

User Guide

for

STEREO PEAK PROGRAMME METER

477-850A

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General Description.

The NTP type 477-850 is a high-end stereo Peak Programme Meter primarily designed for recording and broadcasting studios. The instrument fully complies with the most stringent international standards, such as DIN 45406 and IEC 268-10.

The Instrument is housed in a desktop cabinet powered by an external mains adaptor.

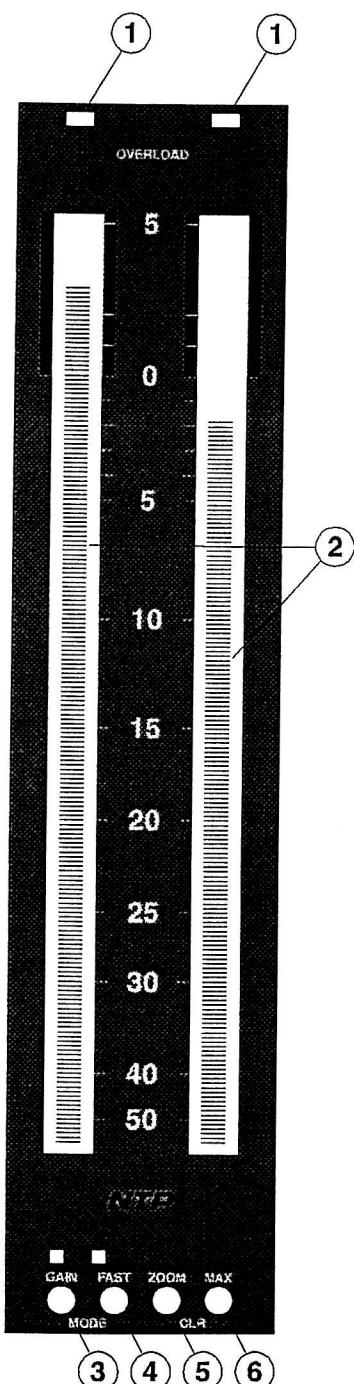
The audio input connections are made through XLR-Connectors.

Practically all signal processing is done in the digital domain with use of a Σ - Δ converter and a DSP to achieve all the stability and accuracy improvements associated with the digital technique.

The instrument features:

- High impedance balanced transformer inputs
- Simultaneous reading of peak values with normal and fast integration time
- Instantaneous LED overload indication with adjustable threshold
- Zoom function for increased display resolution
- Wide range easy selectable reference level
- Ultra fast ("zero") integration time
- Memory for max peak storage
- Various display modes for improved readability
- Additional gain
- Selectable integration time
- Very close tracking between the two channels
- Very close tracking between instruments.

Front Layout.



1) Overload indication.

Above each channel display is an overload LED which is triggered when the input level (fast) is bigger or equals overload threshold.

2) Spot indication

Depending of the actual display mode being used, a spot indication is provided. For more details reference is made to the "Mode" description.

3) Gain

Activating the GAIN (20dB in respect of DIN/BBC, 40dB for NOR) will lower the measuring range with "Gain" dB. The pushbutton has alternating function and the LED will be lit, when GAIN is selected.

4) Integration time select

When NORMAL integration time is selected, the bars will show peaks according to the IEC 268-10 standard. When FAST integration time is selected, the bars will show peaks with practically "zero" integration time, thus showing the instantaneous peaks. The pushbutton has alternating function and the LED will be lit when fast integration time is selected.

5) Zoom.

The zoom function will increase the display resolution by a factor of ten thus for the shown scale the bottom (-50) mark will represent - 5 dB and the top +5 mark will represent +0.5 dB. The GAIN LED will flash while Zoom is active.

6) Max. memory function.

The meter incorporates a peak memory function that continuously monitors and stores the highest peak. The memory content can be displayed by pushing the MAX-button. The memory can be cleared by pushing the ZOOM and MAX buttons simultaneously (5 & 6).

5 & 6) Clear memory function

The memory can be cleared by pushing the ZOOM and MAX buttons simultaneously.

3 & 4) Mode.

To adapt to various applications, the bargraph display can be operated in various modes. Simultaneously pushing the GAIN & FAST buttons, toggles through these modes.

- a) The mode "a" is easy to distinguish from the rest by the blend-in scale markings. An illuminated background to the peak indicating bar-graph extends to the scale mark "0" to provide the user with clear scale markings, even in dimmed lightning.
- b) Same as "a", but without background and scale markings.
- c) In mode "c" the illuminated background extends to the top of the scale and the spot is always showing peaks with fast integration time, thus enabling reading of peak values with normal and fast integration time.
- d) Same as "c", but the integration time is the same as for the bars.

3 & 6) Overload threshold adjustment.

Push the GAIN button, then the MAX button. The PPM now enters the THRESHOLD ADJUST MODE. This mode is easily distinguished from the rest by an illuminated background showing the threshold range (+/- 10dB) and a spot in the middle of the threshold range (0dB).

Actual threshold is marked with a spot in the threshold range.

To increase the threshold with 1 dB: Push the ZOOM button.

To decrease the threshold with 1 dB: Push the MAX button.

Pushing the ZOOM & the MAX buttons simultaneously sets the threshold to 0dB.

On completion, release the Gain button, and the PPM permanently save the new threshold and returns to normal operation.

Circuit Description.

The following description refers to the schematic block diagram no. 477-8019 and to the detailed schematic diagrams no. 477-8030, 477-5036 and 477-8038.

Analog frontend.

The input signal is led to an input stage consisting of a current transformer and an amplifier. A level conditioning stage succeeds the input stage. The level conditioning stage is used to handle the various reference levels. The signal is then fed to a $\Sigma-\Delta$ A/D converter which feeds the DSP.

Digital Signal Processor.

The A/D converter feeds the audio data to the DSP (IC5) via a serial interface. The DSP performs filtering, intermediate sample reconstruction, rectification and it also integrates the sampled values to obtain correct integration time.

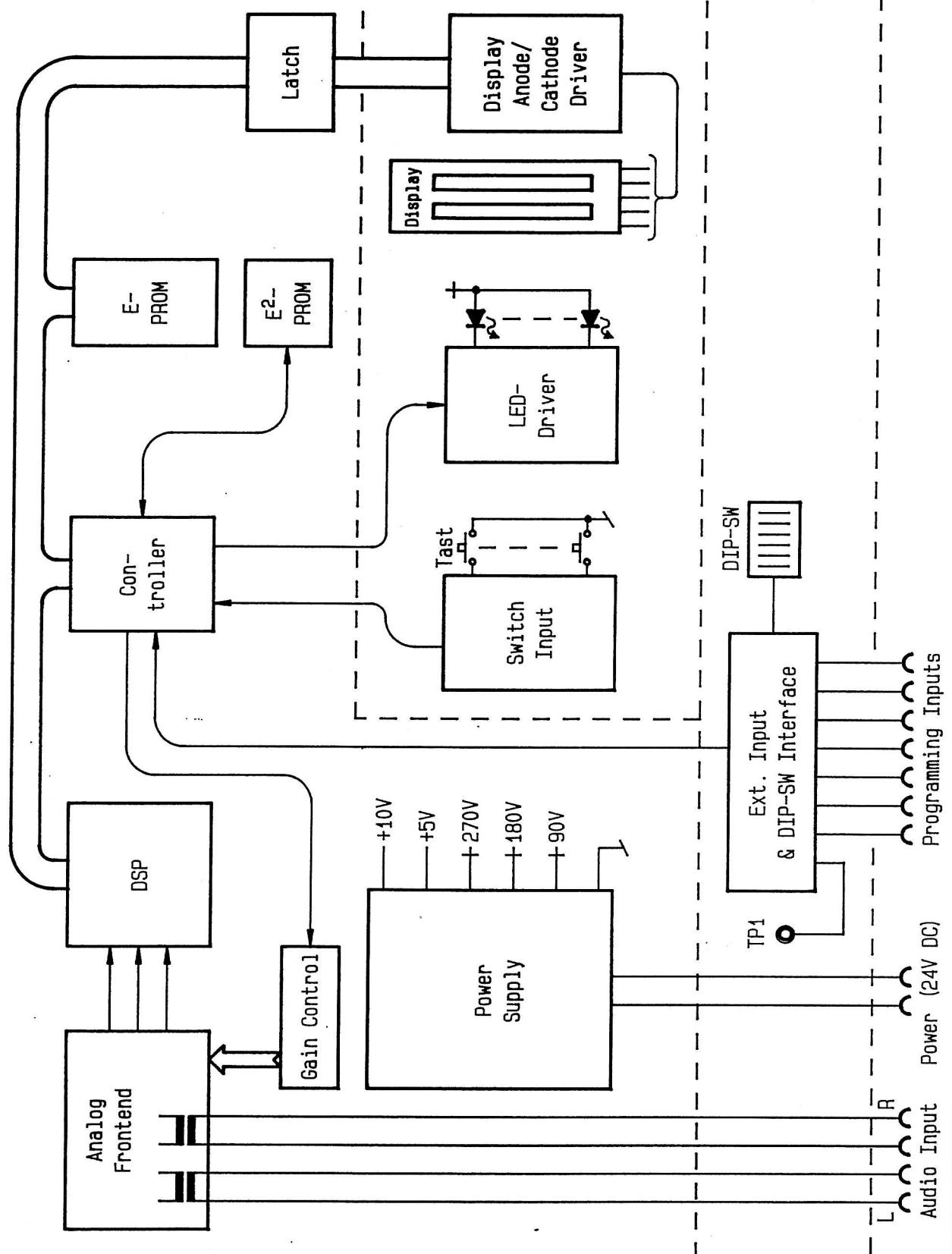
Controller.

The controller (IC6) performs a number of tasks:

- a. - further data processing and communication with the DSP.
 - b. - scanning and control of Gas Discharge Bar-graph Display.
 - c. - control of LED indicators (phase meter, if present).
 - d. - handling inputs from push-button and programming switches.
 - e. - control of the gain switches in the analog frontend.
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- a. The controller (IC6) fetches the measurement values from the DSP via the DSP's "Host Interface". At this stage the measurement values are represented in linear form, thus the controller makes a linear to logarithmic conversion to suit the presentation on a (nearly) linear dB-scale. The DSP-program code is stored in the common E-prom (IC8) and during upstart transferred to the DSP under control of the controller.
 - b. The Bar-graph display requires a 3-phase cathode drive signal and an anode control signal for each of the two anodes. These signals are generated by the controller and latched by IC13. On the display board the IC1 and Q14-Q17 constitutes the cathode drivers, while Q1-Q13 controls the anode voltages.
 - c. The controller controls via a 3-wire serial interface the three LED-drivers (IC2,4 and 5) on the display board.
 - d. Push-button and programming inputs are transferred to the controller via IC3 on the display board and via IC1 and IC2 on the back-panel board.
 - e. Upon knowledge of reference level & gain, the controller sets the gain switches (IC103/104) via a serial to parallel converter (IC109) and a level converter (IC105).

Power supply.

The power supply, placed on the main board, is a PWM-type switched mode supply. It consists of the PWM regulator (IC2) a MOSFET switch (Q1) and the transformer TR1. To achieve sufficient stability on the 5/10 volt supply this also employs linear regulator (IC1/IC101).



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Scale :				
Tolerance :				
Design :	MB			
Layout :	931208.j1			
Revised :				

Digital Peak Program Meter 477-800A
Block Diagram

NTP

477-8019-A-4

Technical Specifications:

Supply voltage 20 - 32 V dc
 Current consumption, @ 24V supply 180 mA typ. (max. 250 mA)
 Temperature range 0 to 45°C ambient temperature.

Signal input:

Frequency range, 0,5dB	20Hz to 20kHz
High frequency roll-off	$\geq 12\text{dB/oct}$. above 20kHz
Input impedance	$20\text{k}\Omega \pm 10\%$ balanced floating
Input CMRR	>60dB at 15kHz
Reference input voltage	0dBu to 15dBu, selectable
Factory setting, DIN/NOR type	1,55V rms sine(+6dBu)
Factory setting, BBC type	1,94V rms sine(+8dBu)
Input overload level	>10dB (relative to reference)
Dynamic measuring range	>60 dB

Measuring errors, PPM

1kHz steady signal	at +10 to -10dB	at -10 to 40dB
Within the frequency range	$\leq 0,3\text{dB}$	$\leq 1\text{dB}$
Polarity shift of unsymmetrical wave	$\leq +0,5\text{dB} / -1\text{dB}$	$\leq +0,5\text{dB} / -1\text{dB}$
Tracking between channels	$\leq 0,3\text{dB}$	$\leq 1\text{dB}$
10% change of supply voltage	$\leq 0,2\text{dB}$	$\leq 0,5\text{dB}$
	$\leq 0,2\text{dB}$	$\leq 0,2\text{dB}$

Integration Time

Normal integration time	According to DIN45406 & IEC 268-10
Fast integration time	"zero"

Fallback time

DIN type	1,5sec from 0 to -20dB, "Zeit linear"
NOR type	1,5sec/20dB
BBC type	3 sec/24dB ("7" to "1")

Max peak memory Accuracy is the same as for the peaks

Additional Gain

20dB additional gain error	$\leq 0,2\text{dB}$
40dB additional gain error	$\leq 0,5\text{dB}$

Overload Indicator

Overload threshold range (adjustable from the front)	-10dB to +10dB
Overload threshold resolution	1dB
Response time	Same as fast integration time ("zero") Accuracy is the same as for the peaks

NB! The overload function is disabled when additional gain is active

Front Panel Controls/Functions See "Front lay-out" part in the description

External Controls/Functions See Terminal Connection, (a separate page in this manual)

Standard Scales

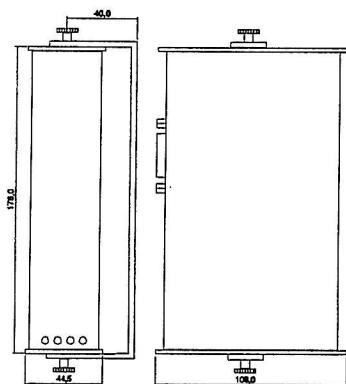
DIN: +5 to - 50dB

NOR: +12 to -36dB

BBC: "7" to "1"

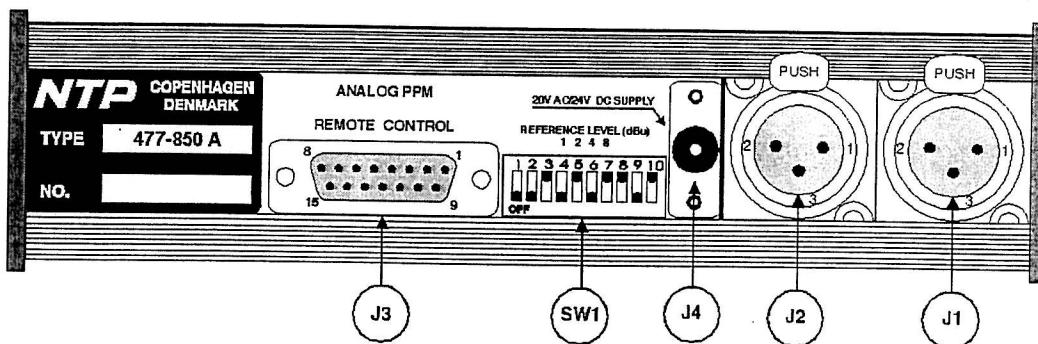
All scale types are available in both horizontal and vertical versions.

Mechanical outline:



Weight approx 0,6kg

Terminal Connections.



J1, Right Audio Input.

Term no.:

- 1 Chassis/Screen
- 2 (+) Input
- 3 (-) Input

J2, Right Audio Input.

Term no.:

- 1 Chassis/Screen
- 2 (+) Input
- 3 (+) Input

J3, Remote control.

Term no.:

- 1 Reference selection, bit 0 = 1 dB
- 2 Reference selection, bit 1 = 2 dB
- 3 Reference selection, bit 2 = 4 dB
- 4 Reference selection, bit 3 = 8 dB
- 5 Not Used
- 6 MAX (Display Max.)
- 7 GAIN (20 dB Gain)
- 8 CLR (Clear memory)
- 9 ZOOM
- 10 MODE select
- 11 Adjust Peak Levels, see "Checking and Adjusting" for more details.
- 12 Reserved for future use. Must not be connected.
- 13 FAST integration time select.
- 14 Not Used
- 15 - VCC, To activate any of the above, connect to this terminal.

SW1, Local Programming.

Pos. no.:

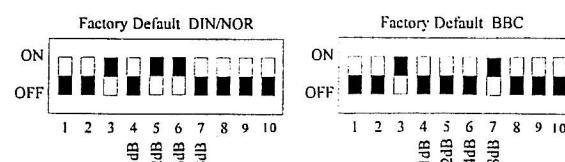
- 1 and 2 Reserved for future use. Should be in off-position.
- 3 Without changing the integration time of the measurements the display ballistics can be changed to obtain a more steady display. The "slow" ballistics is selected when SW 3 is on.

4,5,6 and 7

The reference level can be set on the programming switch. The code range is 0 to 15 dBu, binary code with SW 4 being the least and SW 7 the most significant bit. The factory default setting is 6 dBu for the DIN/NORDIC types and 8 dBu for the BBC type. Alternatively, the reference level can be coded on the connector. If coded through the connector, all code switches should be in off position.

8,9 and 10 not used.

NOTE: If remote control is being used the corresponding local (DIL Switch) programming must be in OFF-position.



Since the instrument is adjusted correctly on delivery, adjustments need only to be carried out in case of indication errors as a consequence of repair. - However, a small offset adjustment ($\pm 1\text{dB}$) of reference level for each channel can be done without affecting the basic adjustments of the instrument:

Offset Adjustments

Connect pin 1 (Adjust peak levels) to -Vcc (See terminal Connections). The PPM now will be in the adjust mode. In this mode the display will show the offset range ($\pm 1\text{dB}$) by an illuminated background with a spot in the middle of the range (0dB). The actual offset for each channel is marked with a spot in the adjustment range.

To increase the reading for left channel with 0,1dB: Push the GAIN button
To decrease the reading for left channel with 0,1dB: Push the FAST button

Activating simultaneously the GAIN and the FAST buttons sets the left channel offset to 0dB.

For the right channel use the ZOOM and MAX buttons in a similar way.

On completion, deactivate the pin, and the PPM permanently saves the new offsets and returns to normal operation.

FOR THE FOLLOWING ADJUSTMENTS, THE INSTRUMENT HAS TO BE OPENED

Adjust Analog Frontend

Under this test/adjustment the controller will step through all reference levels and additional gain (by taking control of the gain switches in the analog frontend) and make a correction table upon knowledge of the input level and actual level.

- 1 Feed a signal of 0,775V rms (0dBu), 1kHz sine to the input terminals.
- 2 Activate the TP1-GND1 input (placed on the connector board - active when TP1 and GND1 are shorted). After about 3 seconds the FAST LED on the frontplate will begin to flash, indicating that testing/adjustment of the analog front end has started/is running. During the test/adjustment -which lasts about 30 seconds- the actual levels will be shown on the display. If any actual level differ with more than 2dB from the nominal level, the test/adjustment has failed. This will be marked with no light in the FAST LED. Steady light in the FAST LED means positive test/adjustment result.
If -and only if- the test/adjustment was successful, the calibration table will be permanently saved.
- 3 Activate the TP1-GND for about 3 seconds to return to normal operation.

CMRR Adjustment

- 1 Feed a signal of 10dB above reference level, 15kHz sine to both input terminals (pin 11 & 14 for the left channel, pin 10 & 15 for the right channel) with respect to -Vcc (pin 12)
- 2 Adjust C101 and C102 (placed on the motherboard) to obtain minimum reading (max -50dB)