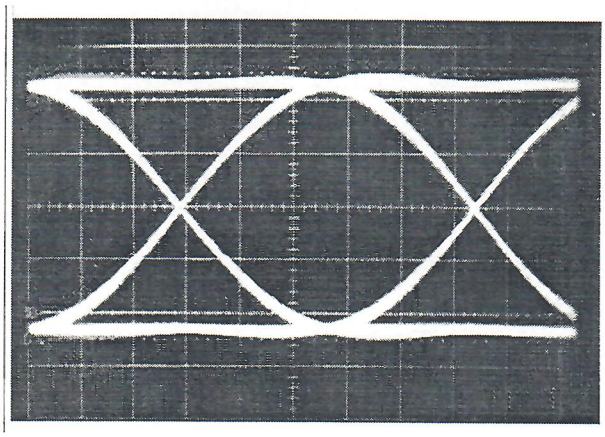


Fig. 12-2 100% rolloff, I-version.

- Activate the status display Eyeheight readout.
- The readout should match the I and Q output: typically >90% with a high-quality QPSK source.

5. IF Input (/10, /20 versions only)

- Select the menu:
  INPUT/IF and IF-MODE/Split.
- Apply an IF signal with NICAM QPSK sound to "QPSK IN" connector.
- Connect an oscilloscope to "I" and "Q" output connectors and trig on "CLK/2" connector.
- The Eyeheight should decrease, usually about 1% relative to the previous intercarrier input.

- Select the menu:
  INPUT/IF and IF-MODE/Inter.
- The Eyeheight value should be slightly lower than the obtained in the previous splitcarrier test.

6. TTL Remote Output

- Apply an appropriate NICAM signal.
- Using a DVM, check the voltages at XL1. A built-in 1K resistor at XL1 pin 23 can be used as pull-up to +5V since the outputs are of an open collector type.
- Change audio mode at the NICAM generator and check that the output from pins 3, 4, 5, 6, and 17 goes low to match the audio mode selected.

- Apply an appropriate NICAM IF or IC signal to the "QPSK IN" connector (except versions /3x).
- Activate the QPSK level alarm by selecting the SET-ALARMS/QPSK-ALARM/enabled menu, select SAVE, and press **EXECUTE** .

- Store the present QPSK level by selecting the menu SET-ALARMS/QPSK-LEVEL/ok menu and press **EXECUTE** .
  The QPSK level alarm should now be off (XL1 pins 20 and 21 high).
- Raise the QPSK input level +3dB above the stored level.
  "HIGH carrier level" (XL1 pin 20) should then go low.
- Lower the QPSK input level -3dB below the stored level.
  "LOW carrier level" (XL1 pin 20) should then go low.

- Remove the signal from the "QPSK IN" connector.
- "Loss of QPSK" (pin 8), "BER alarm" (pin 12), "Eyeheight alarm" (pin 13), and "No NICAM frames" (pin 24) should go low.

- Apply an appropriate NICAM IF signal to the "QPSK IN" connector (/10 versions only, except System L).
- Change the vision/sound 2 carrier ratio by attenuating either the vision carrier or the sound 2 carrier more than 8dB.
  "Vision carrier alarm" (pin 11) should go low.

12.2 Voltage Checks

- Connect the DVM ground lead to one of the mainboard ground connections (TP102, TP202, TP302, TP406, TP501, TP603, TP702) or the chassis.
- The following should be checked:
  1. Check for +5V ±0.25V at TP101.
  2. Check for +12V ±0.5V at TP103.
  3. Check for -12V ±0.5V at TP105.
  4. Check for +5V ±0.25V at TP505.
  5. Check for +9.5V ±0.5V at TP409.
  6. Check for -9.5V ±0.5V at TP410.

12.3 Adjustments

1. IF Filter (/10 and /20 versions only)

- Select the menu:
  ATTENUATOR/Off, INPUT/IF,
  and IF-MODE/Split.
- Remove any solder from SP304.
- Connect a network analyzer (NWA) to the "QPSK IN" connector and CX302.
- Adjust L312 to a notch at 45.5MHz, then adjust L307, L308, and C337 until the response at the sound 2 frequency ±320kHz is flat ±0.1dB.

- Select the menu:
  IF-MODE/Inter.
- Adjust L309, L310, and C347 until a damped response symmetrical around the vision frequency is obtained.

– Select the menu:
IF-MODE/Split.
– Adjust L309 until a notch is obtained at vision frequency.
– Repeat the last two steps until both conditions are fulfilled.
– Solder the SP304.

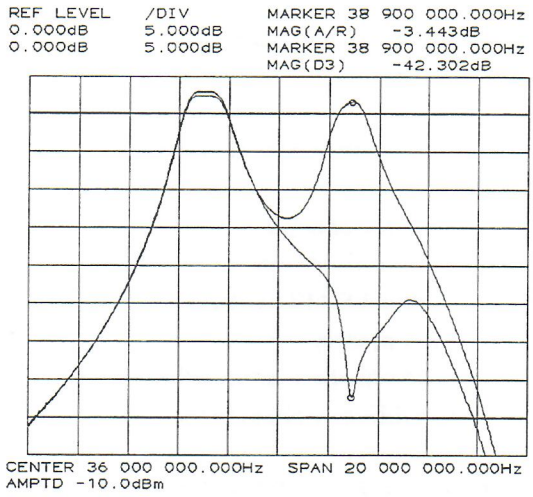


Fig. 12-3 IF filter, Systems B/G & L38.9

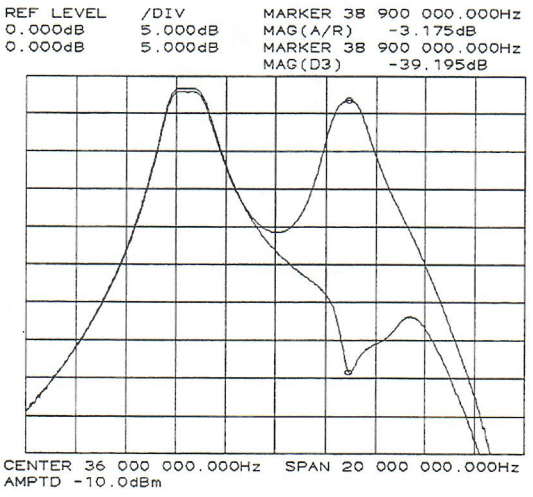


Fig. 12-4 IF filter, System I

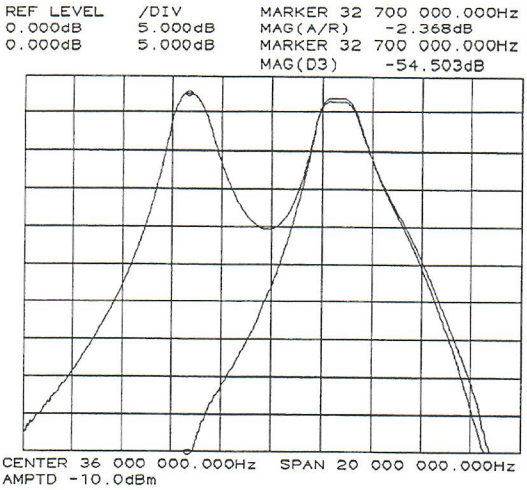


Fig. 12-5 IF filter, System L32.7

2. Demodulator Balance (except /3x versions)

– Select the menu:
INPUT/INTERCARRIER.
– Apply a QPSK intercarrier signal to the "QPSK IN" connector
– Connect an oscilloscope to the "I" and "Q" output connectors.
– Connect "CLK/2" connector to the oscilloscope trigger input.
– Adjust R426 and R432 until simultaneous optimal Eyeheight in the I and Q channels are achieved.

3. Clock Regenerator (except /3x versions)

– Select the menu:
INPUT/INTERCARRIER.
– Apply a QPSK intercarrier signal to the "QPSK IN" connector.
– Connect an oscilloscope to TP403 and TP407.
– Adjust C432 until the positive edge at TP403 coincides with the maximum Eyeheight point at TP407 ±300ns.

4. Sample Pulse Generator (except /3x versions)

– Select the menu: INPUT/INTERCARRIER.
– Apply a QPSK intercarrier signal to the "QPSK IN" connector.
– Connect an oscilloscope to TP503.
– Adjust C523 until the voltage is 6V ±1V.

5. Sample Pulse Phase Offset (except /3x versions)

– Select the menu: INPUT/INTERCARRIER.
– Apply a QPSK intercarrier signal to the "QPSK IN" connector.
– Connect an oscilloscope to TP502 and TP504.
– Adjust R521 until the falling edge at TP504 (364kHz) coincides with the maximum Eyeheight point at TP502. Fine adjust to maximum Eyeheight readout on the display.

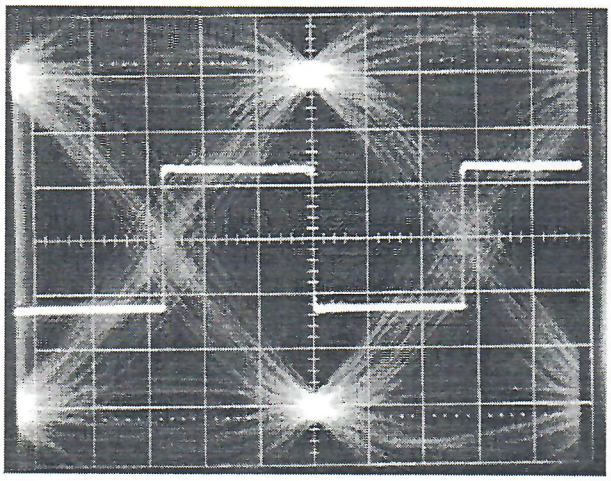


Fig. 12-6 Sample Pulse Position (TP502 , TP504)
0.5µs/div.
0.5V/div. 2V/div.

6. Intercarrier Mixer (/10 and /20 versions only)

– Select the menu: INPUT/IF and IF-MODE/Inter.
– Apply a composite IF signal to the "QPSK IN" connector.
– Connect an oscilloscope to the "I" output connector.
– Adjust L314 (and in System L also R418) to minimize crosstalk from vision and sound 1 (maximum Eyeheight).

7. Splitcarrier Local Oscillator (/10 and /20 versions only)

– Select the menu: INPUT/IF and IF-MODE/Split.
– Connect a counter to TP301.
– Adjust C362 until the frequency is f_V ±40Hz.

8. Splitcarrier Level (/10 version only, except System L)

– Select the menu: INPUT/IF.
– Apply a composite IF signal to the "QPSK IN" connector.
– Connect an oscilloscope to TP401.
– Switch between IF splitcarrier and intercarrier mode and adjust R418 to obtain equal level ±10% in both modes.
– There should only be a small difference between the measured Eyeheight in these two modes.

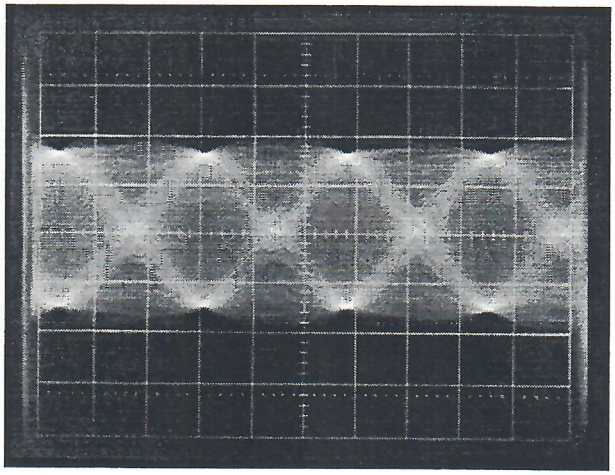


Fig. 12-7 IC Input ~-7dBm (TP401)
1µs/div. 100mV/div.

9. NICAM Clock Regeneration (except /00 versions)

– Apply a NICAM data signal to "NICAM IN" connector.
– Connect a DVM to TP704.
– Adjust C710 until the voltage is 2.3V ±0.25V.

– Connect a DVM to TP708.
– Adjust C722 until the voltage is 2.3V ±0.25V.

– Connect a DVM to TP6 on unit NICAM decoder (Unit 3)
– Adjust C10 on Unit 3 until the voltage is 2.5V ±0.5V.

10. Audio Level

Use the following procedure to activate the test mode.

– Turn the power off.
– Insert a program plug in PP1 on the NICAM decoder unit.
– Press and hold down the buttons:
◄ , ► , and **EXECUTE** simultaneously while turning the power on.
– Select: TEST
– Select TEST/10 and press **EXECUTE** .
– Select TEST/19 and press **EXECUTE** .
– The audio output should now be a 1kHz sine wave at digital maximum with 16 bit resolution.
– Connect a DVM to the "AUDIO OUT" connectors.
– Adjust R601 and R612 until the audio level at XF1 and XF2 in a 600Ω load is 2434mV$_{RMS}$ ±25mV (4148mV$_{RMS}$ ±40mV in System I).
– Remove the program plug in PP1 and turn the power off.

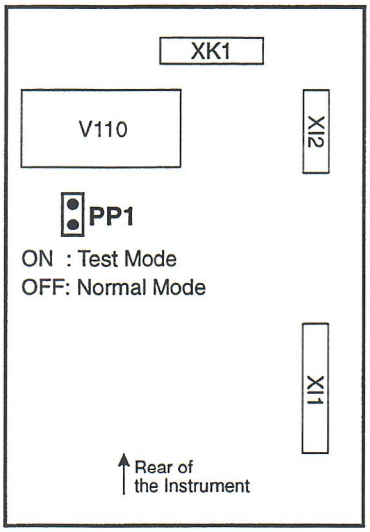


Fig. 12-8 Location of PP1 on NICAM decoder (Unit 3).

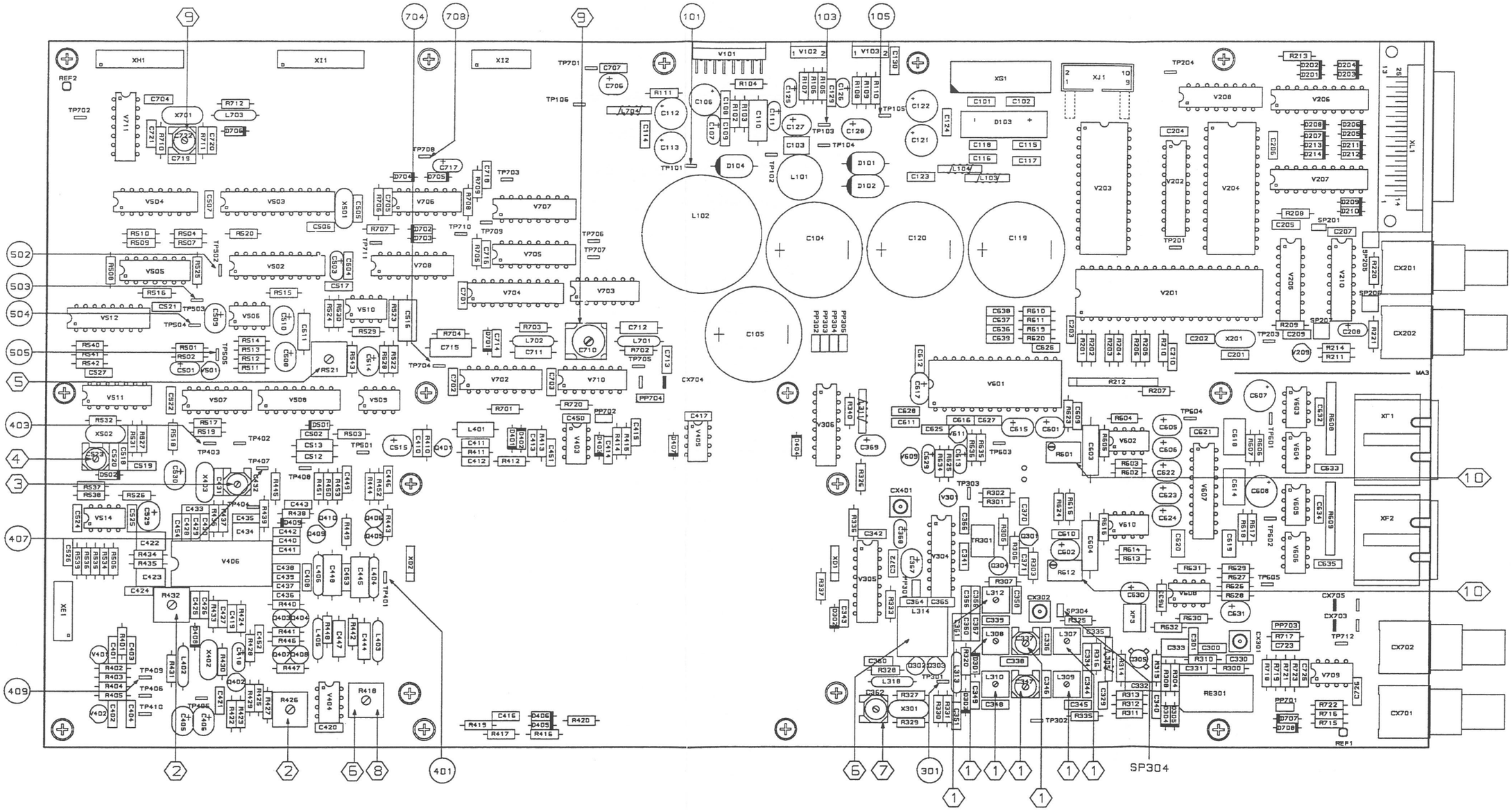
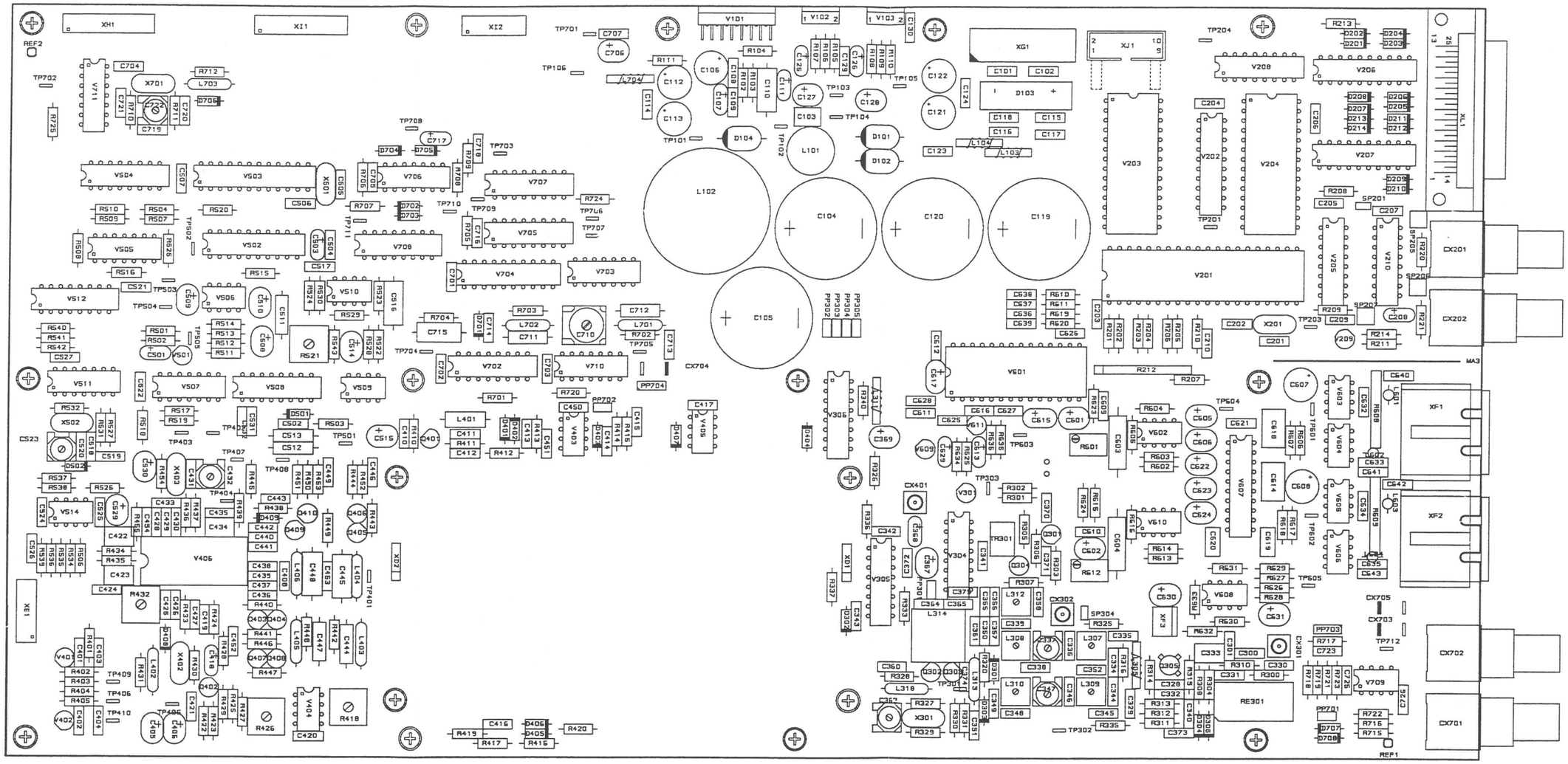
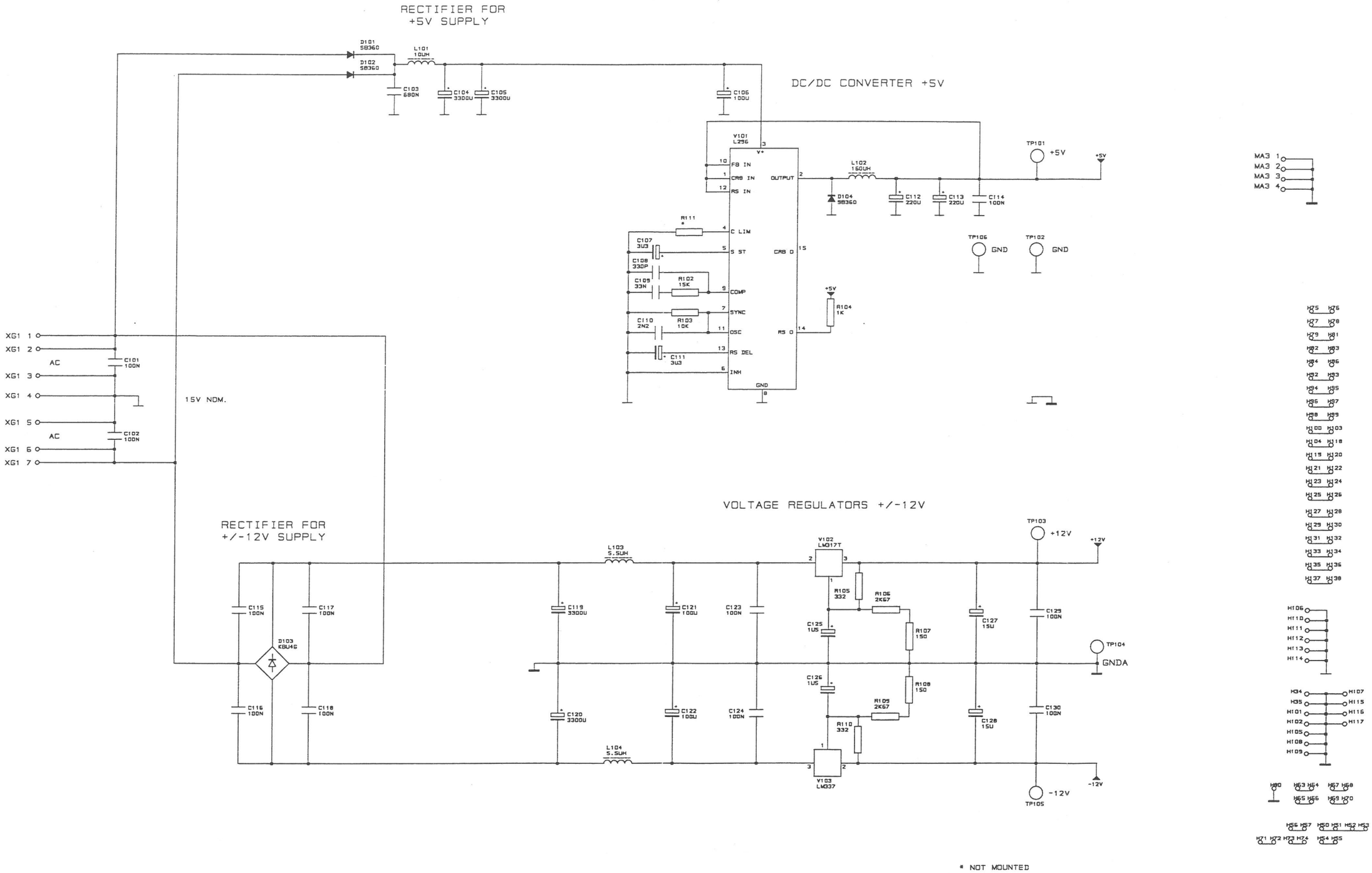


Fig. 12-9 Check points, Main Board - Unit 1



ATTENTION

Fig. 12-10 Component location, Main Board - Unit 1



* NOT MOUNTED

109 82140

Fig. 12-11 Circuit diagram, Main Board - Unit 1, sh.1

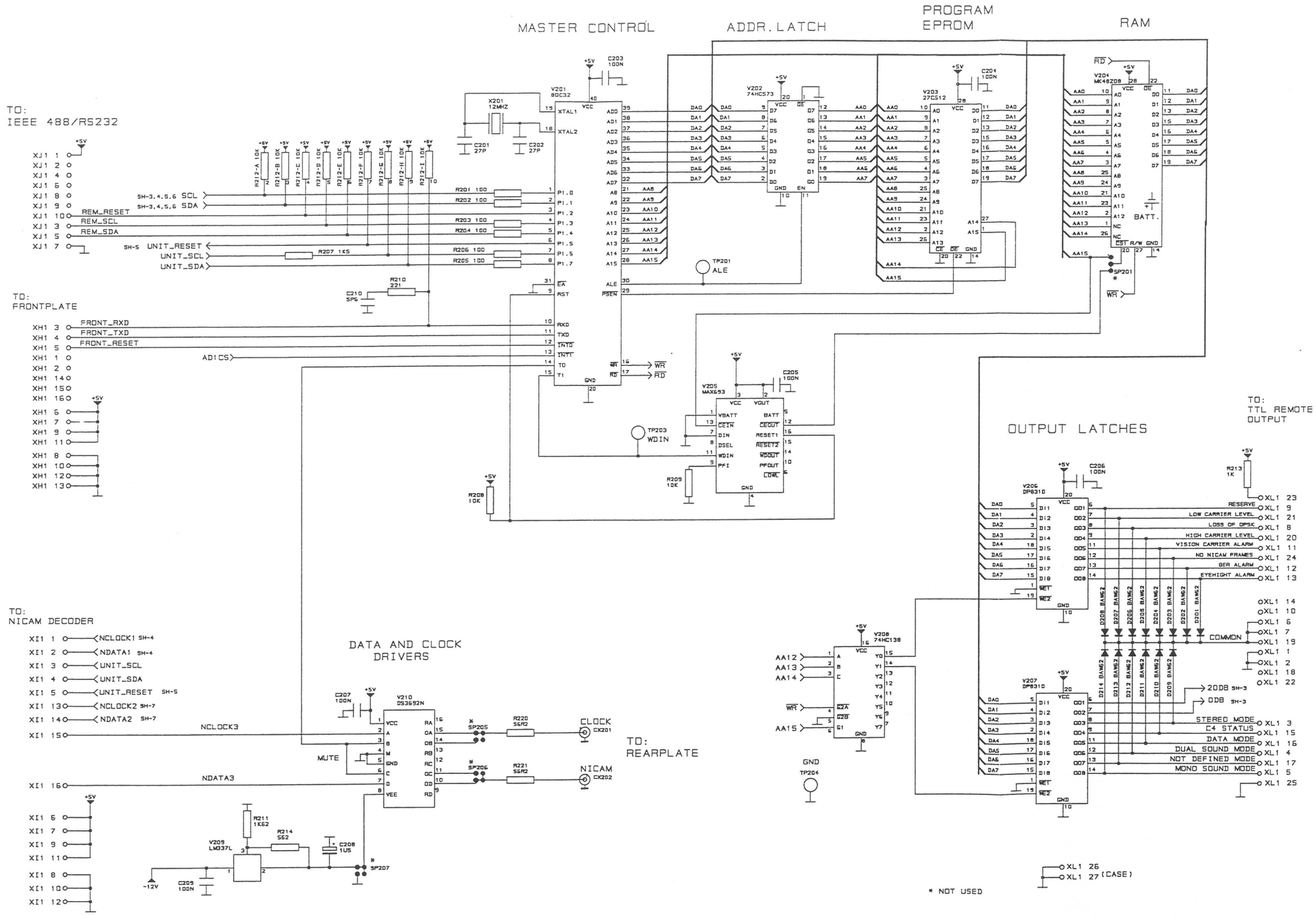
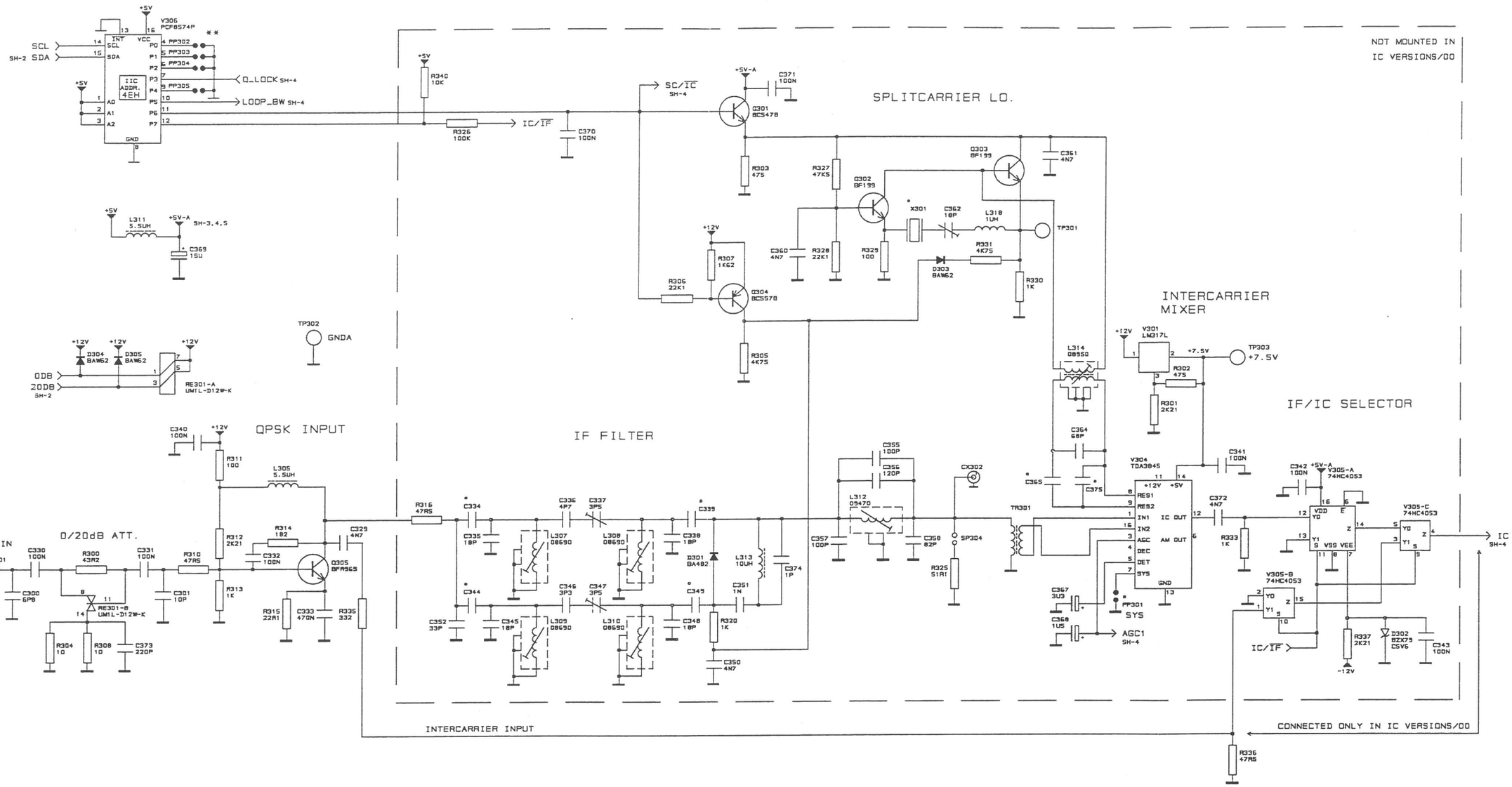


Fig. 12-12 Circuit diagram, Main Board - Unit 1, sh.2



**

PP302	PP303	VERSION
ON	ON	IF
OFF	ON	IC
ON	OFF	NICAM
OFF	OFF	NOT DEFINED

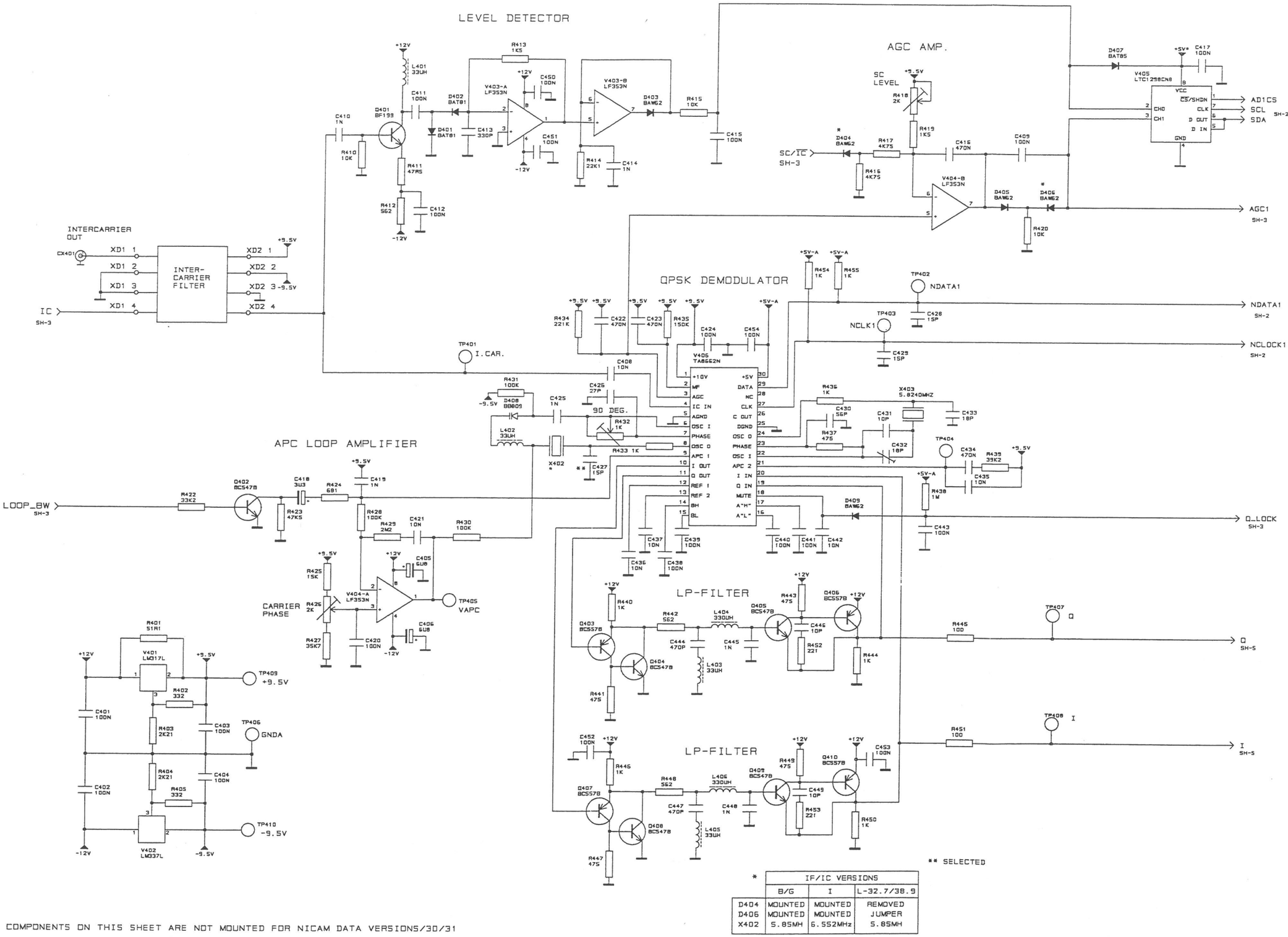
PP304	PP305	VERSION
ON	ON	SYST L
OFF	ON	- D/K
ON	OFF	- I
OFF	OFF	- B/G

*

	IF/IC VERSIONS		
	B/G/I	L-38.9	L-32.7
C334	10P	←	6P8
C339	10P	←	6P8
C344	6P8	←	10P
C349	6P8	←	10P
C365	27P	←	820nH
C375	NOT MOUNTED	←	10P
X301	38.9MHz	←	32.7MHz
PP301	OPEN	CLOSED	CLOSED

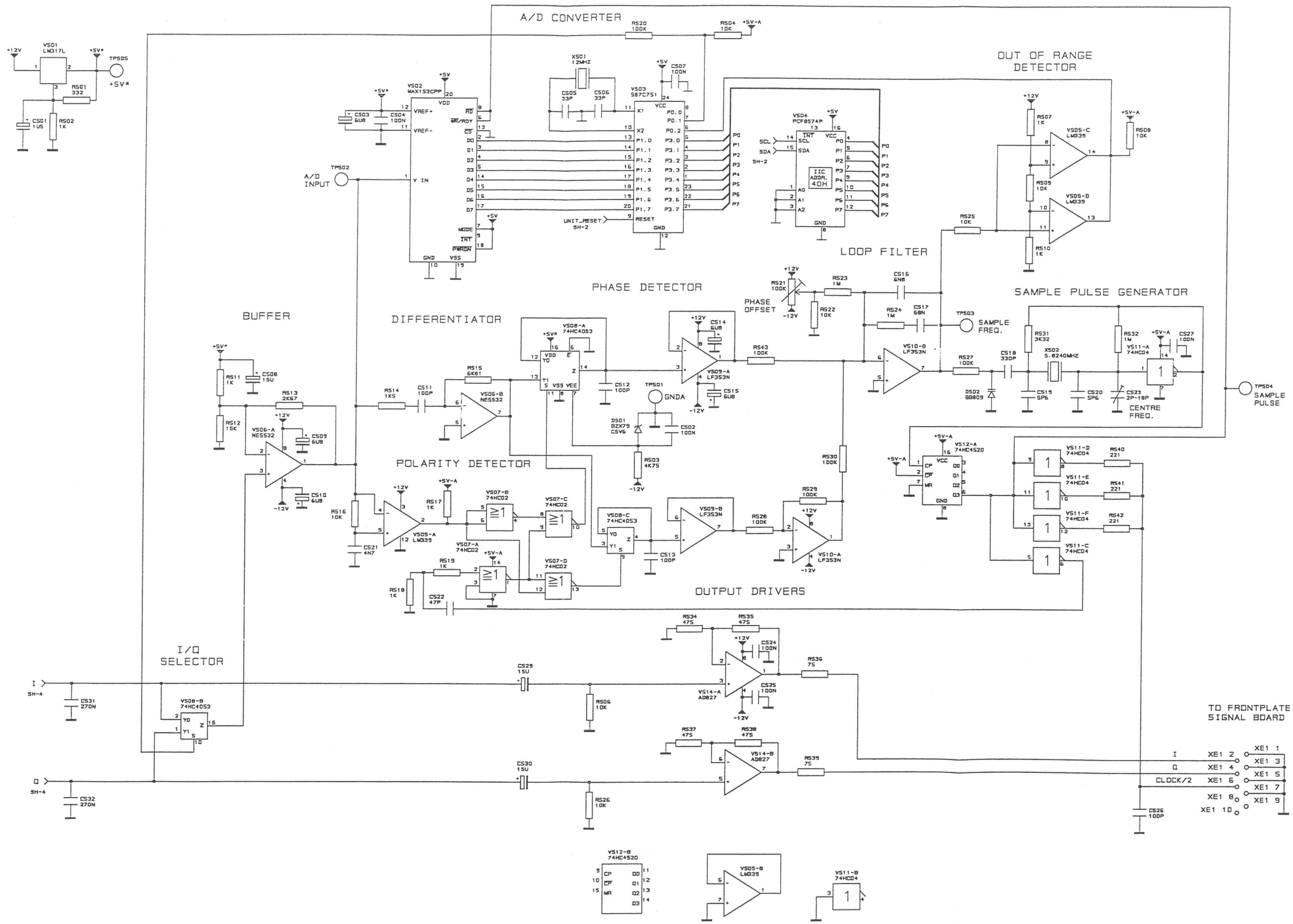
COMPONENTS ON THIS SHEET ARE NOT MOUNTED FOR NICAM DATA VERSIONS/30/31

Fig. 12-13 Circuit diagram, Main Board - Unit 1, sh.3



*	IF/IC VERSIONS		
	B/G	I	L-32.7/38.9
D404	MOUNTED	MOUNTED	REMOVED
D406	MOUNTED	MOUNTED	JUMPER
X402	5.85MH	6.552MHz	5.85MH

Fig. 12-14 Circuit diagram, Main Board - Unit 1, sh.4



COMPONENTS ON THIS SHEET ARE NOT MOUNTED FOR NICAM DATA VERSIONS/30/31

Fig. 12-15 Circuit diagram, Main Board - Unit 1, sh.5

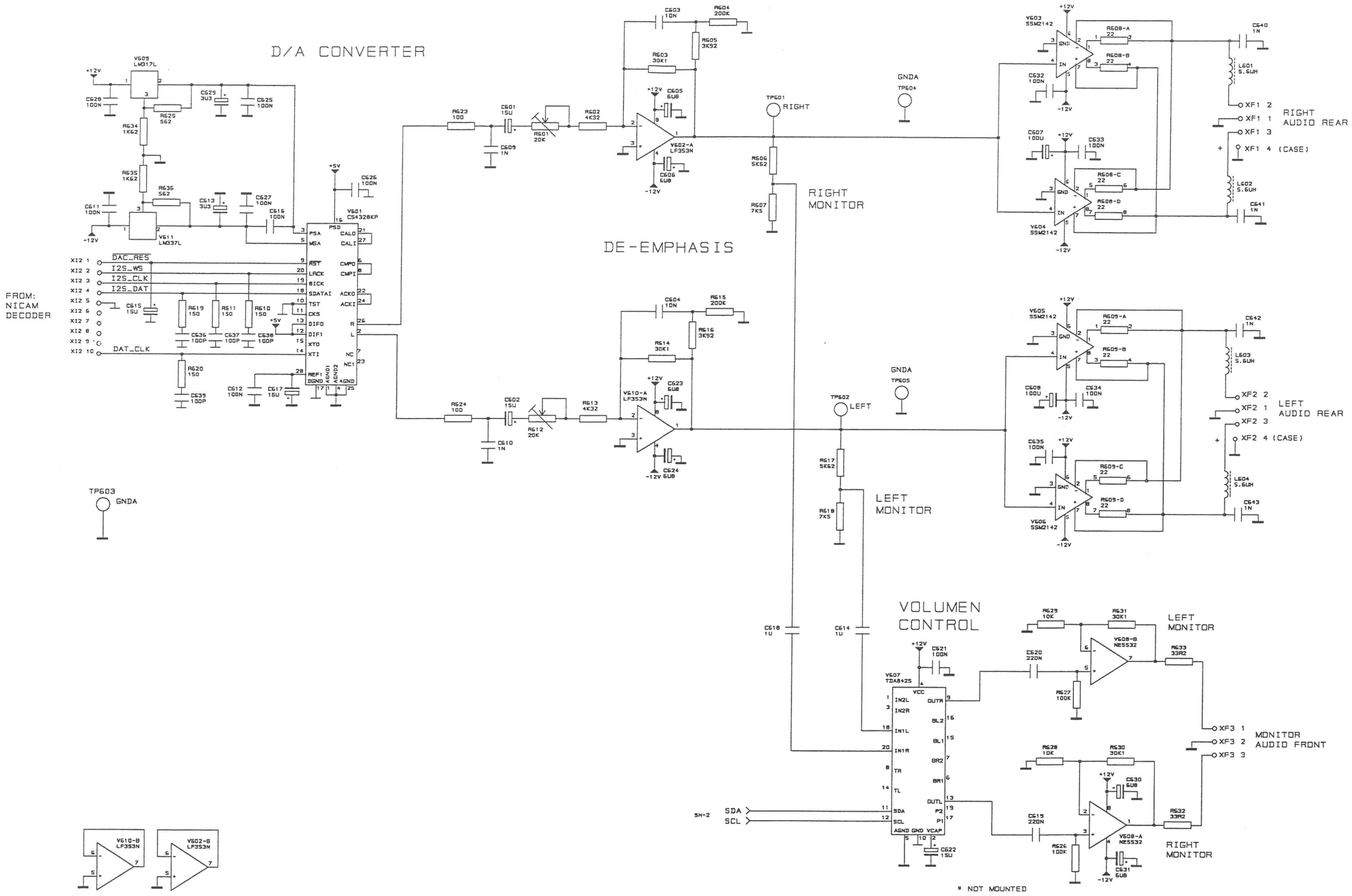
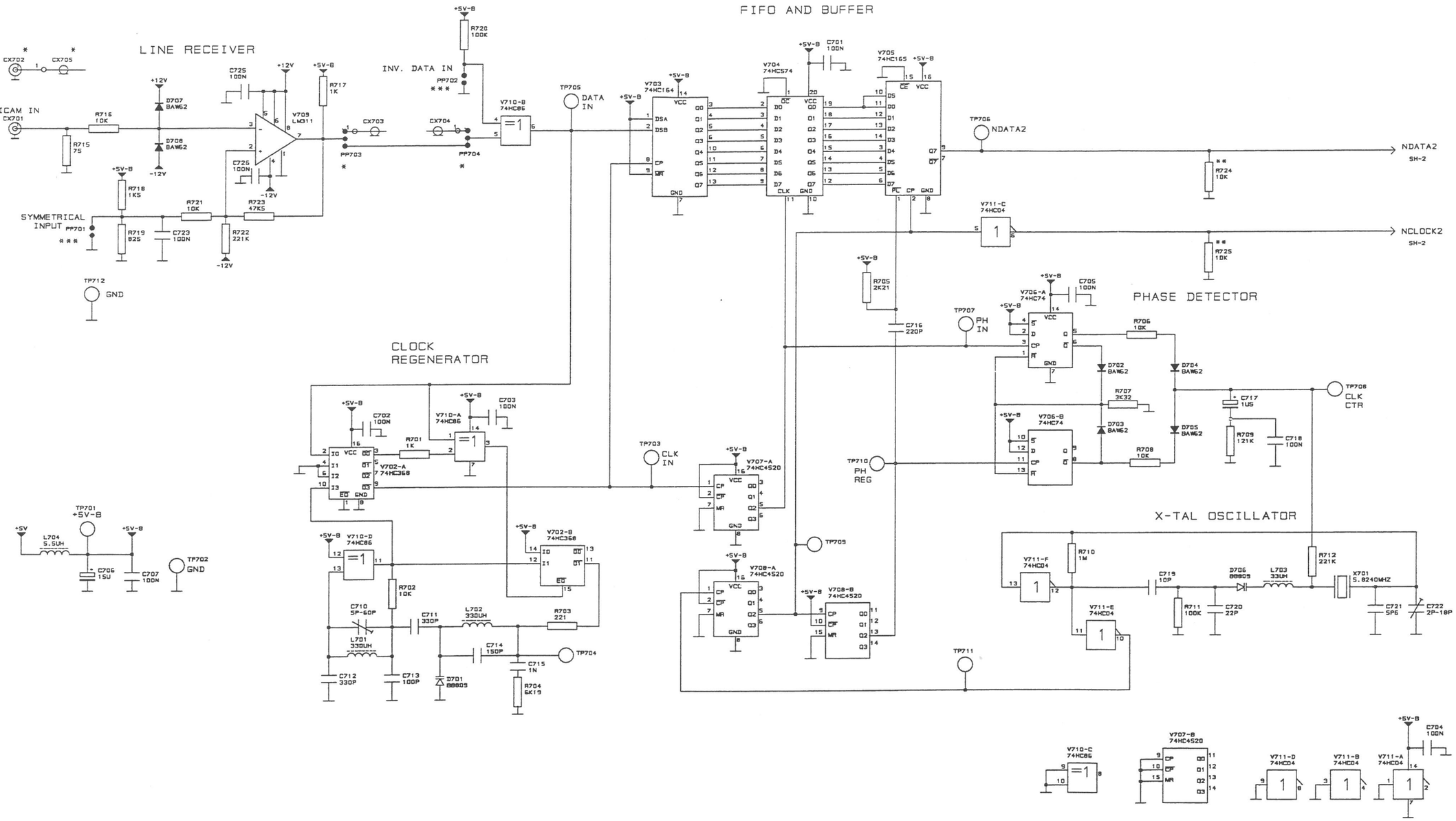


Fig. 12-16 Circuit diagram, Main Board - Unit 1, sh.6

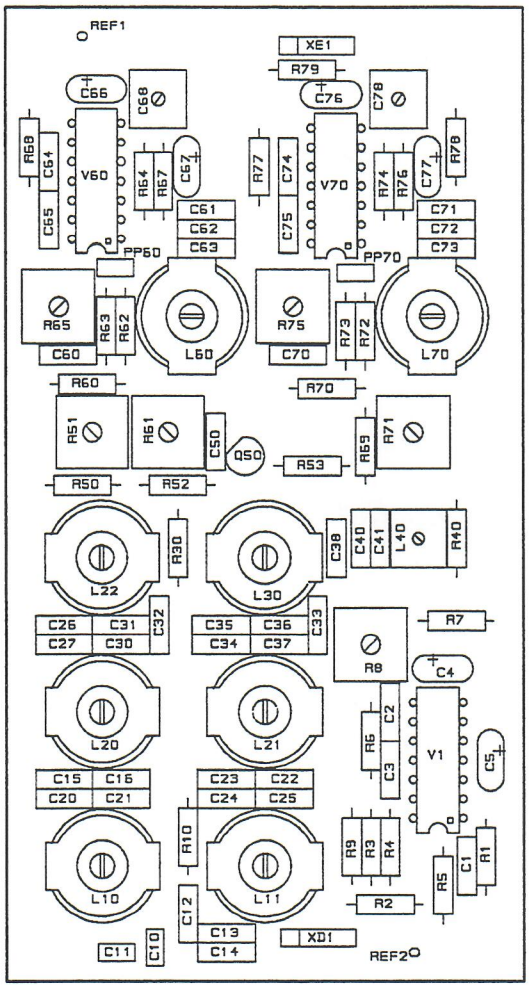


***		
PP701	NOT MOUNTED	ASYMMETRICAL INPUT NOM. 0-5V
	MOUNTED	SYMMETRICAL INPUT NOM. ± 2.5V
PP702	NOT MOUNTED	NORMAL INPUT
	MOUNTED	INVERT. INPUT

* NOT MOUNTED

** ONLY MOUNTED FOR IC VERSIONS /00

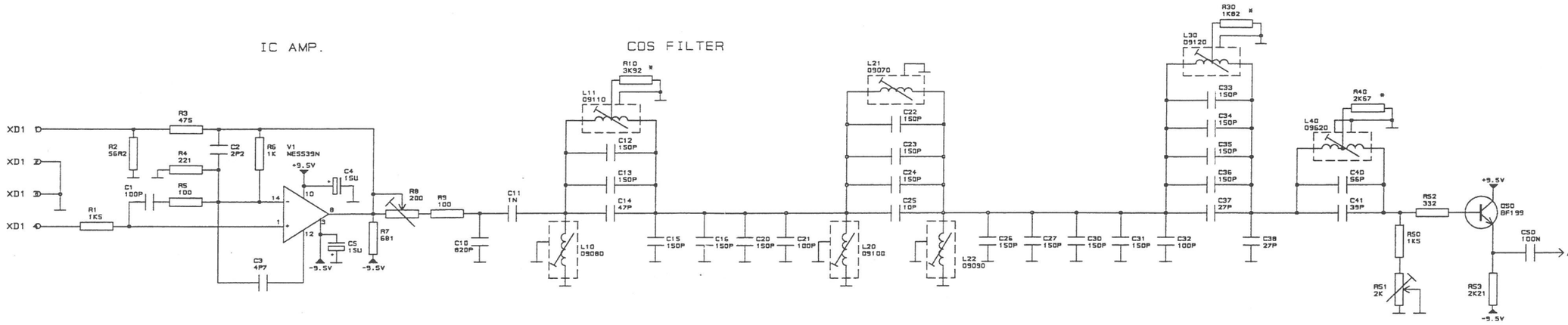
Fig. 12-17 Circuit diagram, Main Board - Unit 1, sh.7

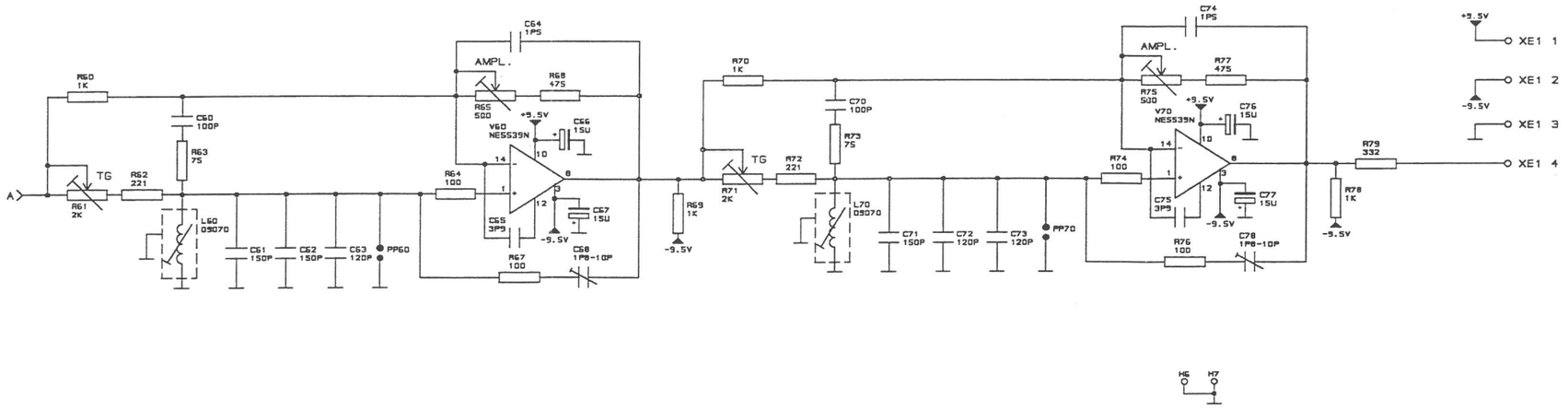


ATTENTION

109 82260

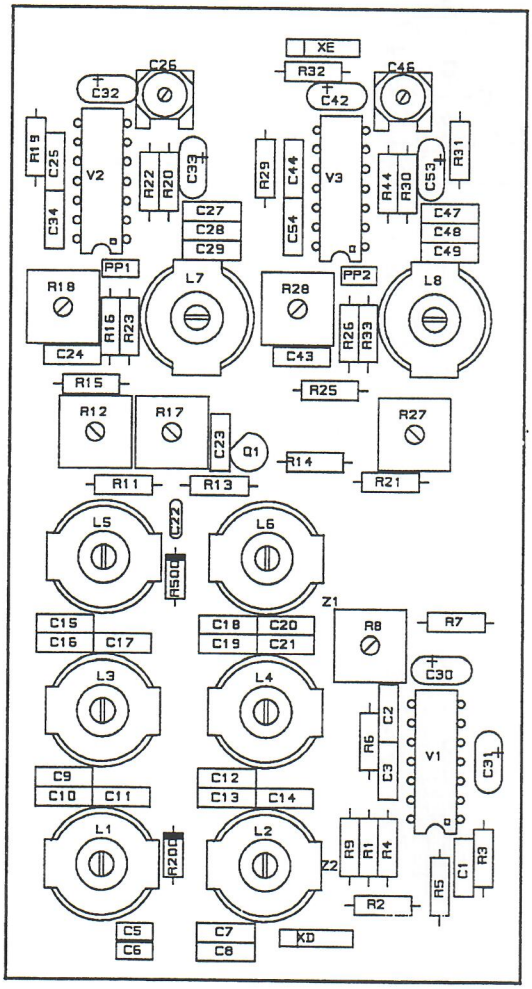
Fig. 12-18 Component location, Cosine Filter - Unit 2





* SELECTED VALUE (1K ... 5K)

Fig. 12-19 Circuit diagram, Cosine Filter - Unit 2



ATTENTION

109 71050

Fig. 12-20 Component location, Cosine Filter - Unit 2 (I versions)

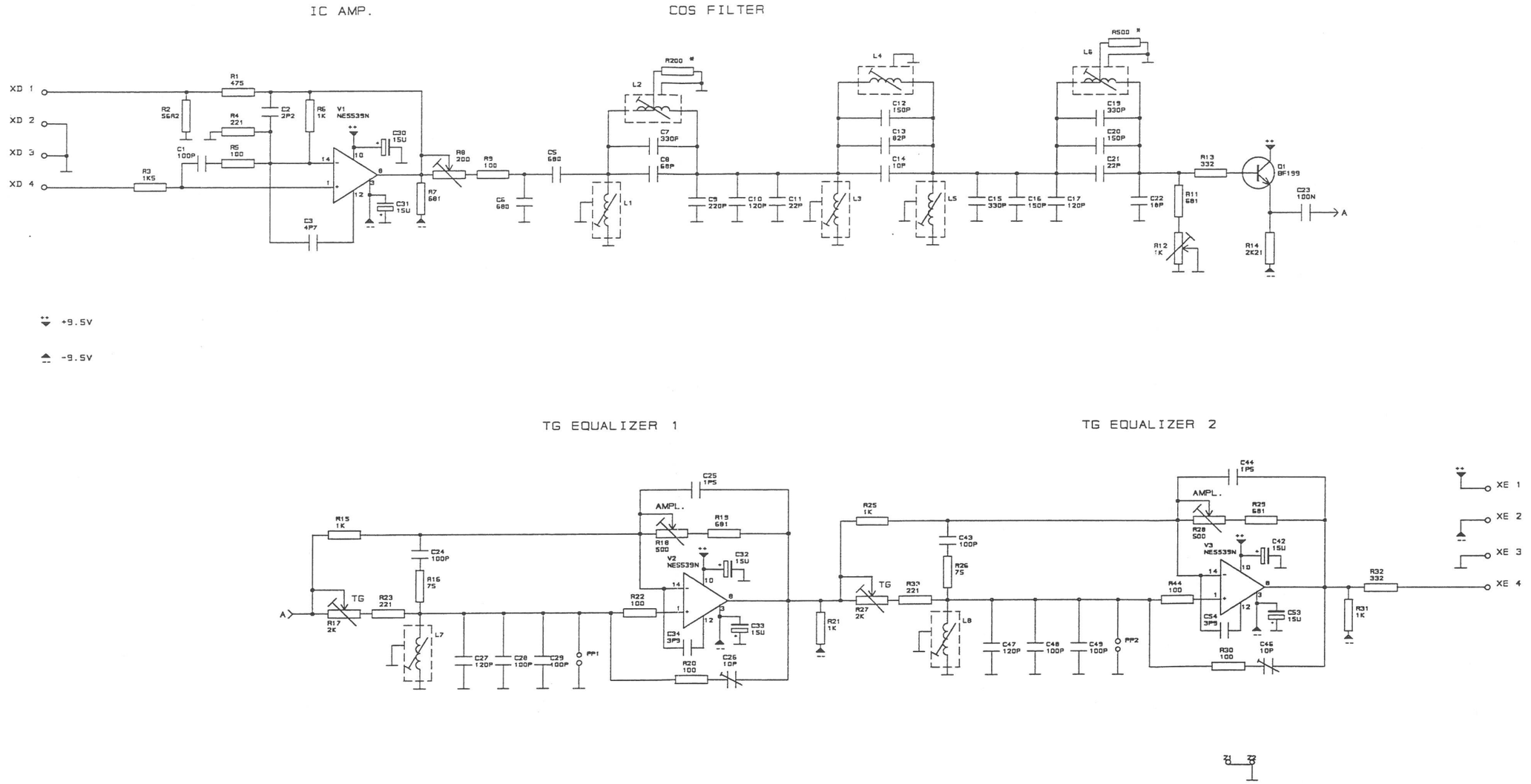
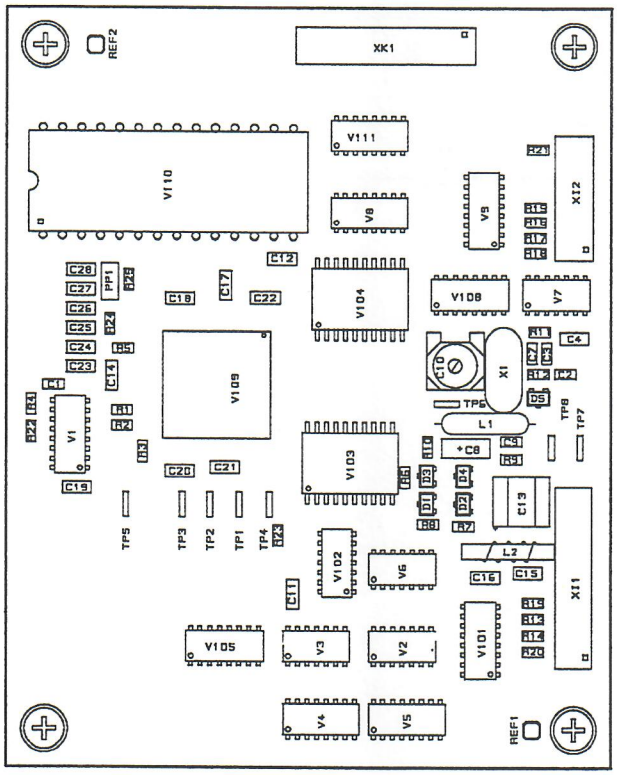


Fig. 12-21 Circuit diagram, Cosine Filter - Unit 2 (I versions)



ATTENTION

109 81990

Fig. 12-22 Component location, NICAM Decoder - Unit 3

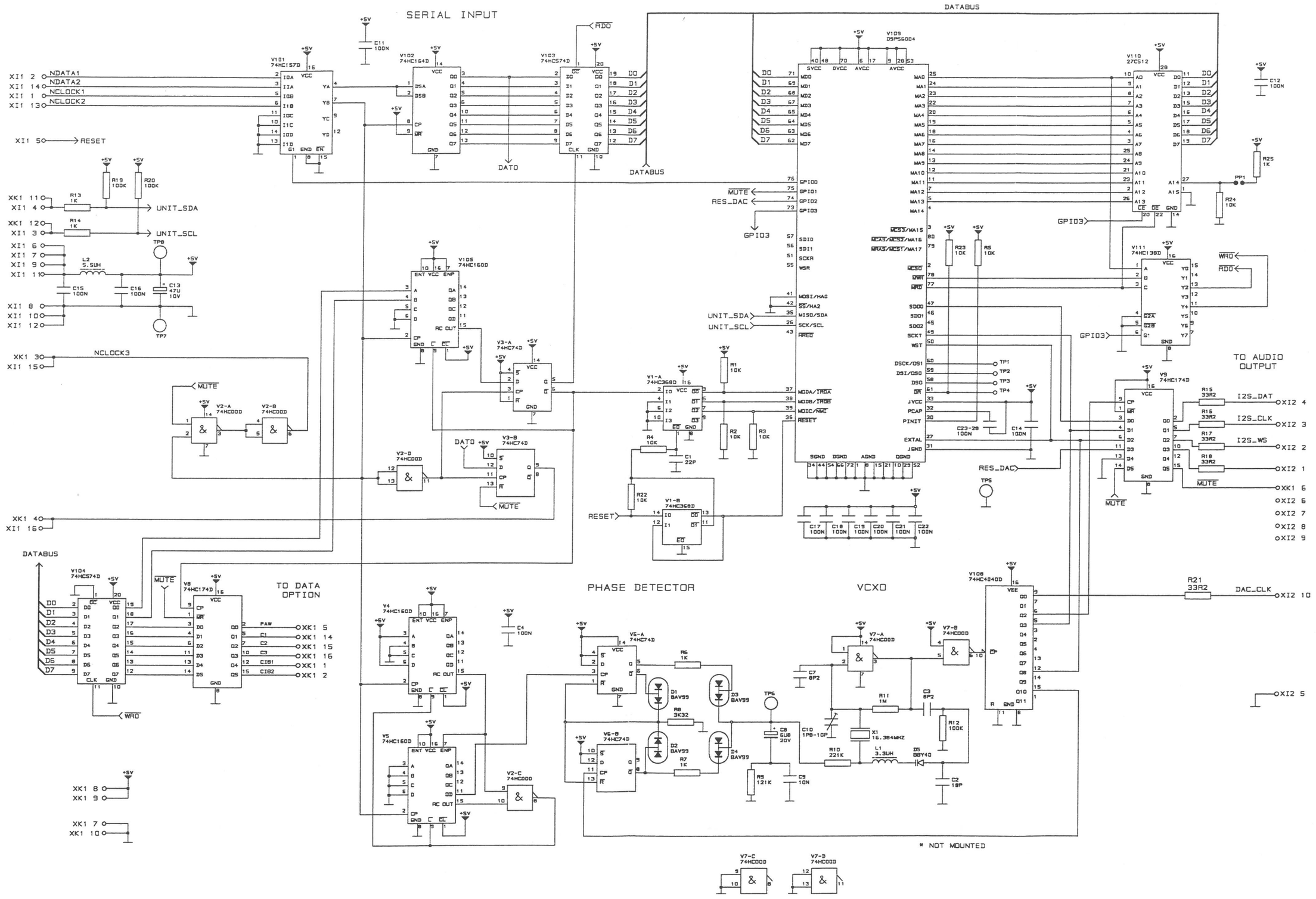
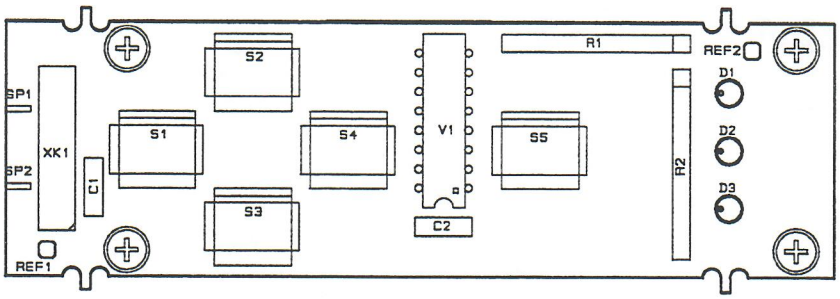


Fig. 12-23 Circuit diagram, NICAM Decoder - Unit 3



109 81980

Fig. 12-24 Component location, Key Board - Unit 4A

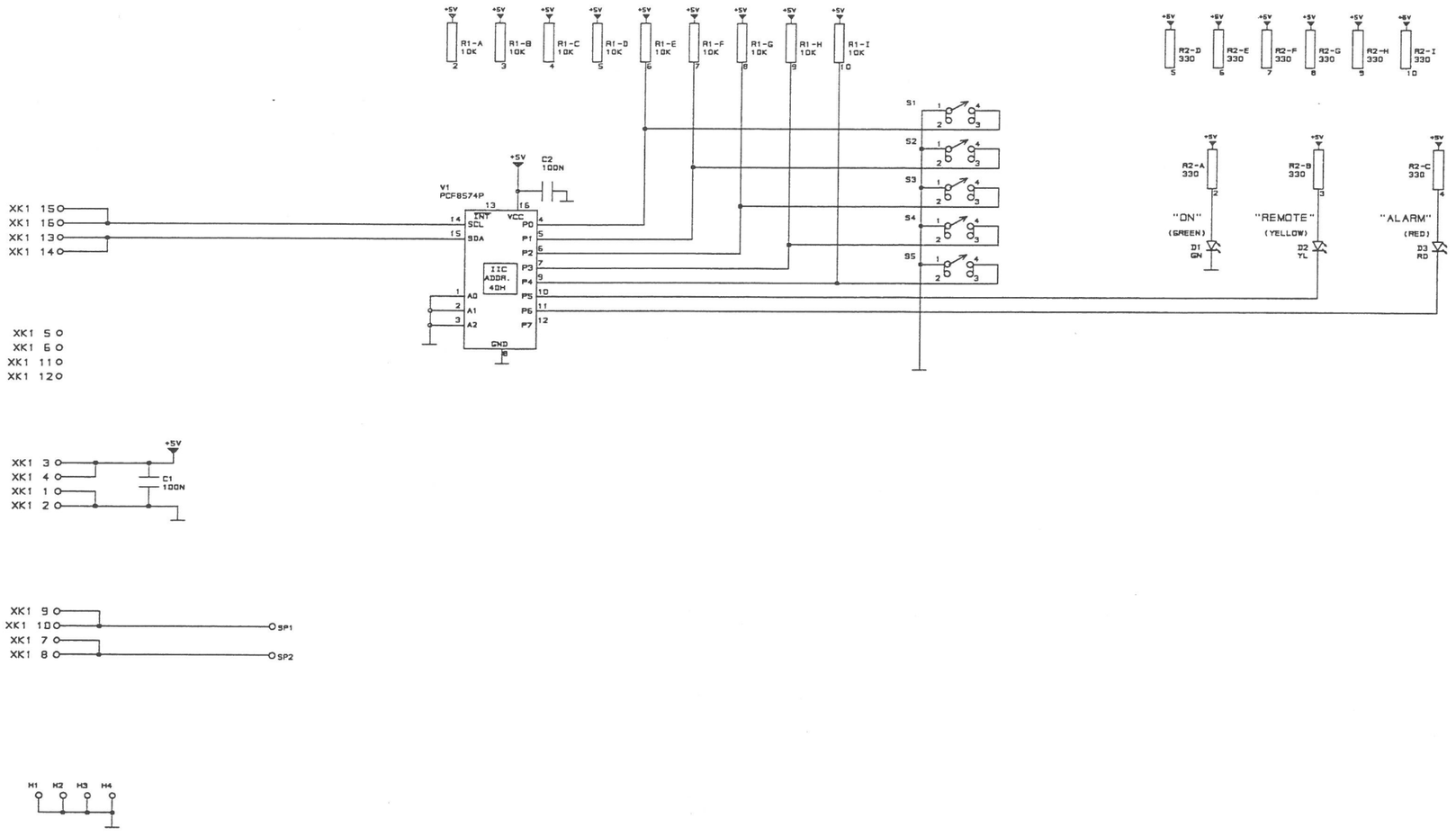
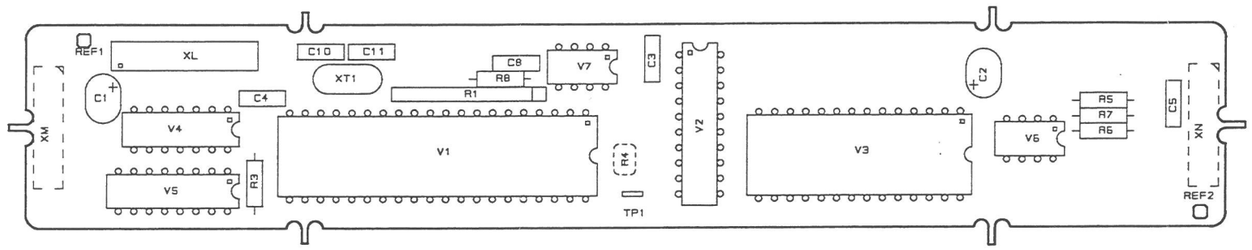


Fig. 12-25 Circuit diagram, Key Board - Unit 4A



R4 RESISTOR MOUNTED ON SOLDER SIDE
XM & XN CONNECTORS MOUNTED ON SOLDER SIDE

ATTENTION

109 81060

Fig. 12-26 Component location, Front Plate Controller - Unit 4B

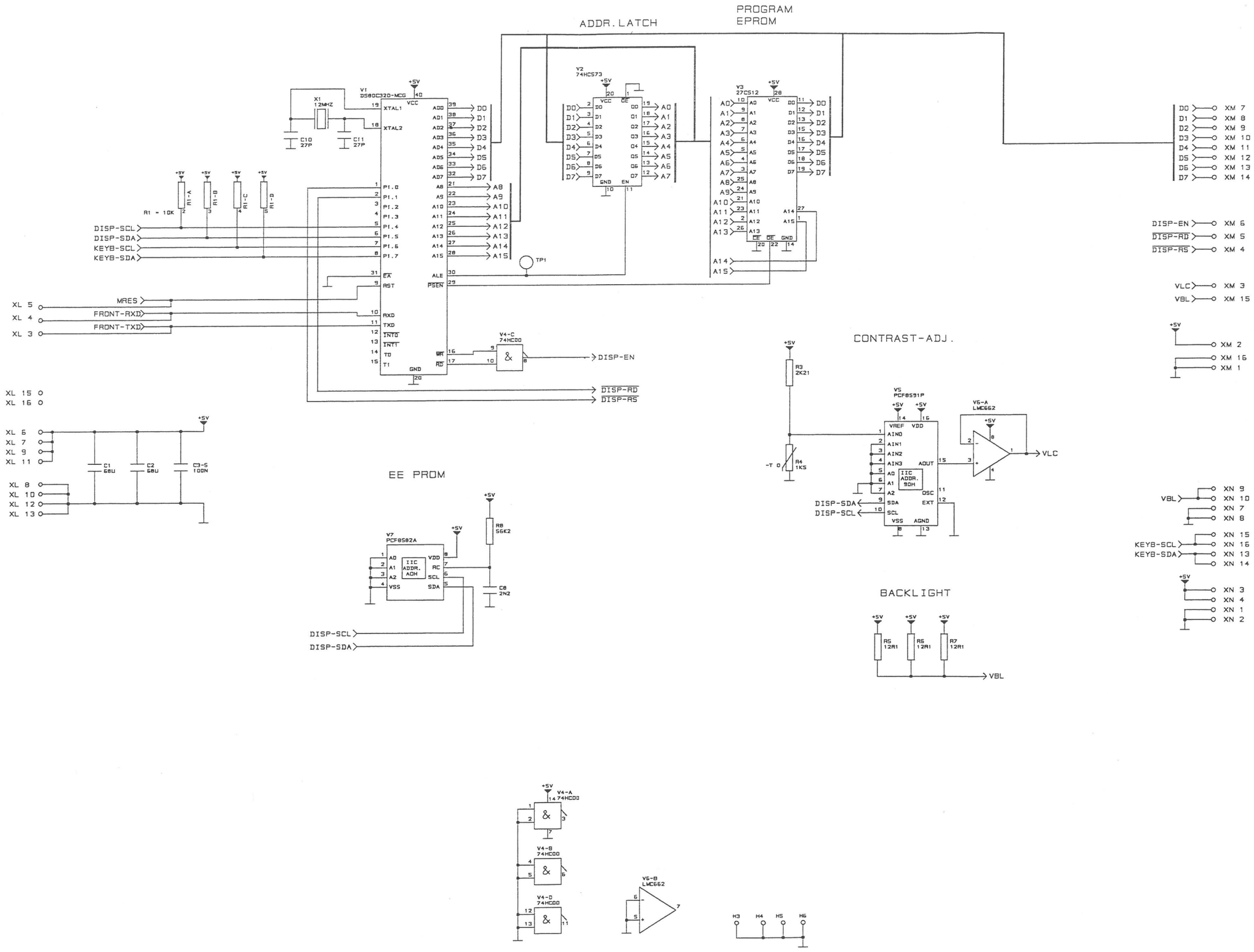


Fig. 12-27 Circuit diagram, Front Plate Controller - Unit 4B

13. RS232/V24 Interface - PM 8551/20

13.1 General Information

The RS232 interface provides the interface between an external RS232/V24 bus and the instruments internal I^2C bus.

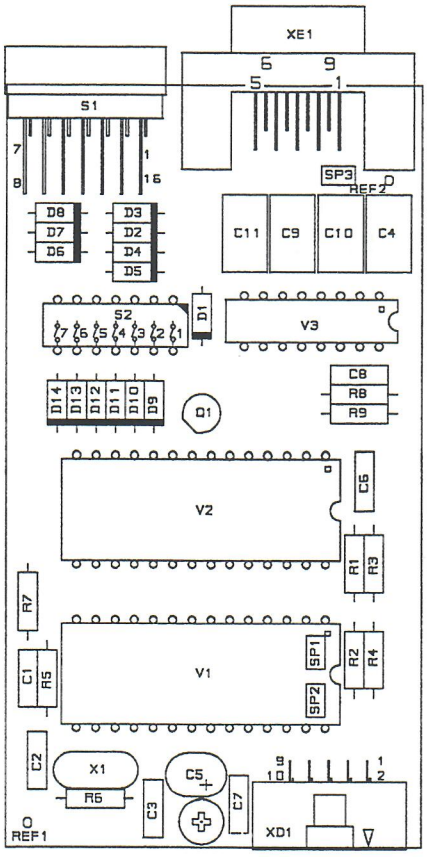
The unit is build around a single chip controller (V1), a DUART (V2), and a line driver (V3).

During output mode the controller transforms the data on I^2C bus to eight bit parallel format which can be handled by the DUART.

During input mode the controller transforms the eight bit parallel data supplied by the DUART into I^2C format.

13.2 Test and Adjustments

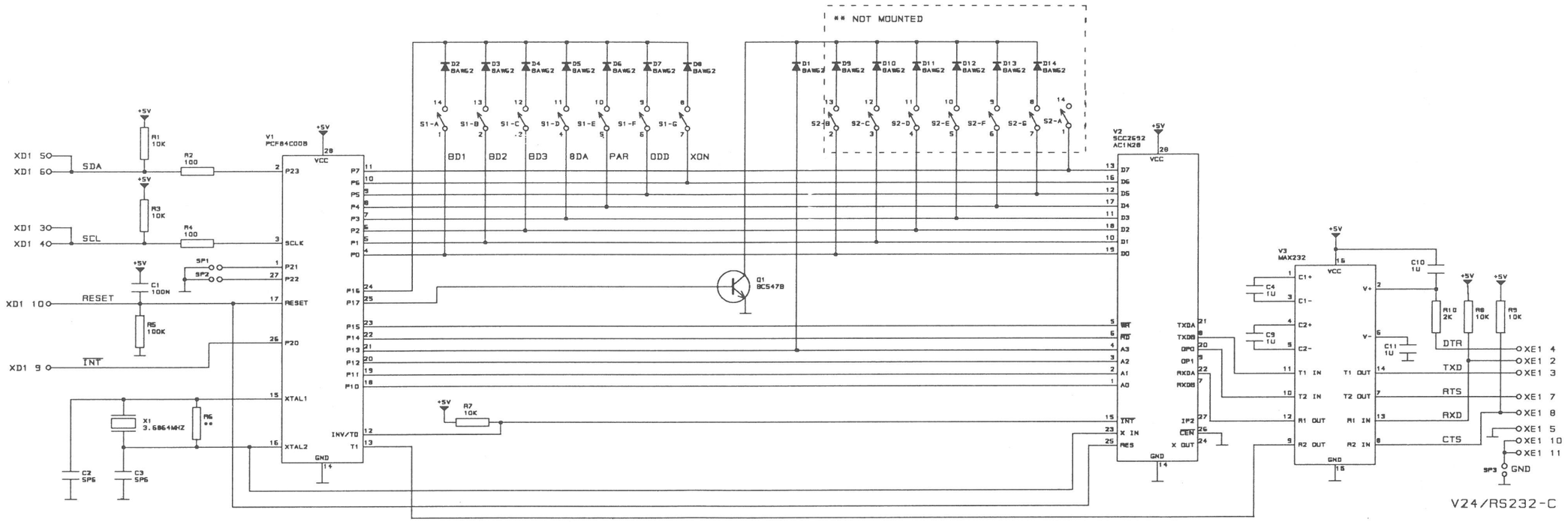
On this unit no adjustments are found.

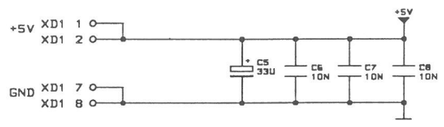


ATTENTION

109 81140

Fig. 13-1 Component location, RS232 Interface - PM 8531/20





** NOT MOUNTED

Circuit diagram, RS232 Interface - PM 8551/20

14. IEEE-488 Interface - PM 8551/30

14.1 General Information

The IEEE interface provides the interface between the IEEE bus input and the internal I^2C bus.

The main part of the unit is the CPU. This provided with a built-in 4K ROM and 128 bytes of RAM.

Port 0 (pin 4 to 11) is used as I/O-port and for reading the pre-selection switches (Address, Listen Only).

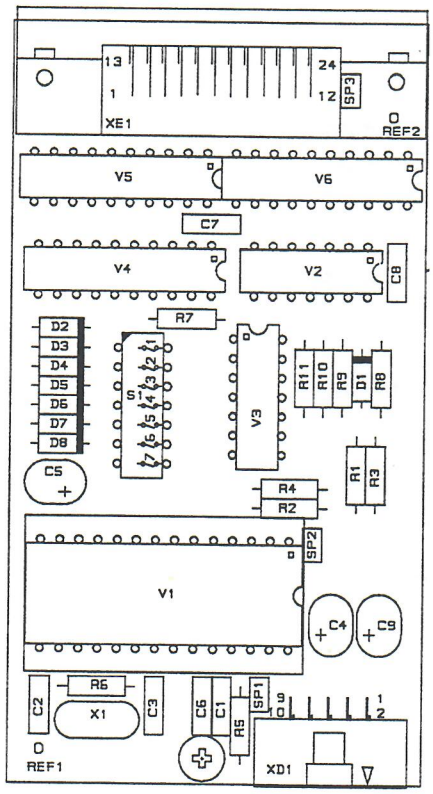
Port 1 (pin 18 to 25) is used for the IEEE control signals and to select the transmitter- or receiver function on the transceivers (V5/V6).

Pin 1 and 27 on the CPU are used for setting the I^2C bus address of the CPU.

The transceiver (V4) is used to open the connection between port 0 and the output IC (V5).

14.2 Test and Adjustments

On this unit no adjustments are found.



ATTENTION

109 81100

Fig. 14-1 Component location, IEEE Interface - PM 8531/30

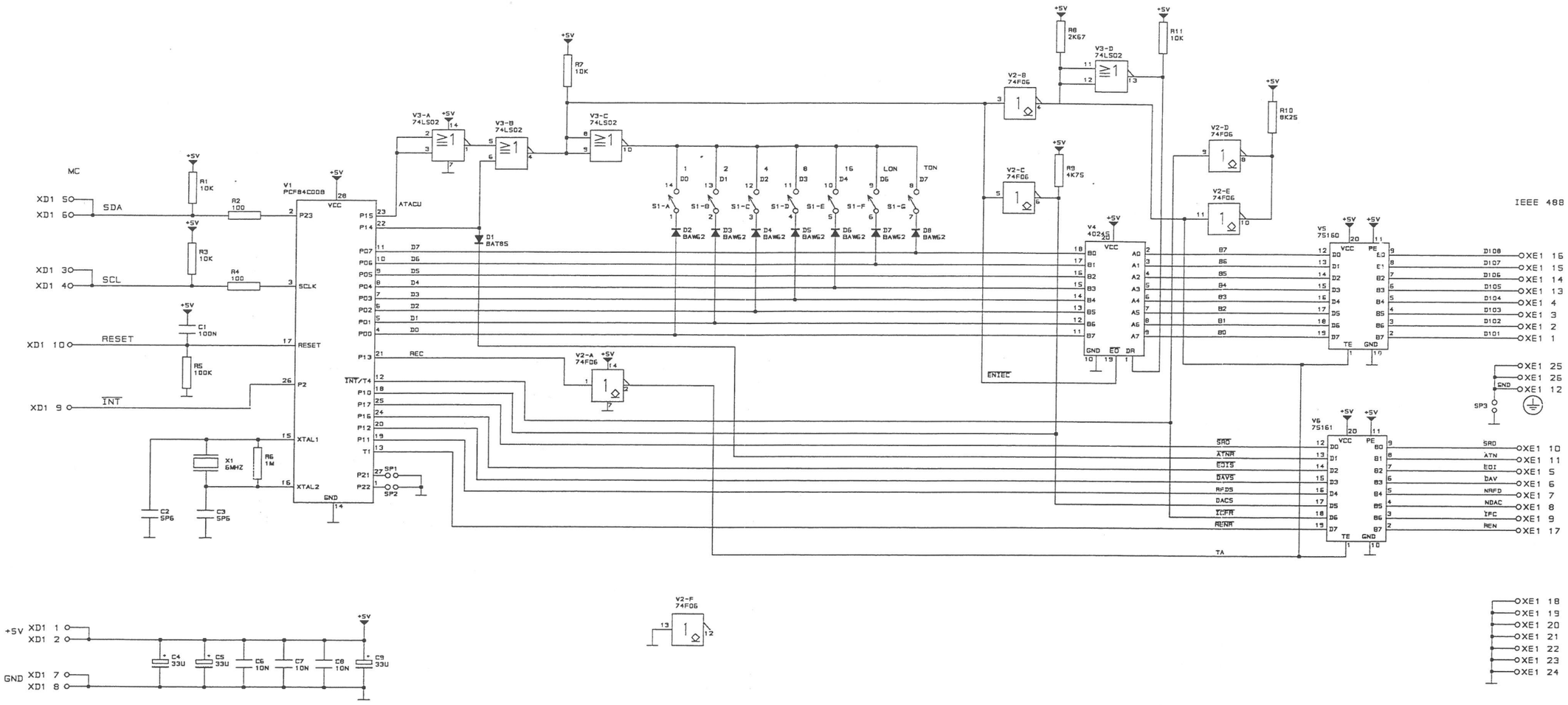


Fig. 14-2 Circuit diagram, IEEE Interface - PM 8531/30

15. NICAM Data Output - PM 8562

15.1 General Information

The NICAM Data Output option adds the following features to the standard NICAM monitor:

- Derivation of the 11 kbit/s Additional data (A-bits) from the NICAM-728 bit stream and generating FAW latch pulse.
- Derivation the Control information (C-bits) from the NICAM-728 bit stream.
- Descrambling of the NICAM-728 bit stream and generating a STROBE pulse for the data fields in Mono or Data mode.
- Derivation of the Control information bits (CIB1 and CIB2) from the NICAM-728 bit stream.

15.2 Circuit Description

The demodulated and decoded NICAM-728 bit stream plus some additional control signals from the NICAM decoder are accepted at the input connector (XK1).

All the logic needed for the above mentioned tasks is implemented in a Field Programmable Gate Array (FPGA) .

The output signals from the FPGA circuit are all latched and buffered in HCMOS output latches before leaving the PM 5689 via a 25-pole sub-D connector in the rear plate.

15.3 Test and Adjustments

Measuring equipment:

Digital Voltmeter	: e.g. PM 2525
Oscilloscope	: e.g. PM 3055
NICAM Encoder	: e.g. PM 5685 or /87

General Information

The NICAM Data Output option is tested when it is mounted in the PM 5689.

15.3.1 Voltage Check

Using the DVM, check for +5V ±0.5V at V102 pin 16.

15.3.2 Functional Checks

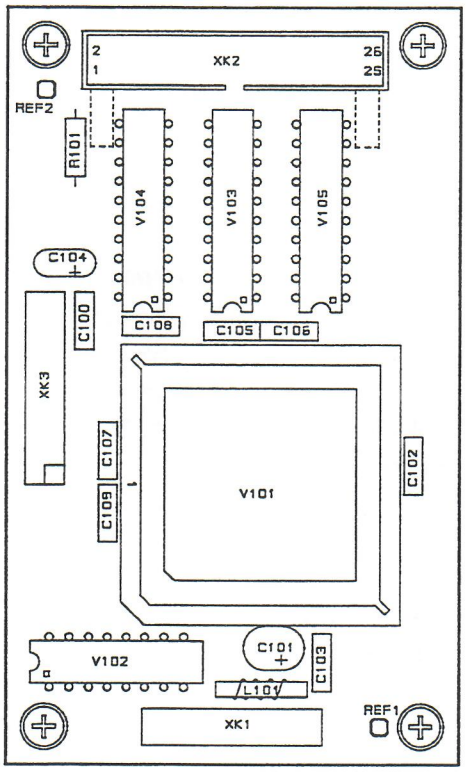
– Set the PM 5689 into the IF, IC, or digital mode to receive and decode a NICAM-728 bit stream in the NICAM decoder.

– With all signals present at the input of the option, the following signals are available at the output connector, ready to be measured by an oscilloscope:

1. The NICAM clock signal at pin 13.
2. The NICAM data signal (descrambled) at pin 12.
3. The FAW signal at pin 10.
4. The DATA STROBE signal at pin 11.
   This signal is only present when the input signal is in MONO or DATA mode.
5. The C_0-C_4 control information bits and the A_0-A_{10} additional data bits at pins 1-8 and 14-21 respectively.
   In order to check these bits, which usually exist as fixed levels, you could for example, shift the NICAM input signal to Stereo, Dual, Mono, and Data modes and check that the appropriate C-bits change their logic levels.

15.3.3 Adjustments

On this unit no adjustments are found.



ATTENTION

109 82030

Fig. 15-1 Component location, NICAM Data Output - PM 8562

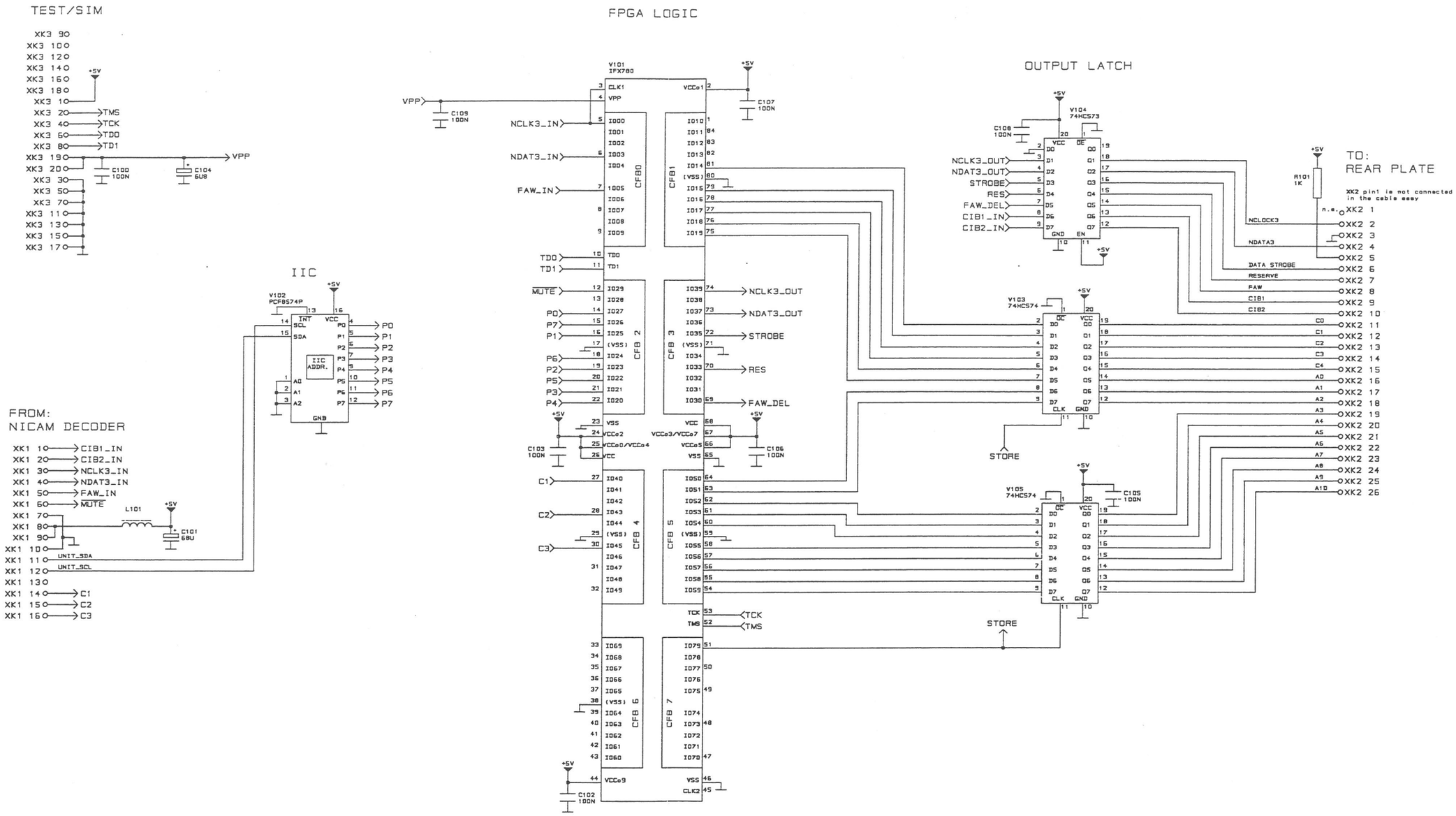


Fig. 15-2 Circuit diagram, NICAM Data Output - PM 8562

16. Service Hints

16.1 Maintenance

16.1.1 Switches

Should the switches cease to function properly due to dirty contacts, they should be treated with a switch cleaner which both cleans and lubricates. After being cleaned, the switch should be operated a number of times to distribute the cleaner evenly.

16.1.2 Cabinet

The cabinet can be cleaned with a mild detergent and water. If necessary, a fine scouring detergent may be used.

16.1.3 Repairs

If you experience problems with this equipment, please contact the local Philips sales/service organization. Our service centers have a trained staff who will provide all possible support in solving your problems.

If the instrument has to be sent to the Philips service center for repair and/or alignment, the following points should be noted:

1. Attach a label to the instrument stating the address of the sender and describing the fault(s) and complaint(s) as clearly as possible.

2. Use the original shipping carton and padding materials (if still available) or pack the instrument, wrapped in a plastic bag, in a rigid box in order to avoid transport damage.

3. The box should be marked with the complete type- and serial number (KU. number) and the remark "Return-shipment for repair".

16.2 Calibration Survey

1. IF Filter
   (/10 and /20 versions only)
2. Demodulator Balance
   (except /3x versions)
3. Clock Regenerator
   (except /3x versions)
4. Sample Pulse Generator
   (except /3x versions)
5. Sample Pulse Phase Offset
   (except /3x versions)
6. Intercarrier Mixer
   (/10 and /20 versions only)
7. Splitcarrier Local Oscillator
   (/10 and /20 versions only)
8. Splitcarrier Level
   (/10 version only, except System L)
9. NICAM Clock Regeneration
   (except /00 versions)
10. Audio Level

Fault analysis report

To aid us in maintaining records and in our continuing efforts to improve instrument reliability and the quality of the servicing manuals, we kindly request that you complete this fault analysis report if the instruments requires repair and/or adjustment.

Instrument type no.: PM _____ KU no. (serial no.) : _____

Estimated usage: _____ HRS/Year

Company name: _____

How many instruments of this type does your company use? _____

Please give a short description of the fault/symptoms:

_____

_____

_____

What was the cause? (Failed component, mis-adjustment etc).:

_____

_____

Time taken to repair/adjust __ HRS.

Does your company/organization normally?:

☐ Repair self ☐ Send the instrument to Philips Customer Support

When fault-finding/making adjustments, did you find the manual:

☐ Excellent? ☐ Adequate?

☐ Very good? ☐ Poor?

☐ Good? ☐ Very poor?

Do you have any suggestions that you think would improve future servicing manuals:

_____

_____

Have you any other suggestions/complains:

_____

_____

Please cut along the line and send this report to the Philips Customer Support Organization in your country.

17. List of Mechanical Parts

Item:	Ordering Number:	Description:
1	5322 459 04015	FRONT PLATE ASSY
2	5322 410 50174	KNOB FOR BUTTON (GREY)
3	5322 410 50175	KNOB FOR BUTTON (RED)
4	5322 130 91263	DISPLAY
5	5322 264 10284	BNC CONNECTOR
6	5322 265 10324	JACK CONNECTOR
7	5322 498 50333	HANDLE ASSY
8	5322 442 00013	TOP COVER
9	5322 426 10054	BOTTOM/REAR PLATE
10	5322 264 10285	N CONNECTOR
11	5322 264 10272	BNC CONNECTOR
12	5322 447 92365	COVER
13	5322 265 10335	XLM CONNECTOR
14	5322 265 10336	TTL CONNECTOR
15	5322 442 00014	COVER
16	5322 447 92315	COVER
17	5322 265 10325	GND CONNECTOR ASSY
18	5322 290 60432	MAINS INLET CONNECTOR
19	5322 455 71099	LABEL FOR MAINS CONN
20	5322 277 11337	MAINS SWITCH
	5322 146 10351	MAINS TRANSFORMER
	4822 253 50047	FUSE 0,5A SLOW
	4822 253 50046	FUSE 1A SLOW

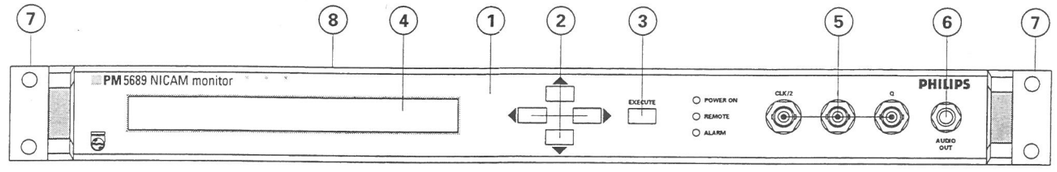


Fig. 17-1 Front of the Instrument

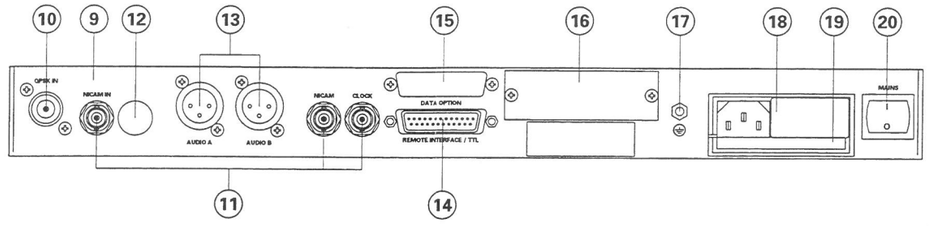


Fig. 17-2 Rear of the Instrument

18. List of Electrical Parts

Standard resistors (MR25, 0.4W, 1% and CHIP0805, 1W, 0.5%) are found on the "List of Standard Resistors" at the end of this Chapter.

Unit 1 - Main Board

Special parts

For common parts please refer to parts list for Version /10 System B/G.

For parts not mounted on Versions /00, /20, /30, and /31 please refer to circuit diagrams.

Version/00 - Systems B/G, D/K, and L

Item	Ordering Number	Description
Resistors		
R724	4822 050 21003	10K0 1% 0,6W MRS25
R725	4822 050 21003	10K0 1% 0,6W MRS25

Versions /00, /10 - System I

Crystal		
X402	5322 242 73562	6.552MHz

Version /10 - System L

Crystals		
X301	5322 242 10245	32.700MHz
X402	5322 242 73563	5,850000MHz
Capacitors		
C334	4822 122 31049	6P8 +-P25 100V CER.
C339	4822 122 31049	6P8 +-P25 100V CER.
C344	4822 122 32185	10P +-2% 100V CER.
C349	4822 122 32185	10P +-2% 100V CER.
C375	4822 122 32185	10P +-2% 100V CER.
C427	4822 122 32027	56P +-2% 100V CER.

Unit 1 - Main Board

Version /10 - System B/G

Integrated Circuits		
V101	5322 209 33682	L296
V102	4822 209 80591	LM317T
V103	5322 209 81236	LM337T
V201	5322 209 52609	80C32 U-CONT
V202	5322 209 83271	74HC573N
V203	5322 209 52894	PROG PROM
V204	5322 209 52594	MK48Z08B-10
V205	5322 209 12535	MAX693ACPE
V206	5322 209 91181	DP8310N
V207	5322 209 91181	DP8310N
V208	5322 209 11335	74HC138N
V209	5322 209 83228	LM337LZ
V210	5322 209 90517	DS3692N
V301	5322 209 82943	LM317LZ
V304	5322 209 62234	TDA3845
V305	5322 209 11296	74HC4053N
V306	5322 209 10883	PCF8574P
V401	5322 209 82943	LM317LZ
V402	5322 209 83228	LM337LZ
V403	4822 209 61115	LF353N
V404	4822 209 61115	LF353N
V405	5322 209 91178	LTC1298CN8
V406	4822 209 73558	TA8662N
V501	5322 209 82943	LM317LZ
V502	5322 209 91179	MAX153CCP
V503	5322 209 52893	PROG PROM
V504	5322 209 10883	PCF8574P
V505	5322 209 60188	LM339AN
V506	5322 209 86234	NE5532N
V507	5322 209 11331	74HC02N
V508	5322 209 11296	74HC4053N
V509	4822 209 61115	LF353N
V510	4822 209 61115	LF353N
V511	4822 209 70194	74HC04N
V512	5322 209 73011	74HC4520N
V514	5322 209 91184	AD827JN
V601	5322 209 90516	CS4328KP
V602	4822 209 61115	LF353N
V603	5322 209 33195	SSM2142
V604	5322 209 33195	SSM2142
V605	5322 209 33195	SSM2142
V606	5322 209 33195	SSM2142
V607	5322 209 33192	TDA8425
V608	5322 209 86234	NE5532N
V609	5322 209 82943	LM317LZ
V610	4822 209 61115	LF353N
V611	5322 209 83228	LM337LZ
V702	4822 209 11586	74HC368N
V703	4822 209 11605	74HC164N
V704	5322 209 11342	74HC574N
V705	5322 209 11531	74HC165N
V706	5322 209 82575	74HC74N
V707	5322 209 73011	74HC4520N
V708	5322 209 73011	74HC4520N
V709	5322 209 85503	LM311N
V710	5322 209 11473	74HC86N
V711	4822 209 70194	74HC04N
Transistors		
Q301	4822 130 40959	BC547B
Q302	4822 130 44154	BF199
Q303	4822 130 44154	BF199

Item	Ordering Number	Description
Q304	4822 130 44568	BC557B
Q305	5322 130 42244	BFR96S/02
Q401	4822 130 44154	BF199
Q402	4822 130 40959	BC547B
Q403	4822 130 44568	BC557B
Q404	4822 130 40959	BC547B
Q405	4822 130 40959	BC547B
Q406	4822 130 44568	BC557B
Q407	4822 130 44568	BC557B
Q408	4822 130 40959	BC547B
Q409	4822 130 40959	BC547B
Q410	4822 130 44568	BC557B
Diodes		
D101	5322 130 80285	SB360
D102	5322 130 80285	SB360
D103	5322 130 81291	RECT. BRIDGE 280V
D104	5322 130 80285	SB360
D201-9	4822 130 30613	BAW62
D210-4	4822 130 30613	BAW62
D301	5322 130 34955	BA482
D302	4822 130 34173	BZX79-C5V6
D303	4822 130 30613	BAW62
D304	4822 130 30613	BAW62
D305	4822 130 30613	BAW62
D401	5322 130 80617	BAT81
D402	5322 130 80617	BAT81
D403	4822 130 30613	BAW62
D404	4822 130 30613	BAW62
D405	4822 130 30613	BAW62
D406	4822 130 30613	BAW62
D407	4822 130 31983	BAT85
D408	5322 130 31684	BB809
D409	4822 130 30613	BAW62
D501	4822 130 34173	BZX79-C5V6
D502	5322 130 31684	BB809
D701	5322 130 31684	BB809
D702	4822 130 30613	BAW62
D703	4822 130 30613	BAW62
D704	4822 130 30613	BAW62
D705	4822 130 30613	BAW62
D706	5322 130 31684	BB809
D707	4822 130 30613	BAW62
D708	4822 130 30613	BAW62
Coils		
L103	5322 157 60475	5.5UH
L104	5322 157 60475	5.5UH
L305	5322 157 60475	5.5UH
L307	5322 157 53619	0,7UH
L308	5322 157 53619	0.7UH
L309	5322 157 53619	0.7UH
L310	5322 157 53619	0.7UH
L311	5322 157 60475	5.5UH
L312	5322 157 71723	50NH
L314	5322 146 21515	6,75
L704	5322 157 60475	5.5UH

Item	Ordering Number	Description
Crystals		
X201	4822 242 71663	12,000000MHz
X301	5322 242 74373	38,90MHz
X402	4822 242 72302	5,850MHz
X403	4822 242 72304	5,8240MHz
X501	4822 242 71663	12,000000MHz
X502	4822 242 72304	5,8240MHz
X701	4822 242 72304	5,8240MHz
Relay		
RE301	5322 280 80795	UM1L-D12W-K
Capacitors		
C101	5322 121 42386	100N +-10% 63V FOIL
C102	5322 121 42386	100N +-10% 63V FOIL
C103	5322 121 42498	680N +-10% 63V FOIL
C104	5322 124 80825	3300UF +-20% 40V ELC
C105	5322 124 80825	3300UF +-20% 40V ELC
C106	5322 124 40852	100U +-20% 35V ELCO
C107	4822 124 20947	3U3 +-20% 16V TANTAL
C108	4822 122 31353	N33 +-2% 100V CER.
C109	5322 121 42489	33N +-10% 100V FOIL
C110	5322 121 54071	2N2 +-1% 250V POLYS
C111	4822 124 20947	3U3 +-20% 16V TANTAL
C112	4822 124 40196	220U +-20% 16V ELCO
C113	4822 124 40196	220U +-20% 16V ELCO
C114	5322 121 42386	100N +-10% 63V FOIL
C115	5322 121 42386	100N +-10% 63V FOIL
C116	5322 121 42386	100N +-10% 63V FOIL
C117	5322 121 42386	100N +-10% 63V FOIL
C118	5322 121 42386	100N +-10% 63V FOIL
C119	5322 124 80825	3300UF +-20% 40V ELC
C120	5322 124 80825	3300UF +-20% 40V ELC
C121	5322 124 40852	100U +-20% 35V ELCO
C122	5322 124 40852	100U +-20% 35V ELCO
C123	5322 121 42386	100N +-10% 63V FOIL
C124	5322 121 42386	100N +-10% 63V FOIL
C125	4822 124 20942	1U5 +-20% 25V TANTAL
C126	4822 124 20942	1U5 +-20% 25V TANTAL
C127	5322 124 10695	15U +-20% 16V TANTAL
C128	5322 124 10695	15U +-20% 16V TANTAL
C129	5322 121 42386	100N +-10% 63V FOIL
C130	5322 121 42386	100N +-10% 63V FOIL
C201	4822 122 30045	27P +-2% 100V CER.
C202	4822 122 30045	27P +-2% 100V CER.
C203	5322 121 42386	100N +-10% 63V FOIL
C204	5322 121 42386	100N +-10% 63V FOIL
C205	5322 121 42386	100N +-10% 63V FOIL
C206	5322 121 42386	100N +-10% 63V FOIL
C207	5322 121 42386	100N +-10% 63V FOIL
C208	4822 124 20942	1U5 +-20% 25V TANTAL
C209	5322 121 42386	100N +-10% 63V FOIL
C210	4822 122 32186	5P6 +-P25 100V CER.
C300	4822 122 31049	6P8 +-P25 100V CER.
C301	4822 122 32185	10P +-2% 100V CER.
C329	5322 122 32261	4N7 +-10% 100V CER.
C330	5322 121 42386	100N +-10% 63V FOIL
C331	5322 121 42386	100N +-10% 63V FOIL
C332	5322 121 42386	100N +-10% 63V FOIL

Item	Ordering Number	Description
C333	4822 121 51252	470N +-10% 63V FOIL
C334	4822 122 32185	10P +-2% 100V CER.
C335	4822 122 31061	18P +-2% 100V CER.
C336	4822 122 31822	4P7 +-P25 100V CER.
C337	5322 125 60196	1,2-3,5PF TRIMMER
C338	4822 122 31061	18P +-2% 100V CER.
C339	4822 122 32185	10P +-2% 100V CER.
C340	5322 121 42386	100N +-10% 63V FOIL
C341	5322 121 42386	100N +-10% 63V FOIL
C342	5322 121 42386	100N +-10% 63V FOIL
C343	5322 121 42386	100N +-10% 63V FOIL
C344	4822 122 31049	6P8 +-P25 100V CER.
C345	4822 122 31061	18P +-2% 100V CER.
C346	4822 122 31821	3P3 +-P25 100V CER.
C347	5322 125 60196	1,2-3,5PF TRIMMER
C348	4822 122 31061	18P +-2% 100V CER.
C349	4822 122 31049	6P8 +-P25 100V CER.
C350	5322 122 32261	4N7 +-10% 100V CER.
C351	5322 122 32331	1N0 +-10% 100V CER.
C352	5322 122 32072	33P +-2% 100V CER.
C355	4822 122 31316	N10 +-2% 100V CER.
C356	4822 122 31348	N12 +-2% 100V CER.
C357	4822 122 31316	N10 +-2% 100V CER.
C358	4822 122 31237	82P +-2% 100V CER.
C360	5322 122 32261	4N7 +-10% 100V CER.
C361	5322 122 32261	4N7 +-10% 100V CER.
C362	5322 125 50051	2,0-18PF TRIMMER
C364	4822 122 31349	68P +-2% 100V CER.
C365	4822 122 30045	27P +-2% 100V CER.
C367	4822 124 20947	3U3 +-20% 16V TANTAL
C368	4822 124 20942	1U5 +-20% 25V TANTAL
C369	5322 124 10695	15U +-20% 16V TANTAL
C370	5322 121 42386	100N +-10% 63V FOIL
C371	5322 121 42386	100N +-10% 63V FOIL
C372	5322 122 32261	4N7 +-10% 100V CER.
C373	5322 122 32056	N22 +-2% 100V CER.
C374	4822 122 30104	1P0 +-P25 100V CER.
C401	5322 121 42386	100N +-10% 63V FOIL
C402	5322 121 42386	100N +-10% 63V FOIL
C403	5322 121 42386	100N +-10% 63V FOIL
C404	5322 121 42386	100N +-10% 63V FOIL
C405	5322 124 14081	6U8 +-20% 25V TANTAL
C406	5322 124 14081	6U8 +-20% 25V TANTAL
C408	4822 121 41857	10N +-10% 250V FOIL
C410	5322 122 32331	1N0 +-10% 100V CER.
C411	5322 121 42386	100N +-10% 63V FOIL
C412	5322 121 42386	100N +-10% 63V FOIL
C413	4822 122 31353	N33 +-2% 100V CER.
C414	5322 122 32331	1N0 +-10% 100V CER.
C415	5322 121 42386	100N +-10% 63V FOIL
C416	4822 121 51252	470N +-10% 63V FOIL
C417	5322 121 42386	100N +-10% 63V FOIL
C418	4822 124 20947	3U3 +-20% 16V TANTAL
C419	5322 122 32331	1N0 +-10% 100V CER.
C420	5322 121 42386	100N +-10% 63V FOIL
C421	4822 121 41857	10N +-10% 250V FOIL
C421	4822 121 51252	470N +-10% 63V FOIL
C423	4822 121 51252	470N +-10% 63V FOIL
C424	5322 121 42386	100N +-10% 63V FOIL

Item	Ordering Number	Description
C425	5322 122 32331	1N0 +-10% 100V CER.
C426	4822 122 30045	27P +-2% 100V CER.
C427	4822 122 32027	56P +-2% 100V CER.
C428	4822 122 31823	15P +-2% 100V CER.
C429	4822 122 31823	15P +-2% 100V CER.
C430	4822 122 32027	56P +-2% 100V CER.
C431	4822 122 32185	10P +-2% 100V CER.
C432	5322 125 50051	2,0-18P TRIMMER
C433	4822 122 31061	18P +-2% 100V CER.
C434	4822 121 51252	470N +-10% 63V FOIL
C435	4822 121 41857	10N +-10% 250V FOIL
C436	4822 121 41857	10N +-10% 250V FOIL
C437	4822 121 41857	10N +-10% 250V FOIL
C438	5322 121 42386	100N +-10% 63V FOIL
C439	5322 121 42386	100N +-10% 63V FOIL
C440	5322 121 42386	100N +-10% 63V FOIL
C441	5322 121 42386	100N +-10% 63V FOIL
C442	4822 121 41857	10N +-10% 250V FOIL
C443	5322 121 42386	100N +-10% 63V FOIL
C444	5322 121 54078	N47 +-1% 630V POLYS.
C445	4822 121 50591	1N0 +-1% 630V POLYS.
C446	4822 122 32185	10P +-2% 100V CER.
C447	5322 121 54078	N47 +-1% 630V POLYS.
C448	4822 121 50591	1N0 +-1% 630V POLYS.
C449	4822 122 32185	10P +-2% 100V CER.
C450	5322 121 42386	100N +-10% 63V FOIL
C451	5322 121 42386	100N +-10% 63V FOIL
C452	5322 121 42386	100N +-10% 63V FOIL
C453	5322 121 42386	100N +-10% 63V FOIL
C454	5322 121 42386	100N +-10% 63V FOIL
C501	4822 124 20942	1U5 +-20% 25V TANTAL
C502	5322 121 42386	100N +-10% 63V FOIL
C503	5322 124 24115	6U8 +-20% 10V TANTAL
C504	5322 121 42386	100N +-10% 63V FOIL
C505	5322 122 32072	33P +-2% 100V CER.
C506	5322 122 32072	33P +-2% 100V CER.
C507	5322 121 42386	100N +-10% 63V FOIL
C508	5322 124 10695	15U +-20% 16V TANTAL
C509	5322 124 14081	6U8 +-20% 25V TANTAL
C510	5322 124 14081	6U8 +-20% 25V TANTAL
C511	4822 121 50562	N10 +-1% 630V POLYS.
C512	4822 121 50562	N10 +-1% 630V POLYS.
C513	4822 121 50562	N10 +-1% 630V POLYS.
C514	5322 124 14081	6U8 +-20% 25V TANTAL
C515	5322 124 14081	6U8 +-20% 25V TANTAL
C516	4822 121 50538	6N8 +-1% 63V POLYS.
C517	5322 121 42465	68N +-10% 63V FOIL
C518	4822 122 31353	N33 +-2% 100V CER.
C519	4822 122 32186	5P6 +-P25 100V CER.
C520	4822 122 32186	5P6 +-P25 100V CER.
C521	5322 122 32261	4N7 +-10% 100V CER.
C522	4822 122 31072	47P +-2% 100V CER.
C523	5322 125 50051	2,0-18PF TRIMMER
C524	5322 121 42386	100N +-10% 63V FOIL
C525	5322 121 42386	100N +-10% 63V FOIL
C526	4822 122 31316	N10 +-2% 100V CER.
C527	5322 121 42386	100N +-10% 63V FOIL
C529	5322 124 10695	15U +-20% 16V TANTAL
C530	5322 124 10695	15U +-20% 16V TANTAL

Item	Ordering Number	Description
C531	4822 122 30107	N27 +-2% 100V CER.
C532	4822 122 30107	N27 +-2% 100V CER.
C601	5322 124 10695	15U +-20% 16V TANTAL
C602	5322 124 10695	15U +-20% 16V TANTAL
C603	5322 121 54154	10N +-1% 63V POLYS.
C604	5322 121 54154	10N +-1% 63V POLYS.
C605	5322 124 14081	6U8 +-20% 25V TANTAL
C606	5322 124 14081	6U8 +-20% 25V TANTAL
C607	5322 124 40852	100U +-20% 35V ELCO
C608	5322 124 40852	100U +-20% 35V ELCO
C609	5322 122 32331	1N0 +-10% 100V CER.
C610	5322 122 32331	1N0 +-10% 100V CER.
C611	5322 121 42386	100N +-10% 63V FOIL
C612	5322 121 42386	100N +-10% 63V FOIL
C613	4822 124 20947	3U3 +-20% 16V TANTAL
C614	5322 121 42114	1U0 +-5% 63V FOIL
C615	5322 124 14091	15U +-20% 6,3V TANT.
C616	5322 121 42386	100N +-10% 63V FOIL
C617	5322 124 14091	15U +-20% 6,3V TANT.
C618	5322 121 42114	1U0 +-5% 63V FOIL
C619	4822 121 42408	220N +-10% 63V FOIL
C620	4822 121 42408	220N +-10% 63V FOIL
C621	5322 121 42386	100N +-10% 63V FOIL
C622	5322 124 10695	15U +-20% 16V TANTAL
C623	5322 124 14081	6U8 +-20% 25V TANTAL
C624	5322 124 14081	6U8 +-20% 25V TANTAL
C625	5322 121 42386	100N +-10% 63V FOIL
C626	5322 121 42386	100N +-10% 63V FOIL
C627	5322 121 42386	100N +-10% 63V FOIL
C628	5322 121 42386	100N +-10% 63V FOIL
C629	4822 124 20947	3U3 +-20% 16V TANTAL
C630	5322 124 14081	6U8 +-20% 25V TANTAL
C631	5322 124 14081	6U8 +-20% 25V TANTAL
C632	5322 121 42386	100N +-10% 63V FOIL
C633	5322 121 42386	100N +-10% 63V FOIL
C634	5322 121 42386	100N +-10% 63V FOIL
C635	5322 121 42386	100N +-10% 63V FOIL
C636	4822 122 31316	N10 +-2% 100V CER.
C637	4822 122 31316	N10 +-2% 100V CER.
C638	4822 122 31316	N10 +-2% 100V CER.
C639	4822 122 31316	N10 +-2% 100V CER.
C640	5322 122 32331	1N0 +-10% 100V CER.
C641	5322 122 32331	1N0 +-10% 100V CER.
C642	5322 122 32331	1N0 +-10% 100V CER.
C643	5322 122 32331	1N0 +-10% 100V CER.
C701	5322 121 42386	100N +-10% 63V FOIL
C702	5322 121 42386	100N +-10% 63V FOIL
C703	5322 121 42386	100N +-10% 63V FOIL
C704	5322 121 42386	100N +-10% 63V FOIL
C705	5322 121 42386	100N +-10% 63V FOIL
C706	5322 124 10695	15U +-20% 16V TANTAL
C707	5322 121 42386	100N +-10% 63V FOIL
C710	5322 125 54003	5,0-60PF TRIMMER
C711	5322 121 54077	N33 +-1% 630V POLYS.
C712	5322 121 54077	N33 +-1% 630V POLYS.
C713	4822 122 31316	N10 +-2% 100V CER.
C714	5322 126 12182	N15 +-2% 100V CER.
C715	4822 121 50591	1N0 +-1% 630 POLYS.
C716	5322 122 32056	N22 +-2% 100V CER.
C717	4822 124 20942	1U5 +-20% 25V TANTAL
C718	5322 121 42386	100N +-10% 63V FOIL
C719	4822 122 32185	10P +-2% 100V CER.
C720	5322 122 32143	22P +-2% 100V CER.
C721	4822 122 32186	5P6 +-P25 100V CER.
C722	5322 125 50051	2,0-18PF TRIMMER
C723	5322 121 42386	100N +-10% 63V FOIL
C725	5322 121 42386	100N +-10% 63V FOIL
C726	5322 121 42386	100N +-10% 63V FOIL
Resistors		
R212	5322 111 90431	9X10K 2% NETWORK
R418	5322 101 11348	2K 20% 0,5W TRIMPOT.
R426	5322 101 11348	2K 20% 0,5W TRIMPOT.
R429	4822 053 20225	2M2 5% 0,25W VR25
R432	5322 103 10316	1K 20% 0,5W TRIMPOT.
R521	5322 103 10314	100K 20% 0,5W TRIMP.
R601	5322 101 11322	20K 10% 0,5W TRIMP.
R608	5322 111 91482	4X22R 2% NETWORK
R609	5322 111 91482	4X22R 2% NETWORK
R612	5322 101 11322	20K 10% 0,5W TRIMPO.

Unit 2 - Cosine filter

Versions /00 /10 Systems B/G, D/K, and L.

Integrated Circuits		
V1	5322 209 81723	NE5539N
V60	5322 209 81723	NE5539N
V70	5322 209 81723	NE5539N
Transistors		
Q50	4822 130 44154	BF199
Coils		
L10	5322 157 71927	1,5UH
L11	5322 157 71931	2,3UH
L20	5322 157 71929	1,3UH
L21	5322 157 71926	1,75UH
L22	5322 157 71928	1,05UH
L30	5322 157 71932	1,05UH
L40	5322 157 71933	0,7-2,3UH
L60	5322 157 71926	1,75UH
L70	5322 157 71926	1,75UH
Capacitors		
C1	4822 122 31316	N10 +-2% 100V CER.
C2	4822 122 31036	2P2 +-P25 100V CER.
C3	4822 122 31822	4P7 +-P25 100V CER.
C4	5322 124 10695	15U +-20% 16V TANTAL
C5	5322 124 10695	15U +-20% 16V TANTAL
C10	4822 122 32765	820P 5% SMD
C11	4822 122 31746	1N0 5% SMD
C12	4822 122 31413	N15 +-2% 100V CER.
C13	4822 122 31413	N15 +-2% 100V CER.
C14	4822 122 31244	47P +-2% 100V CER.
C15	4822 122 31413	N15 +-2% 100V CER.
C16	4822 122 31413	N15 +-2% 100V CER.

Item	Ordering Number	Description
C20	4822 122 31413	N15 +-2% 100V CER.
C21	5322 122 32493	N10 +-2% 100V CER.
C22	4822 122 31413	N15 +-2% 100V CER.
C23	4822 122 31413	N15 +-2% 100V CER.
C24	4822 122 31413	N15 +-2% 100V CER.
C25	4822 122 31413	10P +-2% 100V CER.
C25	5322 122 34059	10P +-2% 100V CER.
C27	4822 122 31413	N15 +-2% 100V CER.
C30	4822 122 31413	N15 +-2% 100V CER.
C31	4822 122 31413	N15 +-2% 100V CER.
C32	5322 122 32493	N10 +-2% 100V CER.
C33	4822 122 31413	N15 +-2% 100V CER.
C34	4822 122 31413	N15 +-2% 100V CER.
C35	4822 122 31413	N15 +-2% 100V CER.
C36	4822 122 31413	N15 +-2% 100V CER.
C37	5322 122 34063	27P +-2% 100V CER.
C38	5322 122 34063	27P +-2% 100V CER.
C40	5322 122 34206	56P +-2% 100V CER.
C41	4822 122 31069	39P +-2% 100V CER.
C50	5322 121 42386	100N +-10% 63V FOIL
C60	4822 122 31316	N10 +-2% 100V CER.
C61	4822 122 31413	N15 +-2% 100V CER.
C62	4822 122 31413	N15 +-2% 100V CER.
C63	5322 126 10457	N12 +-2% 100V CER.
C64	5322 122 32101	1P5 +-P25 100V CER.
C65	5322 122 34107	3P9 +-P25 100V CER.
C66	5322 124 10695	15U +-20% 16V TANTAL
C67	5322 124 10695	15U +-20% 16V TANTAL
C68	5322 125 50049	1,8-10PF TRIMMER
C70	4822 122 31316	N10 +-2% 100V CER.
C71	4822 122 31413	N15 +-2% 100V CER.
C72	5322 126 10457	N12 +-2% 100V CER.
C73	5322 126 10457	N12 +-2% 100V CER.
C74	5322 122 32101	1P5 +-P25 100V CER.
C75	5322 122 34107	3P9 +-P25 100V CER.
C76	5322 124 10695	15U +-20% 16V TANTAL
C77	5322 124 10695	15U +-20% 16V TANTAL
C78	5322 125 50049	1,8-10PF TRIMMER
Resistors		
R8	5322 103 10306	200R 20% 0,5W TRIMP.
R51	5322 101 11348	2K 20% 0,5W TRIMPOT.
R61	5322 101 11348	2K 20% 0,5W TRIMPOT.
R65	5322 103 10317	500R 20% 0,5W TRIMP.
R71	5322 101 11348	2K 20% 0,5W TRIMPOT.
R75	5322 103 10317	500R 20% 0,5W TRIMP.

Cosine filter - Unit 2

Versions /00 /10 System I

Transistors		
V1	5322 209 81723	NE5539N
V2	5322 209 81723	NE5539N
V3	5322 209 81723	NE5539N
Transistors		
Q1	4822 130 44154	BF199

Item	Ordering Number	Description
Coils		
L1	5322 157 71926	1,75UH
L2	5322 157 10312	1,7UH
L3	5322 157 71927	1,5UH
L4	5322 157 10311	2,75UH
L5	5322 157 71928	1,05UH
L6	5322 157 71932	1,05UH
L7	5322 157 71926	1,75UH
L8	5322 157 71926	1,75UH
Capacitors		
C1	4822 122 31316	N10 +-2% 100V CER.
C2	4822 122 31036	2P2 +-P25 100V CER.
C3	4822 122 31822	4P7 +-P25 100V CER.
C5	4822 126 12075	680P 5% SMD
C6	4822 126 12075	680P 5% SMD
C7	5322 126 10732	330P +-10% 25V CER.
C8	5322 122 34057	68P +-2% 100V CER.
C9	5322 126 10731	220P +-10% 25V CER.
C10	5322 122 34163	120PF +-2% 25V CER.
C11	5322 122 34067	22P +-2% 100V CER.
C12	4822 122 32443	150P 10% 25V CER.
C13	4822 122 31505	82P +-2% 100V CER.
C14	4822 122 32185	10P +-2% 100V CER.
C15	5322 126 10732	330P +-10% 25V CER.
C16	4822 122 32443	150P 10% 25V CER.
C17	5322 126 10457	N12 +-2% 100V CER.
C19	5322 126 10732	330P +-10% 25V CER.
C20	4822 122 32443	150P +-10% 25V CER.
C21	5322 122 32143	22P +-2% 100V CER.
C22	5322 122 34168	18P +-10% 25V CER.
C23	5322 121 42386	100N +-10% 63V FOIL
C24	4822 122 31316	N10 +-2% 100V CER.
C25	5322 122 32101	1P5 +-P25 100V CER.
C26	5322 125 50049	1,8-10PF TRIMMER
C27	5322 122 34163	120PF 10% 25V CER.
C28	5322 122 34093	100PF 10% 25V CER.
C29	5322 122 32493	N10 +-2% 100V CER.
C30	5322 124 10695	15U +-20% 16V TANT
C31	5322 124 10695	15U +-20% 16V TANT
C32	5322 124 10695	15U +-20% 16V TANT
C33	5322 124 10695	15U +-20% 16V TANT
C34	5322 122 34107	3P9 +-P25 100V CER.
C42	5322 124 10695	15U +-20% 16V TANT.
C43	4822 122 31316	N10 +-2% 100V CER.
C44	5322 122 32101	1P5 +-P25 100V CER.
C46	5322 125 50049	1,8-10PF TRIMMER
C47	5322 122 34163	120PF 10% 25V CER.
C48	5322 122 34093	100PF 10% 25V CER.
C49	5322 122 32493	N10 +-2% 100V CER.
C53	5322 124 10695	15U +-20% 16V TANT.
C54	5322 122 34107	3P9 +-P25 100V CER.
Resistors		
R8	5322 103 10306	200R 20% 0,5W TRIMPO
R12	5322 103 10316	1K 20% 0,5W TRIMPO.
R17	5322 101 11348	2K 20% 0,5W TRIMPO.
R18	5322 103 10317	500R 20% 0,5W TRIMP.
R27	5322 101 11348	2K 20% 0,5W TRIMPO.

Item	Ordering Number	Description
R28	5322 103 10317	500R 20% 0,5W TRIMP.
R200	4822 116 52263	2K7 5% 0,5W SFR16T
R500	4822 116 52263	2K7 5% 0,5W SFR16T

Unit 3 - NICAM Decoder

Item	Ordering Number	Description
Integrated Circuits		
V1	5322 209 12694	74HC386D - SMD
V2	4822 209 30426	74HC00D - SMD
V4	5322 209 91185	74HC160HD - SMD
V5	5322 209 91185	74HC160HD - SMD
V6	5322 209 71589	74HC74HD - SMD
V7	4822 209 30426	74HC00HD - SMD
V8	5322 209 91183	74HC174HD - SMD
V9	5322 209 91183	74HC174HD - SMD
V101	4822 209 60448	74HC157HD - SMD
V102	5322 209 12099	74HC164HD - SMD
V103	4822 209 60451	74HC574D - SMD
V104	4822 209 60451	74HC574D - SMD
V105	5322 209 91185	74HC160D - SMD
V108	4822 209 30847	74HC4040D - SMD
V109	5322 209 91182	DSP56004/FJ50
V110	5322 209 52892	PROG PROM
V111	5322 209 73178	74HC138D - SMD
Diodes		
D1	5322 130 34337	BAV99 - SMD
D2	5322 130 34337	BAV99 - SMD
D3	5322 130 34337	BAV99 - SMD
D4	5322 130 34337	BAV99 - SMD
D5	5322 130 80119	BBY40
Coils		
L2	5322 157 60475	5,5UH
Crystals		
X2	5322 242 82129	16,384MHz
Capacitors		
C1	5322 122 32658	22P 5% CER. SMD
C2	4822 126 13689	18P 5% CER. SMD
C3	5322 122 33244	8P2 P5 CER. SMD
C4	4822 122 33496	100N 10% CER. SMD
C7	5322 122 33244	8P2 P5 CER. SMD
C8	5322 124 11282	6,8U 20% 20V TANT.
C9	5322 122 34098	10N 10% CER. SMD
C10	5322 125 50049	1,8-10PF TRIMMER
C11	4822 122 33496	100N 10% CER. SMD
C12	4822 122 33496	100N 10% CER. SMD
C13	5322 124 11283	47U 20% 10V TANT.
C14-9	4822 122 33496	100N 10% CER. SMD
C20-8	4822 122 33496	100N 10% CER. SMD

Unit 4A - Key Board

Item	Ordering Number	Description
Integrated Circuits		
V1	5322 209 10883	PCF8574P
Diodes		
D1	4822 130 32472	LED 3MM GREEN TLG124
D2	5322 130 80121	LED 3MM YL. TLY124
D3	4822 130 31274	LED 3MM RED TLR124
Capacitors		
C1	5322 121 42386	100N +-10% 63V FOIL
C2	5322 121 42386	100N +-10% 63V FOIL
Resistors		
R1	5322 111 90431	9X10K 2% NETWORK
R2	5322 111 90449	9X330R 2% NETWORK
Switches		
S1	5322 276 13433	
S2	5322 276 13433	
S3	5322 276 13433	
S4	5322 276 13433	
S5	5322 276 13433	

Unit 4B - Front Plate Controller

Item	Ordering Number	Description
Integrated Circuits		
V1	5322 209 52609	80C32 U-CONT
V2	5322 209 83271	74HC573N
V3	5322 209 52891	PROG PROM
V4	5322 209 83218	74HC00N
V5	5322 209 11738	PCF8591P
V6	5322 209 12576	LMC662CN
V7	5322 209 51263	PCF8582AP
Capacitors		
C1	5322 124 10455	68U +-20% 6,3V TANT.
C2	5322 124 10455	68U +-20% 6,3V TANT.
C3	5322 121 42386	100N +-10% 63V FOIL
C4	5322 121 42386	100N +-10% 63V FOIL
C5	5322 121 42386	100N +-10% 63V FOIL
C8	5322 122 32818	2N2 +-10% 100V CER.
C10	4822 122 30045	27P +-2% 100V CER.
C11	4822 122 30045	27P +-2% 100V CER.
Resistors		
R1	5322 111 90431	9X10K 2% NETWORK
R4	4822 116 30248	1K5 10% 0,5W NTC

PM 8551/20 - RS232 Interface

Item	Ordering Number	Description
Integrated Circuits		
V1	5322 209 12632	PCF84C00B
V2	5322 209 61496	SCC2692AC1N28
V3	5322 209 60094	MAX232
Transistors		
Q1	4822 130 40959	BC547B
Diodes		
D1-8	4822 130 30613	BAW62

Item	Ordering Number	Description
Crystals		
X1	5322 242 71867	3,6864MHz
Capacitors		
C1	5322 121 42386	100N +-10% 63V FOIL
C2	5322 122 32163	5P6 +-P25 100V CERAM
C3	5322 122 32163	5P6 +-P25 100V CERAM
C4	5322 121 42114	1U0 +-5% 63V FOIL
C5	5322 124 11084	33U +-20% 10V ELCO
C6	4822 121 41857	10N +-10% 250V FOIL
C7	4822 121 41857	10N +-10% 250V FOIL
C8	4822 121 41857	10N +-10% 250V FOIL
C9	5322 121 42114	1U0 +-5% 63V FOIL
C10	5322 121 42114	1U0 +-5% 63V FOIL
C11	5322 121 42114	1U0 +-5% 63V FOIL

PM 8551/30 - IEEE Interface

Integrated Circuits		
V1	5322 209 12632	PCF84C00B
V2	5322 209 33673	74F06N
V3	5322 209 85407	74LS02N
V4	5322 209 10867	HEF40245BP
V5	5322 209 81807	SN75160BN-00
V6	5322 209 81842	SN75161AN-00
Diodes		
D1	4822 130 31983	BAT85
D2-8	4822 130 30613	BAW62
Crystals		
X1	4822 242 70392	6,0000MHz
Capacitors		
C1	5322 121 42386	100N +-10% 63V FOIL
C2	5322 122 32163	5P6 +-P25 100V CER.
C3	5322 122 32163	5P6 +-P25 100V CER.
C4	5322 124 11084	33U +-20% 10V ELCO
C5	5322 124 11084	33U +-20% 10V ELCO
C6	4822 121 41857	10N +-10% 250V FOIL
C7	4822 121 41857	10N +-10% 250V FOIL
C8	4822 121 41857	10N +-10% 250V FOIL

PM 8562 - NICAM Data Output

Integrated Circuits		
V101	5322 209 12773	PROG FPGA
V102	5322 209 10883	PCF8574P
V103	5322 209 11342	74HC574N
V104	5322 209 83271	74HC573N
V105	5322 209 11342	74HC574N
Coils		
L101	5322 157 60475	5,5UH
Capacitors		
C101	5322 124 10455	68U +-20% 6,3V TANT.

Item	Ordering Number	Description
C102	5322 121 42386	100N +-10% 63V FOIL
C103	5322 121 42386	100N +-10% 63V FOIL
C104	5322 124 24115	6U8 +-20% 10V TANTAL
C105	5322 121 42386	100N +-10% 63V FOIL
C106	5322 121 42386	100N +-10% 63V FOIL
C107	5322 121 42386	100N +-10% 63V FOIL
C108	5322 121 42386	100N +-10% 63V FOIL
C109	5322 121 42386	100N +-10% 63V FOIL

List of Standard Resistors

MR25 = 0.4W, 1%,
METAL FILM RESISTOR

Type	Value	Ordering number
MR25	10	5322 116 50452
MR25	11	5322 116 54059
MR25	12.1	5322 116 54069
MR25	13	5322 116 54082
MR25	15	5322 116 51221
MR25	16.2	5322 116 54431
MR25	18.2	5322 116 54083
MR25	20	5322 116 51048
MR25	22.1	5322 116 50983
MR25	24.3	5322 116 54435
MR25	26.7	5322 116 54067
MR25	30.1	5322 116 50904
MR25	33.2	5322 116 50527
MR25	35.7	5322 116 54439
MR25	39.2	5322 116 54087
MR25	43.2	5322 116 50519
MR25	47.5	5322 116 50952
MR25	51.1	5322 116 54442
MR25	56.2	5322 116 54446
MR25	61.9	5322 116 54451
MR25	68.1	5322 116 54455
MR25	75	5322 116 54459
MR25	82.5	5322 116 54462
MR25	90.9	5322 116 54466
MR25	100	5322 116 55549
MR25	110	5322 116 54474
MR25	130	5322 116 54481
MR25	150	5322 116 54486
MR25	162	5322 116 50417
MR25	182	5322 116 54493
MR25	200	5322 116 54496
MR25	221	4822 116 51223
MR25	267	5322 116 54503
MR25	301	5322 116 55366
MR25	332	4822 116 51226
MR25	357	5322 116 50603
MR25	392	5322 116 54006
MR25	432	5322 116 54522
MR25	475	5322 116 54007
MR25	511	4822 116 51282
MR25	562	4822 116 51231
MR25	619	4822 116 51232
MR25	681	4822 116 51233
MR25	750	4822 116 51234
MR25	825	5322 116 54541
MR25	909	5322 116 55278
MR25	1K	4822 116 51235
MR25	1.10K	4822 116 51236
MR25	1.21K	5322 116 54557
MR25	1.30K	5322 116 50526
MR25	1.50K	4822 116 51239
MR25	1.62K	5322 116 55359
MR25	1.82K	5322 116 54568
MR25	2K	5322 116 54572
MR25	2.21K	4822 116 51245
MR25	2.43K	5322 116 54004
MR25	2.67K	5322 116 54578
MR25	3.01K	4822 116 51246
MR25	3.32K	5322 116 54005
MR25	3.57K	5322 116 54586
MR25	3.92K	5322 116 54591
MR25	4.32K	5322 116 54594
MR25	4.75K	5322 116 54008
MR25	5.11K	5322 116 54595
MR25	5.62K	4822 116 51281
MR25	6.19K	5322 116 55426
MR25	6.81K	4822 116 51252
MR25	7.50K	5322 116 54608
MR25	8.25K	5322 116 54558
MR25	9.09K	4822 116 51284

Type	Value	Ordering number
MR25	10K	4822 116 51253
MR25	11K	5322 116 54623
MR25	12.1K	5322 116 50572
MR25	13K	5322 116 50522
MR25	15K	4822 116 51255
MR25	16.2K	5322 116 55361
MR25	18.2K	5322 116 54638
MR25	20K	5322 116 54642
MR25	22.1K	4822 116 51257
MR25	24.3K	5322 116 54647
MR25	26.7K	5322 116 54652
MR25	30.1K	5322 116 54655
MR25	33.2K	4822 116 51259
MR25	35.7K	5322 116 54662
MR25	39.2K	4822 116 51262
MR25	43.2K	5322 116 54667
MR25	47.5K	5322 116 54671
MR25	51.1K	5322 116 50672
MR25	56.2K	4822 116 51264
MR25	61.9K	5322 116 50872
MR25	68.1K	4822 116 51266
MR25	75K	4822 116 51267
MR25	82.5K	5322 116 55374
MR25	90.9K	5322 116 54694
MR25	100K	4822 116 51268
MR25	110K	5322 116 54701
MR25	121K	5322 116 54704
MR25	130K	5322 116 54707
MR25	150K	4822 116 51269
MR25	162K	5322 116 54716
MR25	182K	5322 116 54722
MR25	200K	4822 116 51286
MR25	221K	4822 116 51272
MR25	243K	5322 116 54733
MR25	267K	4822 116 54737
MR25	301K	5322 116 54743
MR25	332K	4822 116 51184
MR25	357K	5322 116 51767
MR25	392K	5322 116 51768
MR25	432K	5322 116 51769
MR25	475K	4822 116 51275
MR25	511K	5322 116 55258
MR25	562K	4822 116 51169
MR25	619K	5322 116 55315
MR25	681K	5322 116 55284
MR25	750K	5322 116 55532
MR25	825K	5322 116 51398
MR25	909K	5322 116 55533
MR25	1M	5322 116 55535

SMD resistors

Type 0805 = 1W, 0.5%,
CHIP

Type	Value	Ordering number
0805	2R2	4822 116 90466
0805	2R7	5322 116 82067
0805	3R3	4822 116 90469
0805	3R9	4822 116 82062
0805	4R7	4822 116 90462
0805	5R6	5322 116 82068
0805	6R8	5322 116 82069
0805	8R2	5322 116 82071
0805	10R	4822 116 90457
0805	12R	5322 116 82066
0805	15R	4822 116 81118
0805	18R	5322 116 81929
0805	22R	4822 116 90467
0805	27R	4822 116 90468
0805	33R	4822 116 90471
0805	39R	4822 111 91653
0805	47R	4822 111 91652
0805	56R	4822 116 90451
0805	68R	4822 116 80887
0805	82R	4822 111 91507
0805	100R	4822 116 90441
0805	120R	4822 116 81026
0805	150R	4822 116 80879
0805	180R	4822 116 90438
0805	220R	4822 116 90339
0805	270R	4822 116 80882
0805	330R	4822 111 91501
0805	390R	4822 116 81029
0805	470R	4822 116 90446
0805	560R	4822 111 91533
0805	680R	4822 116 90463
0805	820R	4822 116 81034
0805	1K0	4822 111 91516
0805	1K2	4822 116 80877
0805	1K5	4822 116 90458
0805	1K8	4822 116 81383
0805	2K2	4822 111 91522
0805	2K7	4822 111 91449
0805	3K3	4822 111 91526
0805	3K9	4822 111 91527
0805	4K7	4822 111 91532
0805	5K6	4822 111 91534
0805	6K8	4822 116 90464
0805	8K2	4822 111 91655
0805	10K	4822 111 91517
0805	12K	4822 116 81382
0805	15K	4822 111 91498
0805	18K	4822 111 91521
0805	22K	4822 111 91523
0805	27K	4822 116 90342
0805	33K	4822 116 81017
0805	39K	4822 116 90445
0805	47K	4822 111 91661
0805	56K	4822 111 91535
0805	68K	4822 116 90347
0805	82K	4822 116 81389
0805	100K	4822 111 91518
0805	120K	4822 116 90442
0805	150K	4822 116 90459
0805	180K	4822 116 90443
0805	220K	4822 116 80881
0805	270K	4822 116 81028
0805	330K	4822 116 90345
0805	390K	4822 111 91529
0805	470K	4822 116 90447
0805	560K	4822 116 80925
0805	680K	4822 116 81032
0805	820K	4822 116 90348

19. List of Recommended Spare Parts

Please observe that the recommended spare parts are split into "basic" and "supplement" packages. The "basic" package contains the components common to all versions of PM 5689.
A "supplement" package contains the additional components needed to support a specific version of PM 5689, e.g. the I System.

The packages are to be ordered at your National Philips Sales Organization (we recommend that you purchase 1 package per 10 instruments in service).

Type	Ordering number
Basic kit ordering number	9449 818 56891
Suppl. kit for systems B/G, D/K, L/00, and L/20	9449 818 56893
Suppl. kit for system I/10/20	9449 818 56895
Suppl. kit for system L/10	9449 818 56897

Basic kit

Quantity	Ordering number	Description
1	5322 130 91263	DISPLAY
1	5322 290 60432	MAINS INLET CONNECTOR
1	5322 455 71099	LABEL FOR MAINS CONN.
1	5322 277 11337	MAINS SWITCH
2	5322 276 13433	PUSH BUTTON SWITCH
1	5322 146 10351	MAINS TRANSFORMER
3	4822 253 50047	FUSE 0,5A SLOW
3	4822 253 50046	FUSE 1A SLOW
2	5322 124 40852	100U +-20% 35V ELCO
2	4822 124 40196	220U +-20% 16V ELCO
4	5322 124 80825	3300UF +-20% 40V ELCO
2	4822 124 20942	1U5 +-20% 25V TANTAL
2	4822 124 20947	3U3 +-20% 16V TANTAL
3	5322 124 14081	6U8 +-20% 25V TANTAL
3	5322 124 10695	15U +-20% 16V TANTAL
1	5322 124 11283	47U 20% 10V TANTAL.
1	4822 209 30426	74HC00D - SMD
1	4822 209 30426	74HC00HD - SMD
1	5322 209 83218	74HC00N
1	5322 209 11331	74HC02N

Quantity	Ordering number	Description
1	4822 209 70194	74HC04N
1	5322 209 73178	74HC138D - SMD
1	5322 209 11335	74HC138N
1	4822 209 60448	74HC157HD - SMD
1	5322 209 91185	74HC160D - SMD
1	5322 209 12099	74HC164HD - SMD
1	4822 209 11605	74HC164N
1	5322 209 11531	74HC165N
1	5322 209 91183	74HC174HD - SMD
1	4822 209 11586	74HC368N
1	5322 209 12694	74HC386D - SMD
1	4822 209 30847	74HC4040D - SMD
1	5322 209 11296	74HC4053N
1	5322 209 73011	74HC4520N
1	5322 209 83271	74HC573N
1	4822 209 60451	74HC574D - SMD
1	5322 209 11342	74HC574N
1	5322 209 71589	74HC74HD - SMD
1	5322 209 82575	74HC74N
1	5322 209 11473	74HC86N
1	5322 209 52609	80C32 U-CONT
1	5322 209 91184	AD827JN
1	5322 209 90516	CS4328KP
1	5322 209 91181	DP8310N
1	5322 209 90517	DS3692N
1	5322 209 33682	L296
2	4822 209 61115	LF353N
1	5322 209 85503	LM311N
2	5322 209 82943	LM317LZ
1	4822 209 80591	LM317T
1	5322 209 83228	LM337LZ
1	5322 209 81236	LM337T
1	5322 209 60188	LM339AN
1	5322 209 12576	LMC662CN
1	5322 209 91178	LTC1298CN8
1	5322 209 91179	MAX153CCP
1	5322 209 12535	MAX693ACPE
1	5322 209 52594	MK48Z08B-10
1	5322 209 86234	NE5532N
1	5322 209 81723	NE5539N
1	5322 209 10883	PCF8574P
1	5322 209 51263	PCF8582AP
1	5322 209 11738	PCF8591P
2	5322 209 33195	SSM2142
1	4822 209 73558	TA8662N
1	5322 209 62234	TDA3845

Quantity	Ordering number	Description
1	5322 209 33192	TDA8425
2	4822 130 40959	BC547B
2	4822 130 44568	BC557B
2	4822 130 44154	BF199
1	5322 130 42244	BFR96S/02
1	5322 130 34955	BA482
1	5322 130 80617	BAT81
1	4822 130 31983	BAT85
2	5322 130 34337	BAV99 - SMD
4	4822 130 30613	BAW62
2	5322 130 31684	BB809
1	5322 130 80119	BBY40
1	4822 130 34173	BZX79-C5V6
1	4822 130 31274	LED 3MM RED TLR124
1	5322 130 80121	LED 3MM YL. TLY124
1	4822 130 32472	LED 3MM GREEN TLG124
1	5322 130 81291	RECT. BRIDGE 280V
3	5322 130 80285	SB360
1	5322 280 80795	UM1L-D12W-K
1	4822 242 72304	5.8240MHz
1	4822 242 71663	12.000000MHz
1	5322 242 82129	16.384MHz

Suppl. Kit for Systems B/G, D/K, L/00, and L/20

1	5322 242 74373	38.90MHz
1	4822 242 72302	5.850MHz

Suppl. Kit for System I

1	5322 242 74373	38.90MHz
1	5322 242 73562	6.552MHz

Suppl. Kit for System L/10

1	5322 242 10245	32.700MHz
1	5322 242 73563	5.850000MHz

APPENDICES

Appendix A - Tables

A.1 Error Codes

Error Code:	Error Description:
E(01)	Internal checksum error
E(02)	Internal illegal commands
E(03) - E(07)	Reserved for future RS232 acknowledge information
E(08)	Internal acknowledge timeout
E(09)	Internal command timeout
E(10)	Internal reply timeout
E(11)	Communication error - Keyboard
E(12)	Communication error - LEDs
E(13)	Communication error - EEPROM
E(14)	Read/Write error - EEPROM
E(15)	Communication error - ADC
E(16)	Checksum error - Front
E(17)	Processor system error
E(18)	Memory error, checksum fail
E(19)	Hardware error on serial lines
E(20)	Failure on access to internal circuits
E(21)	Failure in internal circuits
E(22)	Processor testing
E(23)	QPSK level **not** valid
E(24)	Preset function **not** available

Installation Instructions

Date: 1994-10-20

IEEE488 Controller
PM 8551/30

PM 8551/30 is IEEE488 remote interface facility for some of Philips PTV instruments.

This instruction is a guide in retrofitting an interface control unit.

1. Packing list

Check that the PM 8551/30 option package contains the following items:

1	Interface board
1	Ribbon cable assembly
2	Screws for fixing the board
1	Installation instruction

2. Installation of the PM 8551/30

IMPORTANT: When mounting the PM 8551/30 note that both the PM 8551/30 unit as well as the instrument contains ESD sensitive circuits and take the necessary precautions.

To gain access to the inside of the instrument:

- If the instrument is rack-mounted, remove it from the rack.
- Remove all the screws in the top plate.
- Lift the top plate.

Mounting instruction:

- Remove the blind plate at the rear of the instrument.
- Mount the remote control unit by fastening it with the two screws.
- Fix the ribbon cable between the connector on the remote unit and the appropriate connector in the instrument.

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