

## 24.0 Specifications

### Dial Pulse Specification

#### Dial Speed

Frequency range: 5Hz to 25Hz.  
 Resolution: 0.1Hz.  
 Accuracy:  $\pm 0.1$ Hz with square wave input.

Dial speed calculation:  $\frac{1,000}{\text{Time Break} + \text{Time Make}}$  Hz

#### Make-Break Time

Range: 10ms to 200ms.  
 Resolution: 1ms.  
 Accuracy:  $\pm 1$ ms with square wave input.

#### Duty Cycle

Range: 10% to 90%.  
 Resolution: 0.1%.  
 Accuracy:  $\pm 0.4\%$  with square wave input at 48V, 50mA VM mode.

Duty cycle calculation:  $\frac{\text{Time Break} \times 100}{\text{Time Break} + \text{Time Make}}$  %

#### Inter-Digit Pause

Range: 207ms to 9999ms.  
 Resolution: 1ms.  
 Accuracy:  $\pm 1$ ms with square wave input.

#### Voltage Trigger Level

Range: 5V to 60V.  
 Resolution: 1V.  
 Accuracy:  $\pm 0.5$ V.

#### Current Trigger Level

Range: 3mA to 60mA.  
 Resolution: 1mA.  
 Accuracy:  $\pm 1$ mA.

#### Flashing

Range: 10ms to 600ms.  
 Accuracy:  $\pm 1$ ms.

#### Make & Break Resistance

The result is an average of all pulses detected.

Minimum make/break time 27ms/27ms. No dial tone present.

Make resistance: 100 $\Omega$  to 999 $\Omega$ .  
 Break resistance: 1k $\Omega$  to 100k $\Omega$ .  
 Accuracy:  $\pm 5\%$  at 48V feed voltage, > 20mA and constant current mode.

#### Sequence

Digits: 1234567890.  
 Number of digits: Max. 20.

#### Note:

Digit 1 = 1 break  
 Digit 0 = 10 breaks

#### Note:

To ensure the stated accuracy of a specific parameter, it is necessary that the values of the other parameters are within their nominal values.

## DTMF Receiver Specification

### The Tested Frequency Combinations

Hz	1209	1336	1477	1633
697	1	2	3	A
770	4	5	6	B
852	7	8	9	C
941	*	0	#	D

### Trigger Level

Range: 0.0dBm to -35.0dBm.  
Resolution: 0.1dBm.

### Sequence Test:

Digits: 1234567890\*#ABCD.  
Number of digits: Max. 20.

### Level Measurement

Dynamic range: 0dBm to -30dBm.  
Accuracy:  $\pm 0.2$ dB, from 0dBm to -13dBm.  
Resolution:  $\pm 0.1$ dB.  
Twist: Max. 9.9/-7.0dB.  
(Negative means that the high group is lower than the low group)

### Note:

To ensure the stated accuracy of a specific parameter, it is necessary that the values of the other parameters are within their nominal values.

### Input Impedance

Selectable: 600 $\Omega$ , 900 $\Omega$ , & HIGH  
(Min. 200k $\Omega$  at 1kHz).  
Accuracy:  $\pm 1\%$ , 500Hz to 1800Hz.

### Frequency Measurement

Bandwidth:  $\pm 2\%$  of nominal frequencies.  
Accuracy:  $\pm 1$ Hz.  
Resolution: 1Hz.

### Tone On and Tone Off Times

Range: 40ms to 999ms on.  
40ms to 9999ms off.  
Accuracy:  $\pm 2$ ms.

### DC Measurement at Tone On

Range: 0V to 67V.  
Accuracy:  $\pm 1$ V.  
Resolution: 1V.  
Not valid with EXT.  
FEED

### Earth Recall Specification

Time range: 100ms to 9999ms.  
 Resolution: 10ms.  
 Accuracy:  $\pm 20$ ms.  
 Resistance range:  $50\Omega$  to  $999\Omega$ .  
 Resolution:  $1\Omega$ .  
 Accuracy:  $\pm 5\%$  at 48V, 50mA, IM mode,  $100\Omega$ - $999\Omega$ .

### 12/16kHz Generator Specification

Frequency area: 1kHz to 18kHz.  
 Resolution: 1Hz.  
 Accuracy:  $\pm 2$ Hz.  
 Level: 20mV to 250mV.  
 Resolution: 1mV.  
 Accuracy:  $\pm 2\%$ ,  $\pm 2$ mV at  $200\Omega$  load, and 11kHz to 18kHz.  
 Tone on/off time: 20ms to 999ms.  
 Resolution: 1ms.  
 Accuracy:  $\pm 2$ ms at 11kHz to 18kHz.  
 Repetition: 1 to 65,000 times.  
 Output impedance:  $200\Omega$ ,  $\pm 10\%$ .  
 Distortion:  $< 2\%$ .

### Dial Tone Specification

Frequency area: 100Hz to 1999Hz in 1Hz steps.  
 Accuracy:  $\pm 1$ Hz, 300Hz to 600Hz.  
 Level: -00.0dBm to -59.9dBm in 0.1dBm steps.  
 Accuracy:  $\pm 0.2$ dBm, 300Hz to 600Hz. 0dBm at -15dBm.  
 Time on: 0000ms to 9999ms in 1ms steps.  
 Accuracy:  $\pm 2$ ms.

### Test Tones Specification

Frequency area: 100Hz to 1999Hz in 1Hz steps.  
 Accuracy:  $\pm 1$ Hz, 500Hz to 1800Hz.  
 Level: 2 levels. 00.0dBm to -59.9dBm in 0.1dBm steps.  
 Accuracy:  $\pm 0.1$ dBm at -10dBm.  
 Time on/off: 100ms to 9999ms in 1ms steps.  
 Accuracy:  $\pm 2$ ms.  
 Sequence: 2 on times, 2 off times.

### DTMF Generator Specification

Frequency area: 350Hz to 1999Hz in 1Hz steps.  
 Accuracy:  $\pm 1$ Hz, 500Hz to 1800Hz.  
 Level: -02.0dBm to -30.0dBm in 0.1dBm steps.  
 Accuracy:  $\pm 0.1$ dBm at -10dBm.  
 Tone on/off: 15ms to 999ms on, 15ms to 9999ms off, in 1ms steps.  
 Accuracy:  $\pm 1$ ms, 15ms to 225ms.  
 Repetition: 1 to 99 times of same digit.  
 Sequence: 1 to 20 digits.

## General Specification

### Feed Supply Constant Voltage Mode

Feed voltage:	0V to 67V, programmable in 1V steps.
Ripple:	Max. 30mV RMS at load 600Ω.
Accuracy:	±0.5V.
Resolution:	1V.
Output resistance:	5Ω.
Response time:	Max. 25μs.
Max. current:	127mA, short circuit protected.

### Feed Supply Constant Current Mode

Feed current:	0mA to 127mA, programmable in 1mA steps.
Accuracy:	±0.5mA.
Resolution resistance:	1mA.
Output resistance:	> 100kΩ at 500- 5000Hz.
Response time:	Max. 25μs.
Ripple:	Max. 100μA.
Max. voltage:	67V.

### Temperature Range

Operating:	+10°C to +40°C.
Storage:	-20°C to +70°C.
Humidity:	30-80%. No condensation.

### Dimensions and Weight

475x150x340mm (WxHxD).  
13.2kg.

### Mains Supply

110V, 130V, 150V,  
220V, 240V and 260V  
AC, ±10%. 50-60Hz.

### Test Programs

Number of programs: 10 for DTMF and dial  
pulse. Loaded in RAM  
with battery back-up.

### Ring Generator

Two different outputs can be generated in  
sequence.

Frequency:	10Hz to 300Hz, programmable 1Hz steps. Accuracy ±1Hz.
Level output:	2 programmable levels. 1V to 150V RMS, programmable in 1V steps.
Accuracy:	±2%, 20Hz to 60Hz. ±5%, 13Hz to 20Hz, > 60Hz. ±10% < 13Hz. Load 10kΩ in series with 1μF.
DC output impedance:	< 300Ω. 25Hz to 50Hz with 10kΩ load.
Ringing ON/OFF time:	1ms to 9999ms, programmable 1ms steps. Accuracy ±2ms.
Ring sequence:	3 ON times and 3 OFF times.
Distortion:	< 5%.
Repetition:	1 to 99 times.
Load:	> 3kΩ AC.

### Current Detector

Stops the ring generator at hook off.

Trigger level: > 10mA.

### Printer Output

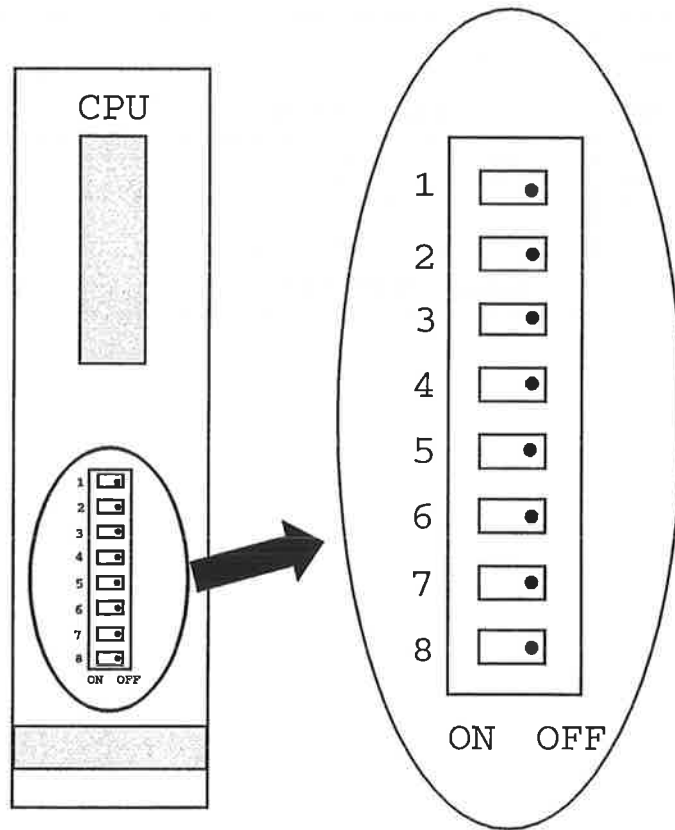
A V24/RS232 output for print out of all  
measured results or faults only.

Speed:	300, 600, 1200, 2400, 4800 or 9600 baud.
Number of data bits:	7 or 8 bits.
Stop bits:	1 or 2.
Parity:	Odd, even or none.
Characters:	40 or 80.
Print mode:	ALL or ERROR.

**Contact Rating of Relays on  
the ATL Board (optional)**

Max. Switching Power	60W	125VA
Max. Switching Voltage	220V DC	250V AC
Max. Switching Current	2A	2A
Max. Carrying Current	3A	3A
Contact Resistance	Initial 50M $\Omega$ (Max.)	

## DIL Switch Setting



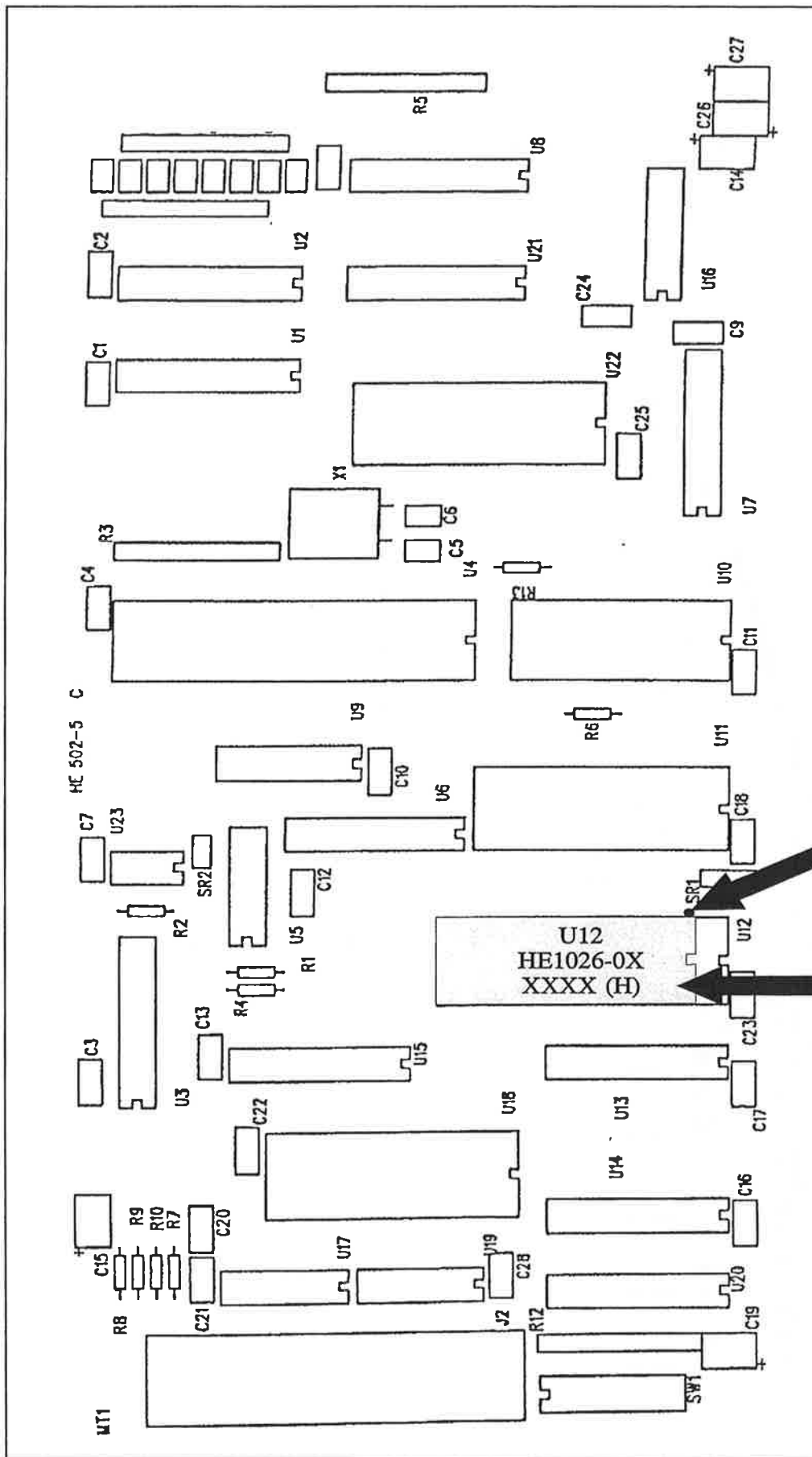
### ON

1. Cold start
2. Print output without header.
3. 213 without Acoustic option.  
(setting 5 is not accessible).
4. Not used.
5. Not used.
6. Not used.
7. Cold start.
8. Calibration.

### OFF

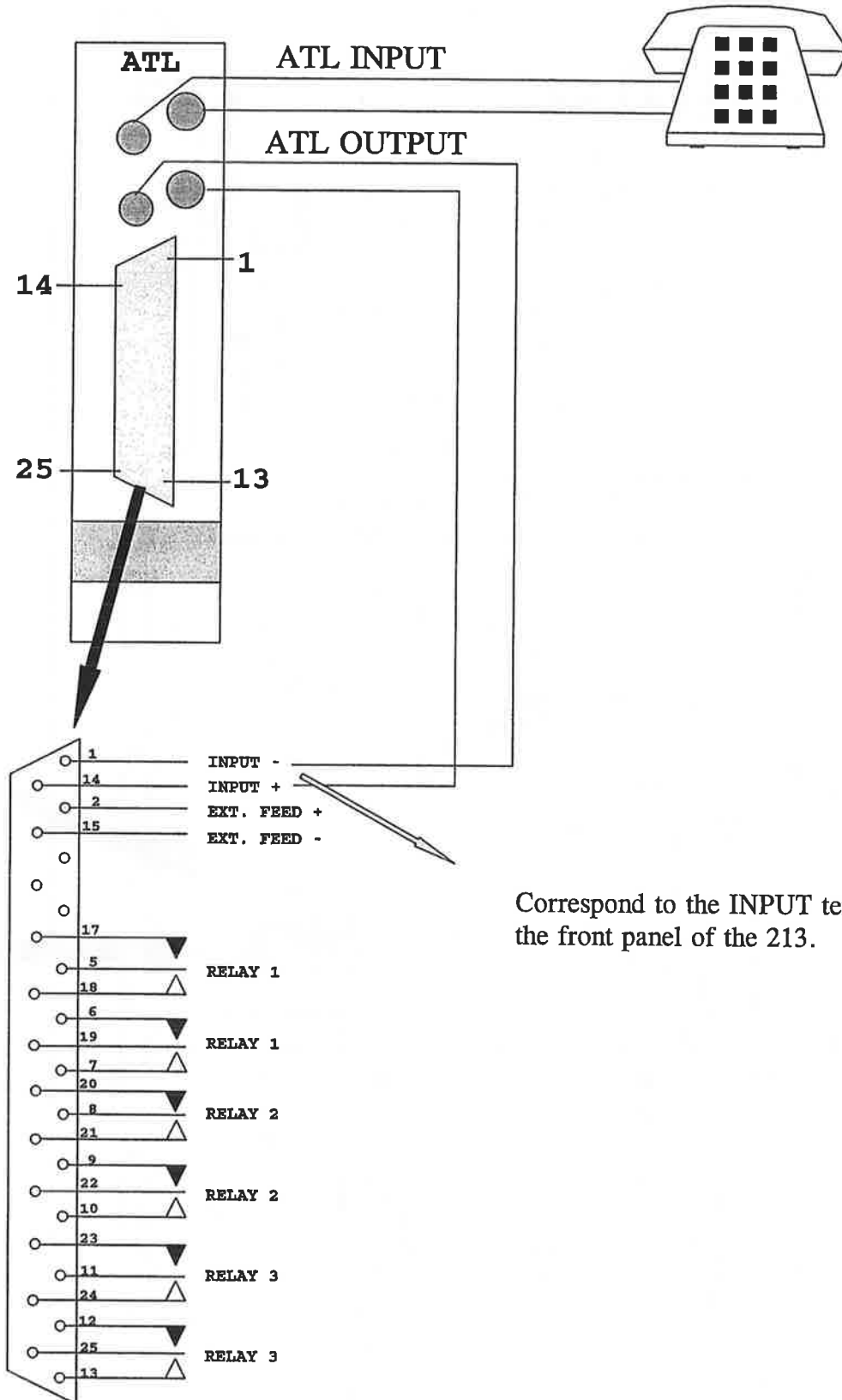
- Normal use.
- Print output with header every new page or every time setting is changed.
- 213 with Acoustic option.  
(If switch is OFF and the 213 does not have acoustic module, the 213 will get locked out if setting 5 is selected. Cold start required to restart unit.)
- Not used.
- Not used.
- Not used.
- Normal use.
- Normal use.

# CPU Board Layout



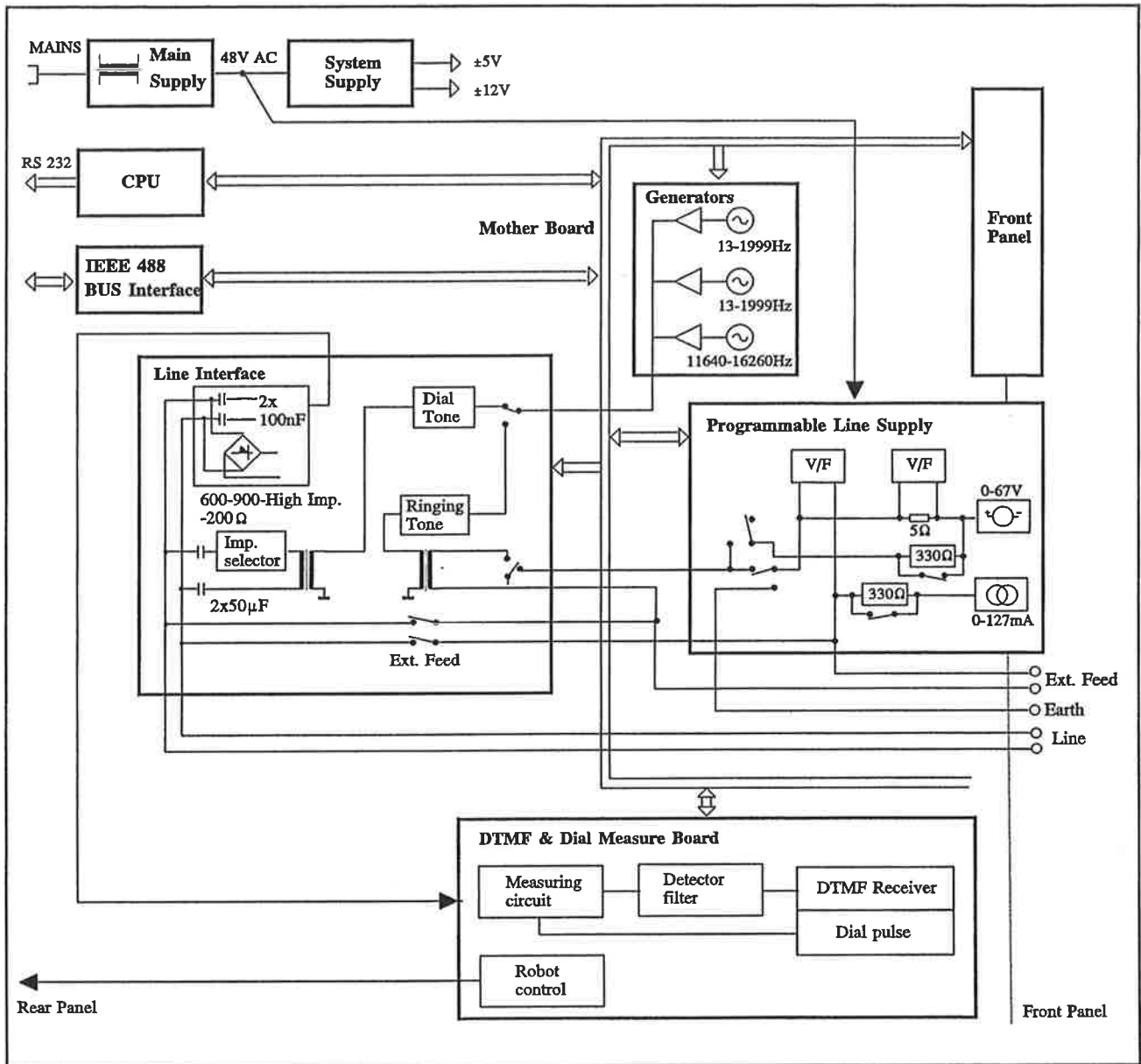
## Artificial Line Connection (optional)

### Relay 1, 2, and 3 termination





# Block Diagram



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## 25.0 Technical Explanation

213: Telecom Tester 213 from Hasselriis Electronics A/S.  
 305: DTMF Generator 305 from Hasselriis Electronics A/S.  
 401: Signal Sequence Relay 401 from Hasselriis Electronics A/S.  
 CR: Carriage return.

dBm:  
 (600Ω) 1mW in 600Ω.  
 0dBm = 0.7746V

dBm:  
 (900Ω) 1mW in 900Ω = 0.949mV

dBm/V:  $0.7746 \times 10^{\left(\frac{dBm}{20}\right)}$

Dial speed:  $\frac{1000}{\text{Time break ms} + \text{time make ms}} \text{ Hz}$

DTMF: Dual Tone Multi Frequency  
 Up to 16 different digits  
 0-9, \*, #, A, B, C, and D

### The Tested Frequency Combinations

Hz	1209	1336	1477	1633
697	1	2	3	A
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941	*	0	#	D

Duty cycle: Pulse ratio.  $\frac{\text{Time break} \times 100}{\text{Time break} + \text{time make}} \%$

EOI: End Or Identify.

Flashing: A loop disconnect (break) of approx. 100ms.  
 Switch the PABX from local to public line (R-button).

Inter-digit pause: The pause between two dialed digits.

LF: Line feed.

## Technical Explanation

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ms: Millisecond = 0.001 second

mV: Millivolt = 0.001V

mV/dBm:  $20 \log \frac{mV}{774.6}$

PC: Personal computer.

Serial poll register: Bit 6 is set when the 213 has data for the controller.

SRQ: Service request from the 213 on the 488 BUS when the 213 needs service.