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ELECTRICS

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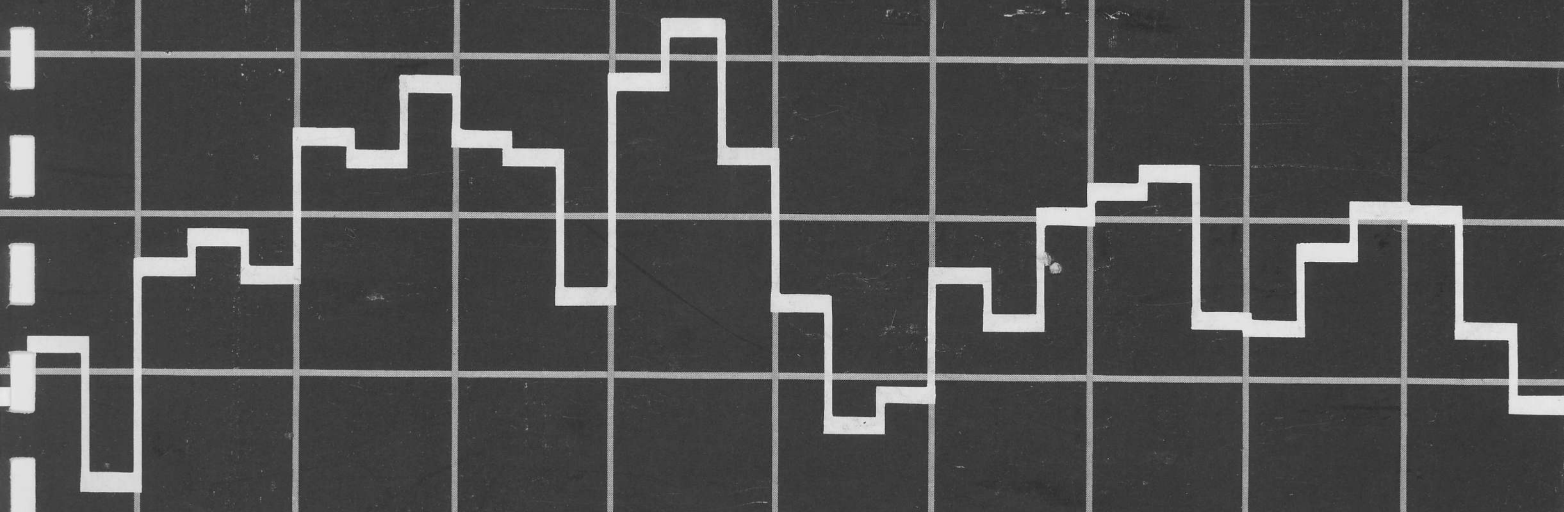
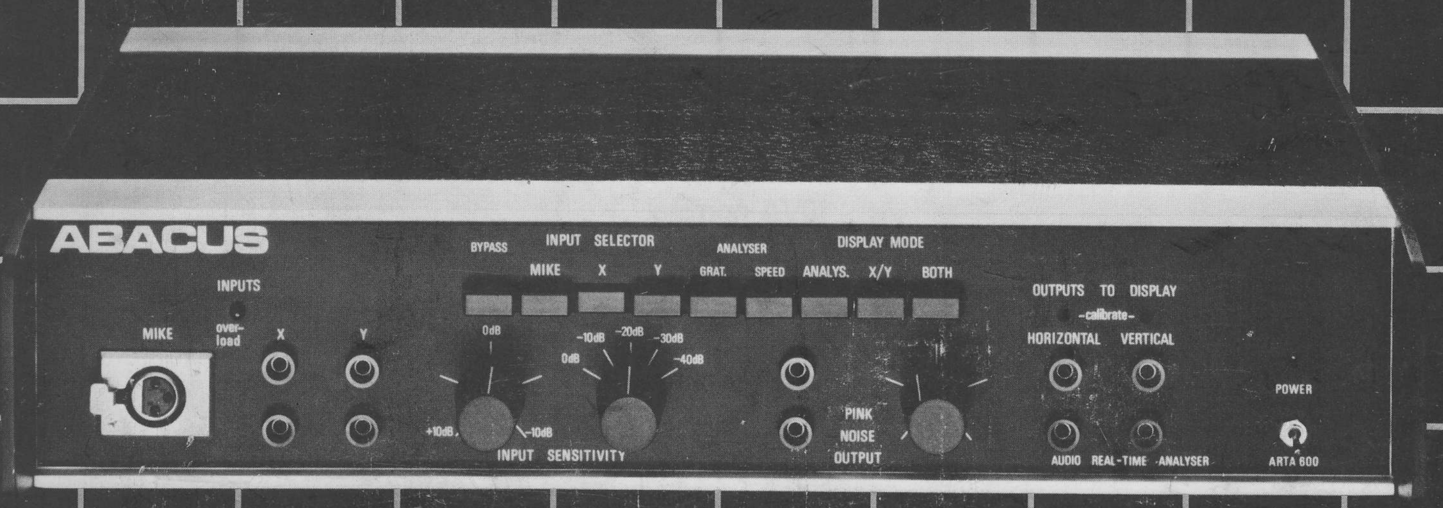
ARTA 600

The **ARTA** third octave audio analyser adaptor may be used in conjunction with an oscilloscope or large screen X/Y monitor to display the real-time intensity and spectral distribution of sounds. Using the internal pink noise generator as an excitation signal, a system's electrical or electro-acoustic frequency response may be accurately and rapidly determined.

The use of an external display enables the analyser to be priced economically and allows the user to choose either a large screen display for production line and laboratory work, or service oscilloscope for on site measurements.

Applications include loudspeaker and microphone response measurements; tape recorder alignment; amplifier, tone control and filter response checks; signal and hum tracing; loudspeaker cross-over design; crosstalk and noise measurements and numerous other specialist applications in the design, evaluation, maintenance and installation of audio circuits and systems.





ARTA 600 Data Summary

The **ARTA 600** may be used with any D.C. coupled oscilloscope or large screen display capable of X/Y mode operation.

Frequency Range	Audio Band, 25Hz to 20kHz	
Filters	30 'single-pole-pair' third-octave filters on ISO centres from 25Hz to 20kHz. (25Hz, 31.5Hz, 40Hz, 50Hz, 63Hz, 80Hz, 100Hz, 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz, 8kHz, 10kHz, 12.5kHz, 16kHz, 20kHz)	
Measurement Range	−60dBm to +20dBm in five switched ranges	
Display Range	20dB	
Detector Ballistics	Fast or slow to suit programme or noise analysis	
Inputs	**Mike**	One balanced input on XLR-3-31 connector with +12 volt phantom powering
	Line	Two unbalanced inputs, X and Y, on 4mm terminals. >10kohms input impedance
Pink Noise Output	Spectrally flat, unbalanced output on 4mm terminals. 700 mvolts maximum level.	
Outputs to Display	Calibration controls set polarity and magnitude of output signals to suit sensitivity of display inputs. Up to 5 volts, + or −, available on 4mm terminals.	
Graticule	In analyser mode −10dB, 0dB, and +10dB graticule lines may be generated. Oscilloscope shift and analyser calibration controls allow these lines to be set behind existing oscilloscope graticule.	
Display Mode	**Analyser**	Selected input channel X,Y or Mike is analysed and the energy level in the 30 ISO centered third-octave bands is displayed as an easy to read histogram. Wide band energy for total signal level is also displayed.
	X/Y	Line signals X and Y are displayed in X/Y mode for phase comparisons
	Both	Selected input channel in analyser mode and Line inputs in X/Y mode displayed simultaneously
Bypass	Allows use of oscilloscope without replugging leads	
Power Requirements	Internally wired 115 or 230 volts A.C. 50/60Hz 10VA nominal	
Mechanical	**Dimensions**	432×89×268 millimetres, optional brackets allow rack mounting
	Weight	3.5 Kg

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A UNPACKING AND INSTALLATION

CHECK SUPPLY VOLTAGE BEFORE APPLYING POWER
A rear panel label indicates whether the unit has been wired for 115 volt or 230 volt operation. If it is necessary to change the wiring then the bottom cover plate should be removed (see servicing section of handbook) and the mains transformer rewired according to the information printed on it.

The unit may be used standing on a bench or laboratory trolley. The unit will also mount into a standard 19 inch rack using the optional brackets, type 501.

The analyser is supplied with a 3-wire power cable with moulded I.E.C. socket. When connected to a suitable receptacle the instrument cabinet and panel will be grounded. Signal ground is connected to chassis via 10 ohms in parallel with 47nF, in order to avoid earth loops.

The following wiring convention should be observed when using the power cable supplied with the unit.

(Continental Style)	Live	Neutral	Earth
	Brown	Blue	Green/Yellow

Choice of Oscilloscope Display

Many users will already have an oscilloscope with which they intend to the use the ARTA 600 analyser adaptor. Essential requirements for the display are:-

1) Must be capable of X/Y mode operation. (Inputs for horizontal and vertical deflection both available)

2) X (horizontal) and Y (vertical) inputs to be D.C. coupled.

3) Deflection to be linear (worst case linearity of 5% tolerable)

4) 5 volts peak or less must be sufficient to deflect the spot the full width or height of the display.

5) For analyser mode display a minimum bandwidth of 1kHz for the horizontal deflection and 10kHz for the vertical deflection is required. For X/Y and 'Both' mode of operation bandwidths of 20kHz horizontally and vertically are required, with low relative phase shift.

Large Screen Display

Large screen (9" to 12") monitors may be used for studio, laboratory and educational purposes where viewing at a distance is required. These displays, usually based on T.V. technology, often have only 1kHz horizontal bandwidth. This is adequate for displaying the analyser histogram waveform but is insufficient for showing useable X/Y (relative phase) displays.

It should be noted that a video monitor is not suitable as the ARTA 600 does not produce a video signal output.

Suitable large screen X/Y monitors include Wavetek models 1901C, 1903 and 1951, Telonic model 121, Marconi Instruments model TF2212A and certain models by Kikusui.

Service/Laboratory Oscilloscope Display

Most modern oscilloscopes are entirely satisfactory for use with the ARTA 600. Some oscilloscopes select X/Y mode of operation with a single push button and this is ideal, others have an X/Y (or external X) position on the timebase speed switch. Many dual channel oscilloscopes use the two input amplifiers for X and Y deflection; single channel and some dual channel oscilloscopes have an 'External X' input for use when the timebase is switched off. All of these variations are satisfactory.

Square (rectangular) oscilloscope screens are to be prefered to round ones. With round screens a choice must be made between having a smaller trace or occasionally losing part if the display in the corners.

Some portable oscilloscopes have very small screens and though useable make an analyser trace difficult to resolve. Three or five inch (8 x 10cm) screens are to be prefered.

Connection/Calibration of Oscilloscope Display

1) Switch on oscilloscope and ARTA 600
2) Switch oscilloscope to X/Y mode of operation and inputs to D.C. coupling. A single spot should be visible on the screen. If variable sensitivity controls are provided these should be put into the 'cal' position. If possible X and Y sensitivities should be set to about 1 or 2 volts full scale deflection.
3) Connect outputs from ARTA 600 to vertical and horizontal inputs of oscilloscope using low capacity screened cables, preferably of identical length.
4) Set ARTA 600 input selector switch to any unused input and display mode switch to analyser mode. A horizontal line should now be observed. (A vertical line may indicate that horizontal and vertical signals have been reversed). This line is the lower (-10dB) display line.

   N.B. Bypass button should not be depressed.
5) Link Pink Noise Output socket to X Line Input and select X input. Turn Pink Noise Output level to maximum and Input Sensitivity controls to OdB.

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A pink noise histogram trace should now be seen. This may be more easily observed if the 'speed' button is depressed. Using the horizontal 'calibrate' control on the ARTA 600 and the oscilloscope horizontal shift control align the trace suitably. The channel reading high should be at the right hand side of the display. If the wideband channel is on the left the calibration control should be rotated. The trace should reduce in size and then reverse direction. For oscilloscopes with 10 divisions horizontally it is convenient to have three third-octave channels per division. The bands central to each graticule division are then 31.5Hz, 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, and 16kHz, reading from left to right. The wideband channel is just off screen but may still be visible. Fig.1 shows a trace set up as detailed above. If considered desirable the oscilloscope screen could be labelled with dry rub-down lettering.

6) Press and hold in the graticule (GRAT.) button on the analyser. Two lines, 0dB and +10dB, should now be seen in addition to the original -10dB line. Using the oscilloscope vertical shift

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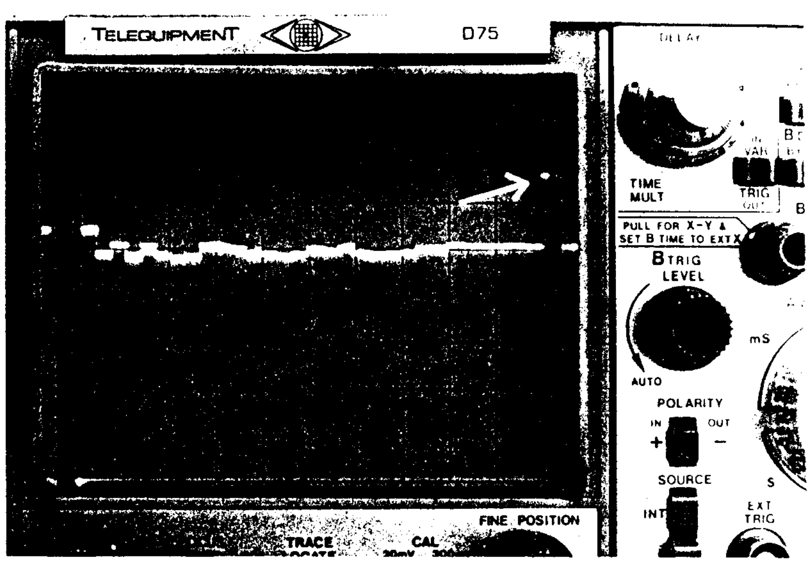

Fig.1. Pink noise - analyser mode. Note three third-octave bands per graticule division and wideband channel to right of display.

control and the ARTA 600 vertical 'calibrate' control these lines should be set behind the existing oscilloscope graticule. Fig.2 and Fig.3 show two possibilities; Fig.2 with 20dB displayed range (2.5dB/division) and Fig.3 with 16dB displayed range (2dB/division).

NOTE. If the oscilloscope vertical sensitivity is set to 0.2V/div. and the ARTA 600 has been aligned for 2dB/div. then switching the oscilloscope to 0.1V/div. will give 1dB/div. for the analyser display.

Oscilloscope calibration is now complete

+10dB

0dB

-10dB

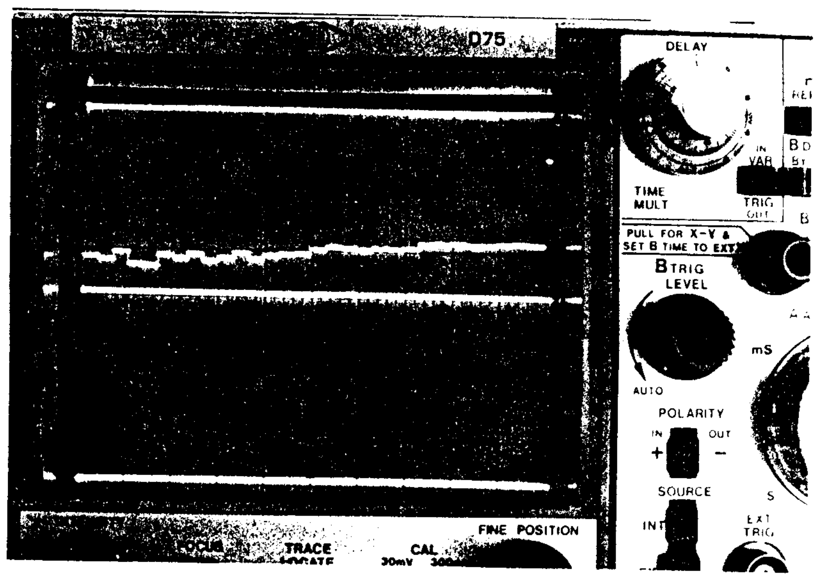

Fig.2. Pink noise plus graticule - 20dB displayed range

0dB

-10dB

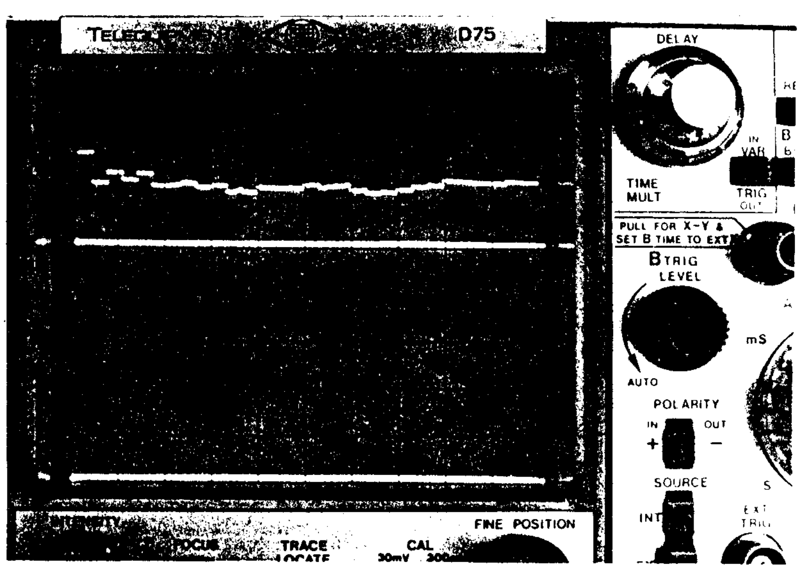

Fig.3. Pink noise plus graticule - 16dB displayed range

Line/Mike Input connections

Line Inputs

The Line Inputs X and Y are unbalanced and have over 10kohms input impedance. 4mm banana sockets are used on standard spacing. Connections should be made using low capacity screened cable, the screen going to the earthy side of the input (black terminal). Test leads used for X and Y inputs should preferably be identical in type and length as in certain circumstances relative phase shift at high frequencies may be discernible when the display is in X/Y mode.

Mike Input

The Mike input is balanced via a transformer and has nominally 600 ohms input impedance. 12 volt phantom powering is provided (12 volts via 470 ohms to transformer primary centre tap) and certain microphones will connect directly. The AKG C451E with CK2 capsule is recommended.

A Cannon XLR-3-31 connector is used, pins 3 and 2 are signal input, pin 1 is earth. Extension cables should be twin-screened microphone cables of high quality, pins 3 and 2 carried through by the twin cores, pin 1 by the shield. Pins 3 and 2 should NOT be connected to earth (pin 1) as D.C. current will pass through the input transformer. If a dynamic microphone is to be used it should be connected to pins 3 and 2, pin 1 should not be used. In this way the 12 volt phantom supply will not damage the dynamic microphone.

B INTRODUCTION

The ABACUS ELECTRICS ARTA 600 analyser adaptor is a compact instrument that enables an oscilloscope to display the real-time intensity and spectral distribution of sounds.

Electrical signals, corresponding to the pressure of sounds, may be fed to the analyser either directly from a microphone or from a tape-recorder, mixing console, etc. Three inputs are provided, one high sensitivity microphone input and two identical line level inputs, X and Y, allowing signals between -60dBm (775 µvolts) and +20dBm (7.75 volts) to be observed.

The selected input channel, after suitable level adjustment, feeds a parallel array of active band-pass filters. These filters divide the audio spectrum into 30 contiguous channels centred at one-third octave intervals from 25Hz to 20kHz. Each filter feeds a detector and integrator the 'time-constants' of the latter determining the display ballistics. Large time-constants give longer integration times and hence slower ballistics which are more suited to the measurements of continuous noise spectra. Faster ballistics are suited to the examination of music and other programme material where the spectral content changes more rapidly.

An additional detector/integrator monitors the wideband signal for total signal energy. This wideband channel appears to the right hand side of the frequency spectrum display and is attenuated by 10dB relatively; see Fig.4. If required it may be given the same gain (see service information), however on full spectrum signals it will generally be over full scale.

The D.C. output voltages of the 31 integrators are sampled in sequence and the resulting voltage, after passing through a logarithmic amplifier, forms the vertical deflection waveform of the 'stepped' histogram analyser trace. The logarithmic amplifier is used to produce an equal-decibel-per-division vertical scale with a 20dB (+10dB to -10dB) window.

The horizontal deflection signal is a synchronised repeating ramp waveform so that the display is shown in terms of level against frequency.

The analyser histogram and ramp waveforms pass through electronic switches and then on to the output sockets via buffer amplifiers and calibration controls.

In X/Y mode of operation the electronic switches pass the X and Y pre-amplifier output signals instead of the analyser waveforms; in 'both' mode the switches rapidly alternate so that a combined image is observed.

The ARTA 600 anayser contains a pink noise generator with variable output level that may be used as a signal source for systems under test. Pink noise contains energy at all frequencies with equal energy per-octave bandwidth, when displayed it gives a flat voltage response. The frequency response of a system may be displayed directly by using pink noise as an input signal and examining the spectrum of the system output.

For a stereo source left and right channels may be fed to X and Y line inputs and by depressing both X and Y input selector buttons the sum of left and right signals (mono) will be displayed.

In X/Y and 'both' mode only the switched input sensitivity control varies the magnitude of the X/Y display, the variable control is inoperative. An overload clipping circuit operates on the X/Y display and in high level signal conditions some waveform distortion in the lower left hand corner of the display may be observed; in practice this is of no significance.

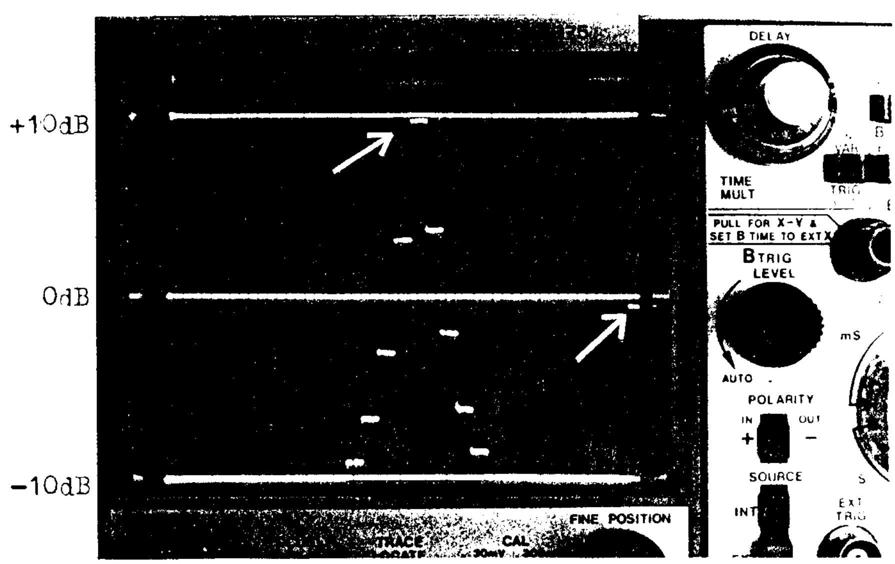

Fig.4. 1kHz tone - analyser mode. Note 10dB relative attenuation of wideband channel.

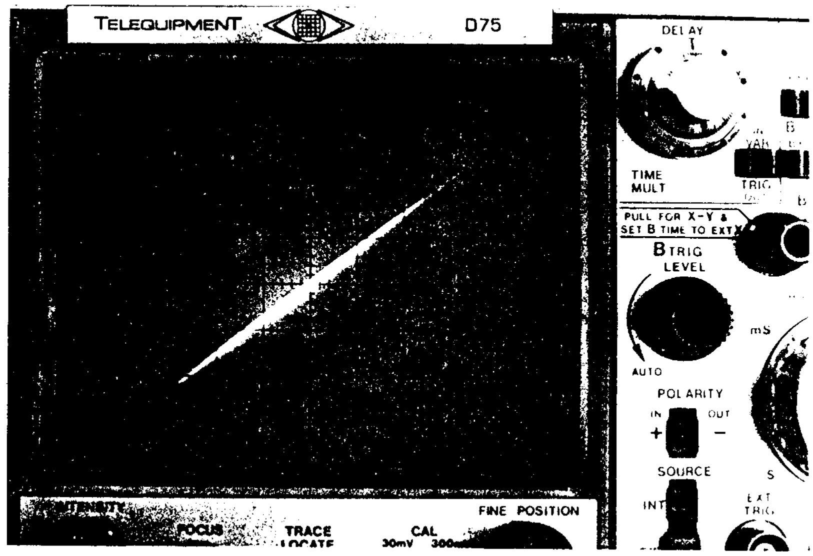

Fig.5. X/Y mode - coherent pink noise fed to X and Y line inputs

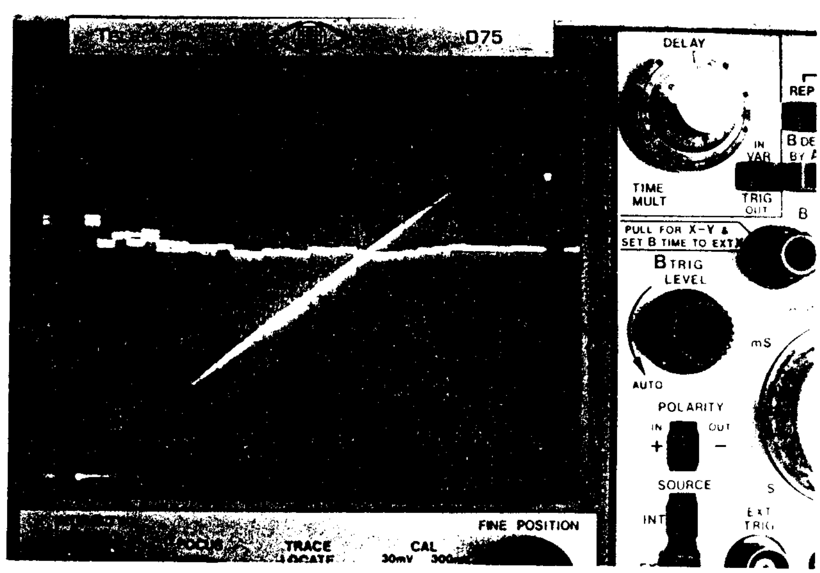

Fig.6. 'Both' mode - X or Y line input selected, coherent pink noise fed to X and Y line inputs

C APPLICATION NOTES

General

The display range and ballistics of the ARTA 600 analyser adaptor may be switched to optimise the instrument's characteristics for various applications. The instrument's large dynamic range allows measurements on systems of widely varying output capability. When using the internal pink noise generator as a source to excite a system under test ensure the system is not being overloaded as inaccurate readings and/or damage to the system may result. If the input sensitivity of the system is unknown always start with the pink noise output level control turned down and gradually increase drive to the system.

Audio Signal Analysis

The spectral distribution of energy in audio signals may be observed by feeding the programme material to the analyser from microphone or audio line. Where the spectrum of the signal varies rapidly as with speech or music fast ballistics are suitable. If the residual noise of a system is being examined (to measure the hum content say) slower ballistics may be more appropriate.

The lower level components of the signal may be observed in the presence of high level components by increasing the sensitivity of the analyser. It is quite satisfactory for the signals to exceed the display full scale deplection (+10dB); the overload indicator will indicate when the analyser input stage is overloaded. As the analyser recovers instantly from overload occa sional overload is permissible and will not affect the accuracy of readings significantly. The ARTA 600 is not a peak indicating instrument, even in its fast mode the attack time constant is approximately 20msec and so on fast, short duration transients under reading will occur. It should be noted that when high resolution filters are used in an analyser some under-reading of transients is inevitable due to the rise-time of the filters themselves. Due to the nature of multi-band analysers a signal peak occuring at a frequency half way between band centres will under-read by 3dB in each adjacent band.

Acoustic Measurements

Real time measurement of the frequency response of acoustic systems may be carried out using the ARTA 600 analyser adaptor and a high quality microphone. The loudspeaker system is excited with pink noise and the noise received in the listening area is fed to the analyser for spectral examination.

When injecting pink noise into a system start with the level turned down to avoid inadvertently overloading and possibly damaging the speaker system. In a cinema where the analyser may not be in the auditorium check (by ear) the actual sound level to ensure a realistic level is being produced without causing system overload.

Most large auditoria have a residual background noise, usually of low frequency, that will be visible on the analyser display. This may be due to traffic, underground trains, ventilation systems etc and when checking the response the level of the pink noise should be at least 10dB over the level of the rumble so that misleading readings do not occur.

It is important to move the microphone around to see an overall response picture as highly directive loudspeakers, standing waves and reflections from hard surfaces will give quite different response curves at different points in a room.

When adjusting electro-acoustic responses by the use of tone controls, octave, third-octave or parametric equalisers there are a number of factors to be considered. Although careful electrical equalisation can often give considerable improvement in sound quality, constraints due to structural defects cannot be overcome. Reverberation times, standing wave patterns and loudspeaker dispersion will all be unaffected by equalisation and in certain cases only physical changes to the auditorium (shape or surface materials) or loudspeakers (type, position or direction) will affect the required improvement. Usually such physical changes will be considerably more expensive than fitting equalisers.

Loudspeakers should be inspected to ensure they are operating correctly, if high-frequency attenuators are used in the cross-over networks these should be set to minimum attenuation. Unnecessary attenuation by the loudspeaker or cross-over network would otherwise be offset by unnecessary boosting by the equaliser. Any boosting by an equaliser

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reduces the overload margin of the power amplifier which may cause cause excessive heating and/or increased distortion.
In studio control rooms and other situations where stereo images are critically observed the relative phase of the two (or four) channels is of considerable importance. When equalisation is applied to a monitor its phase response is changed as its electr-acoustic frequency response is changed and so when equalising a stereo system the amount of equalisation applied to each loud-speaker should be very similar. Differences in equalisation applied, if large, will cause audible image widening that may be more apparent than the earlier response differences.

Tape Machine Alignment

Pink noise and a real time analyser can be used to simply and effectively verify the record/replay response of a tape recorder. Once an in-house standard pink noise tape has been produced the full audio band replay response of a tape machine can be checked in a fraction of the time of running a 'tone run' replay calibration tape. This time saving is of considerable advantage when checking the replay and record/replay characteristics of multi-track machines. Pink noise injected on to the head of a tape could ensure that the tape would play back correctly on other machines, considerably more information is available with pink noise than with 100Hz, 1kHz and 10kHz tones. Certain tape machines have independent high frequency slope and peaking controls. Using pink noise and an analyser, adjustment of these controls is considerably simplified.

D TECHNICAL DESCRIPTION AND SERVICING

Unit Disassembly

To disassemble the analyser the four screws and side-plate adjacent to the Mike Input socket should be removed. Top and bottom covers may then be slid out. If necessary the screws holding the remaining side plate may be loosened but it is advisable not to remove both end plates as undue stress may then be placed on the printed circuit board. With top and bottom covers removed access is provided to all circuitry.

User adjustable Pre-set Controls

Analyser should be disassembled as described above.

1) Mike Sensitivity

Microphone pre-amplifier gain may be varied over a 14dB range using the pre-set potentiometer situated between I.C.2 and I.C.3.
Using a sound level calibrator it is possible to calibrate the wideband channel of the analyser to indicate dB(flat) SPL, (sound pressure level) for the particular instrumentation microphone used.

2) Wideband Channel Gain

The wideband level detector is factory set to have 10dB lower gain than the third-octave band detectors. If required it may be set to have the same gain using the pre-set potentiometer situated between I.C.33 and I.C.2. When depressing the Graticule button and feeding a sine wave signal to the analyser (1kHz say) the pre-set control is rotated to raise the wideband channel step height by 10dB.

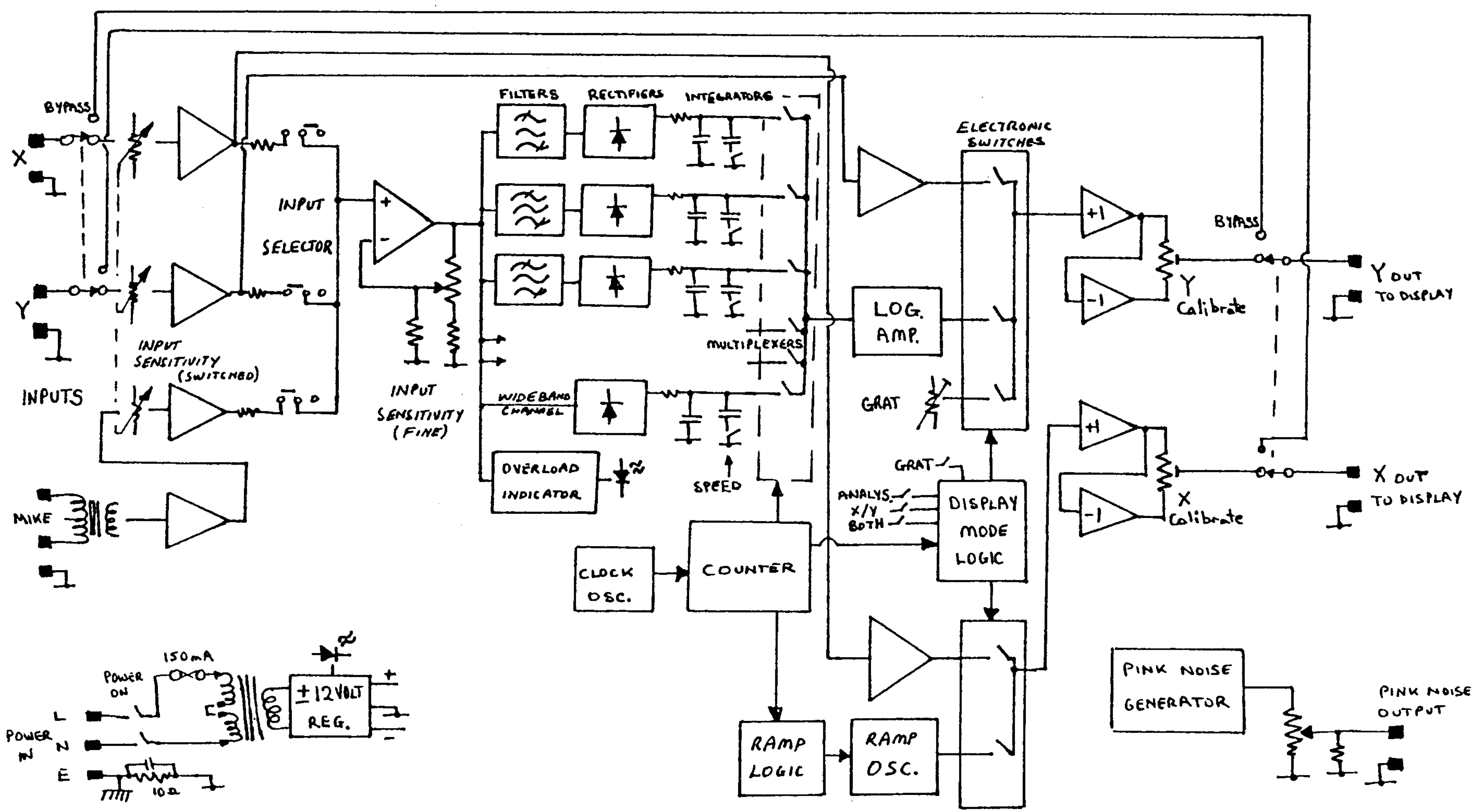

Fig.7. ARTA 600 Block Diagram

Circuit Description

Except for front and rear panel hardware all circuitry for the analyser is housed on a single printed circuit board. Section B of the handbook contains a simplified circuit description and Fig.7. shows the analyser in block diagram form. Fig.s 12 to 15 show the complete circuitry of the analyser.

A standard mains transformer/rectifier/regulator circuit provides the + and - 12 volts powering for all the analyser circuitry. The mains transformer may be strapped for 115 or 230 volt operation.

Line input signals pass via the bypass switch, switched attenuators (input sensitivity control) and buffer pre-amplifiers to the input selector switch. The microphone input signal passes through the input transformer, one pre-amplifier, a switched attenuator (input sensitivity control) and a second pre-amplifier before reaching the input selector switch. The input transformer has a centre-tapped primary with 12 volt phantom powering provided via 470 ohms.

The selected input channel feeds I.C.4, the filter driver amplifier. This amplifier has variable feedback to provide a 20dB range of gain adjustment (input sensitivity control). I.C.4 drives the inputs of the 30 filters, the wideband channel rectifier (level detector) and the overload indicator. Signal level for full scale deflection (+10dB) at the input of the filters is about 316mV, clipping level is over 6 volts. The overload indicator, I.C.39, is a fast attack - slow release peak detector using a transistor array.

The 30 bandpass filters are of the 'single-pole-pair' type with a nominal Q of 4.32 and a mid-band gain of about 10dB. Each filter feeds a level detector comprising a precision half-wave rectifier and RC integrator. In the fast ballistics mode the attack time-constants are formed by the 10k resistor and 2u2 capacitor. In the slow ballistics mode F.E.T. switches switch a 22u capacitor in parallel with the 2u2 capacitor in each channel. The wideband channel has no filter and the rectifier has pre-set adjustable gain.

The 31 integrator outputs feed four analog multiplexers, I.C.s35 to38. Timing waveforms from the counter (I.C.46) select one of the eight inputs for each multiplexer and I.C.47, a one-of-four decoder, selects each multiplexer in sequence.

The output pins of the multiplexers are joined and the histogram (stepped graph) signal is fed to a logarithmic amplifier in order to give a 'linear-decibel' vertical display. The non-linear (logarithmic law) amplifier is a multiple slope function generator where I.C.40 has signal dependent gain. At increasing signal levels further feedback resistors are switched in to reduce the gain. 2.5 volts D.C. output from a level detector is set to produce 5.0 volts output from the logarithmic amplfier (at pin 1 of I.C.51) with the set +10dB (full scale deflection) preset control. 250mvolts D.C. output from a level detector is set just to produce 0 volts output from the logarithmic amplifier with the -10dB (zero scale deflection) preset control.

All timing waveforms are derived from a clock oscillator, I.C.45, which oscillates at approximately 1.6kHz. This waveform is fed to the counter, I.C.46, which provides all the harmonically related square-waves used for sequencing the multiplexer and driving the ramp and display mode logic circuitry.
In analyser mode the horizontal deflection signal is a ramp waveform synchronised to the multiplexer scanning rate. The ramp generator itself, I.C.44, is a switched operational integrator controlled by the ramp logic. Whilst the counter counts from 0 to 30 (and the multiplexer sequences through the 31 channels) the ramp output runs up. When the counter reaches 31 the ramp logic resets the ramp output to zero. On the following count (zero again) the lowest frequency channel is selected (25Hz) and the operational integrator output starts to run up again. The integrator output reaches about 5 to 6 volts before being reset (pin 1 of I.C.44).

The output histogram from the logarithmic amplifier feeds the vertical output buffer amplifier I.C.52 via the display mode switch I.C.51. The ramp oscillator similarly feeds the horizontal output buffer amplifier via the display mode switch I.C.50. The buffer amplfiers comprise of unity gain inverting and non-inverting stages so that by rotating the calibration control from one extreme to the other an oscilloscope drive signal of either polarity is available. The output buffers feed the output sockets via the bypass switch.

The two line signals from the input pre-amplifiers are fed to I.C.49 where they are amplified and a D.C. offset of about 2.5 volts is added. These signals, which are fed to the display mode switches, are clamped via diode networks so that the display mode switches are not driven negatively. The vertical display mode switch is also fed with 5.00 volts, 2.50 volts and 0.0 volts for the generation of the +10dB, 0dB and -10dB graticule lines. In analyser mode I.C.51 passes the histogram signal and I.C.50 passes the ramp signal and so provide the signals for the analyser display (scan rate is approximately 20msecs) - see Fig.8. If the graticule button is depressed I.C.50 still passes the ramp signal but I.C.51 now selects the histogram and the three graticule voltages in a sequence controlled by timing waveforms from the counter, I.C.46 - see Fig.9. In X/Y mode I.C.50 and I.C.51 pass the line input signals from I.C.49 - see Fig.10. In 'both' mode the timing waveforms from the counter switch I.C.50 and I.C.51 alternately to pass the line signals and analyser waveforms - see Fig.11.

The pink noise generator comprises I.C.54 and I.C.55. I.C.54 is a digital pseudo-random white noise generator with approximately 100kHz clock rate and about 1.5Hz repetition rate. The 'random' square-wave noise is fed to I.C.55 and the associated RC networks which has a 3dB/octave slope falling with frequency. The resulting pink noise is fed to the output socket via an output level control.

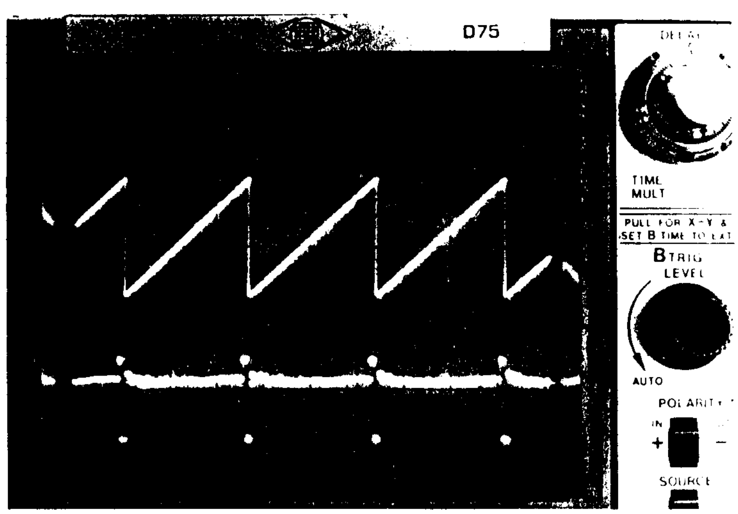

Fig.8. Horizontal and vertical outputs, analyser mode, pink noise being displayed

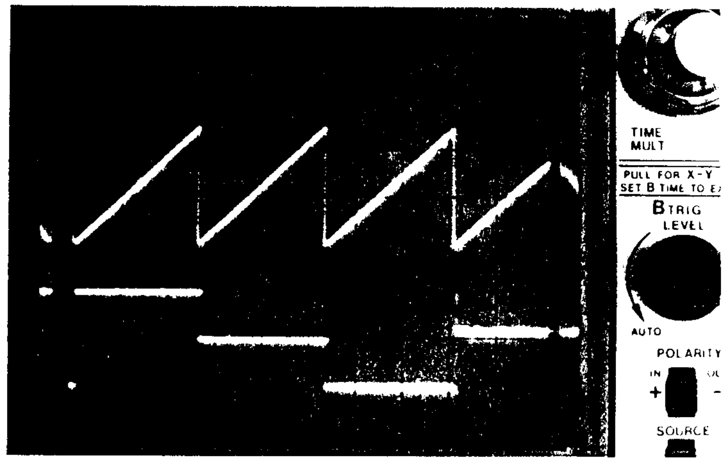

Fig.9. Horizontal and vertical output, analyser mode with graticule

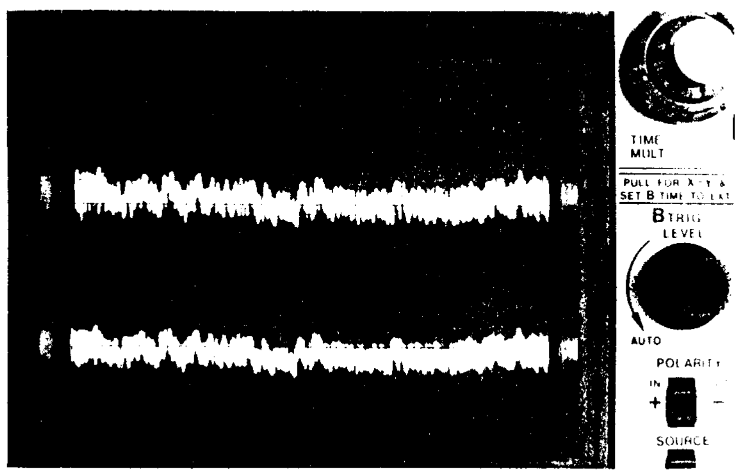

Fig.10. Horizontal and vertical outputs, X/Y mode, pink noise input

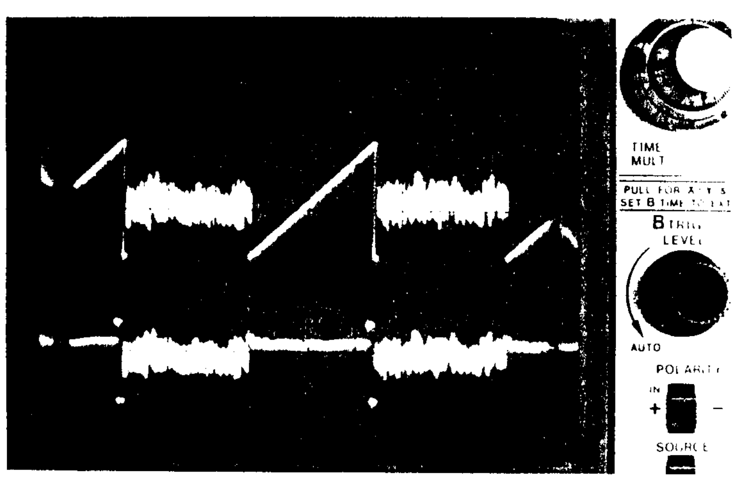

Fig.11. Horizontal and vertical outputs, Both mode, pink noise input

Service Hints

Required Equipment:

1) Dual Beam Oscilloscope
2) High Impedance Digital Voltmeter

Desirable Equipment:

1) Sinewave Oscillator
2) Audio Millivoltmeter
3) Digital Frequency Meter

In fault-finding voltages and waveforms should be checked at their source and destination.

1) Check supply rails + and - 12 volts ±5%
2) Check timing waveforms from counter. -should be 0 to +12 volt square-waves. I.C.46 pin9 - 800Hz, pin7 - 400Hz, pin6 - 200Hz, pin5 - 100Hz, pin3 - 50Hz, pin2 - 25Hz, and pin4 - 12.5Hz
3) If one filter band fails compare its operation with a working band close in frequency. Pink noise or sine-wave tone may be used as a signal source.

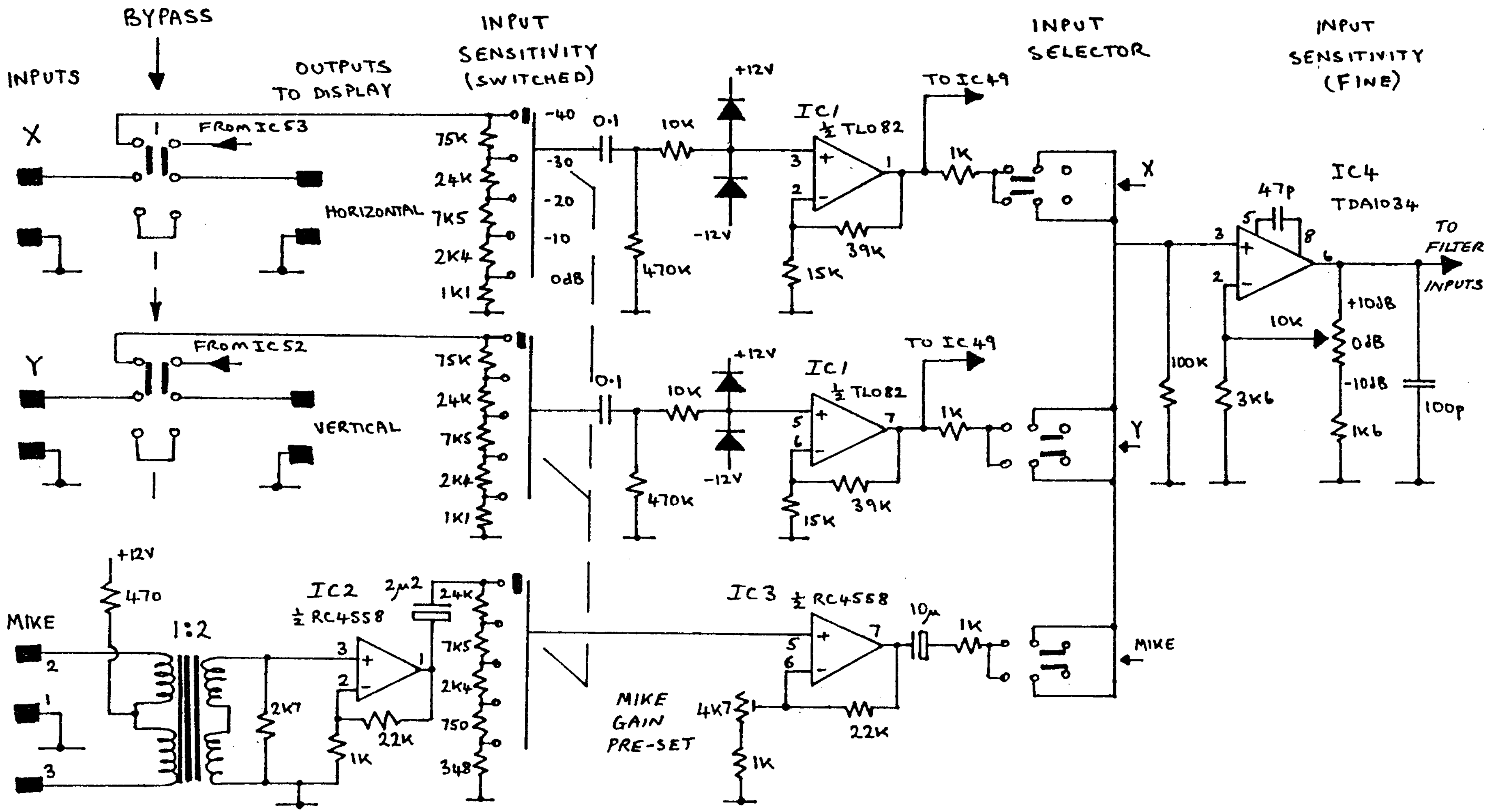

Fig.12. Input Pre-amplifiers, Input Selctor and Filter Driver

②

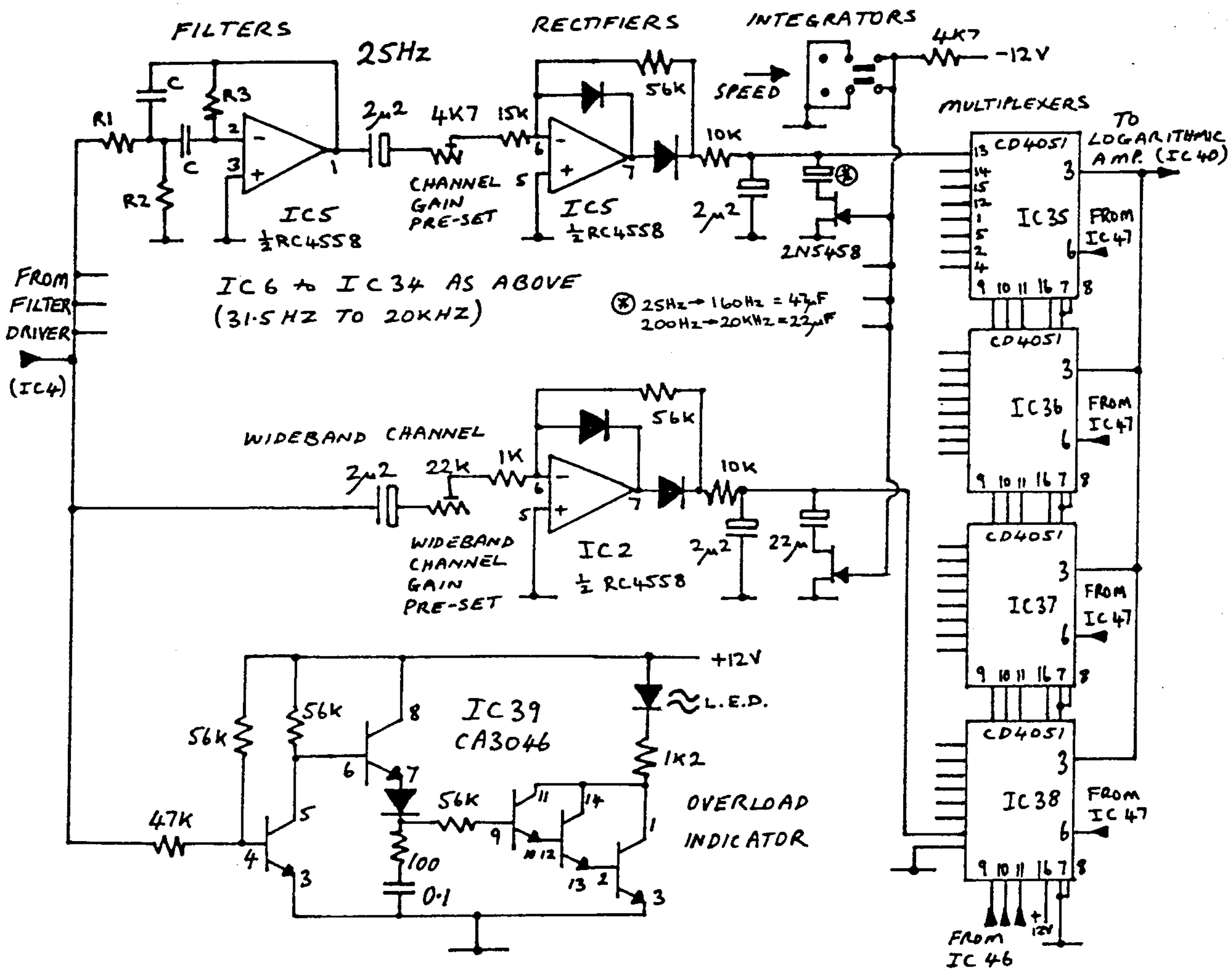

Fig.13. Filters, Level Detectors, Multiplexers and O/L Indicator.

Filter Component Values

f_o	I.C.	R_1	R_3	C
25Hz	5	18k	120k	.47u
31.5Hz	6	15k	100k	.47u
40Hz	7	22k	150k	.22u
50Hz	8	18k	120k	.22u
63Hz	9	15k	100k	.22u
80Hz	10	12k	82k	.22u
100Hz	11	22k	150k	.1u
125Hz	12	18k	120k	.1u
160Hz	13	12k	82k	.1u
200Hz	14	22k	150k	47n
250Hz	15	18k	120k	47n
315Hz	16	15k	100k	47n
400Hz	17	22k	150k	22n
500Hz	18	18k	120k	22n
630Hz	19	15k	100k	22n
800Hz	20	12k	82k	22n
1kHz	21	22k	150k	10n
1.25kHz	22	18k	120k	10n
1.6kHz	23	12k	82k	10n
2kHz	24	22k	150k	4.7n
2.5kHz	25	18k	120k	4.7n
3.15kHz	26	15k	100k	4.7n
4kHz	27	22k	150k	2.2n
5kHz	28	18k	120k	2.2n
6.3kHz	29	15k	100k	2.2n
8kHz	30	12k	82k	2.2n
10kHz	31	22k	150k	1n
12.5kHz	32	18k	120k	1n
16kHz	33	12k	82k	1n
20kHz	34	22k	150k	470p

R_2 is typically R_1/10 but is selected on test

I.C.5 to I.C.34 are RC4558

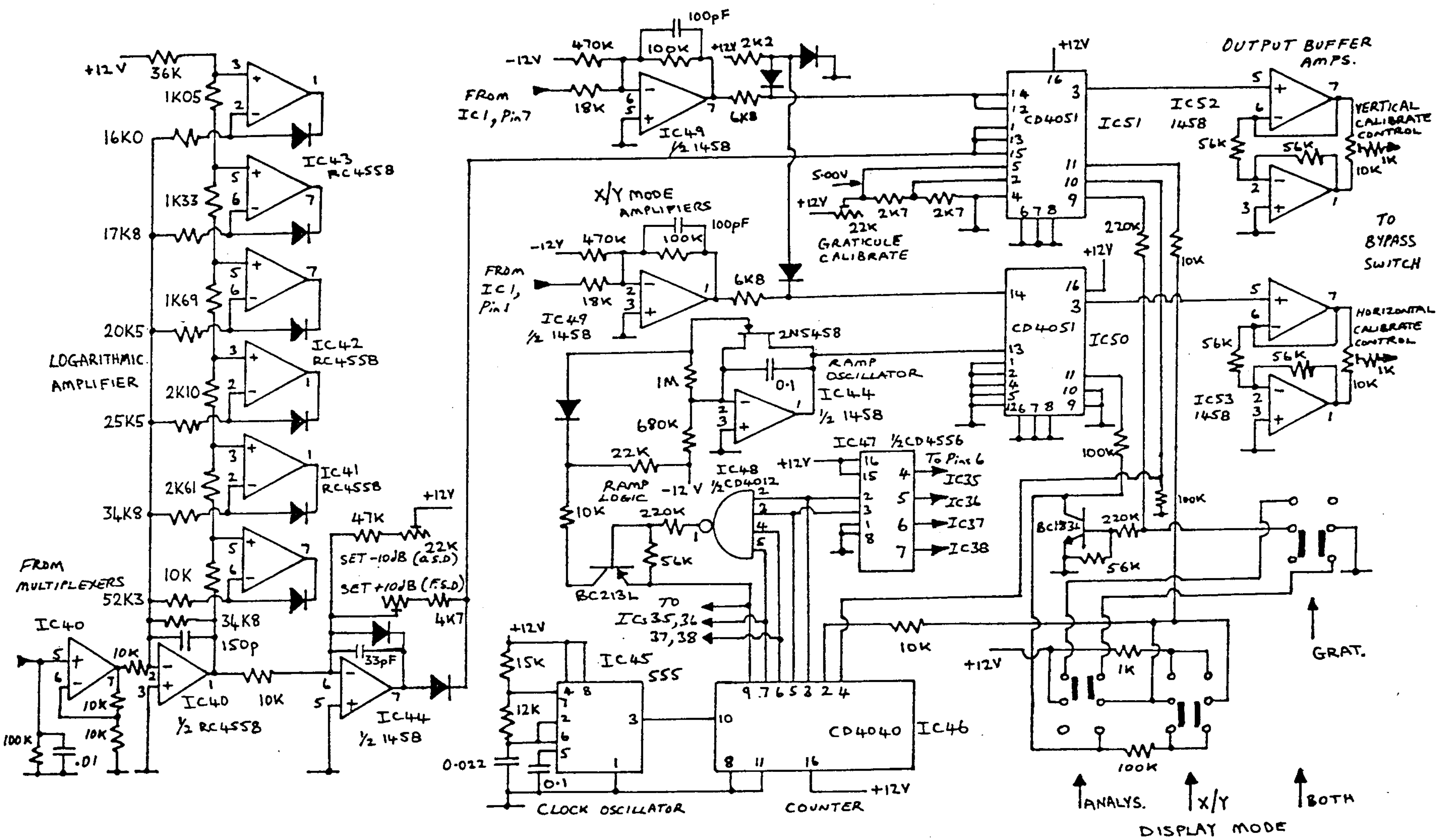

Fig.14. Logarithmic Amplifier, Clock, Counter, Ramp Generator and Display Mode Circuitry.

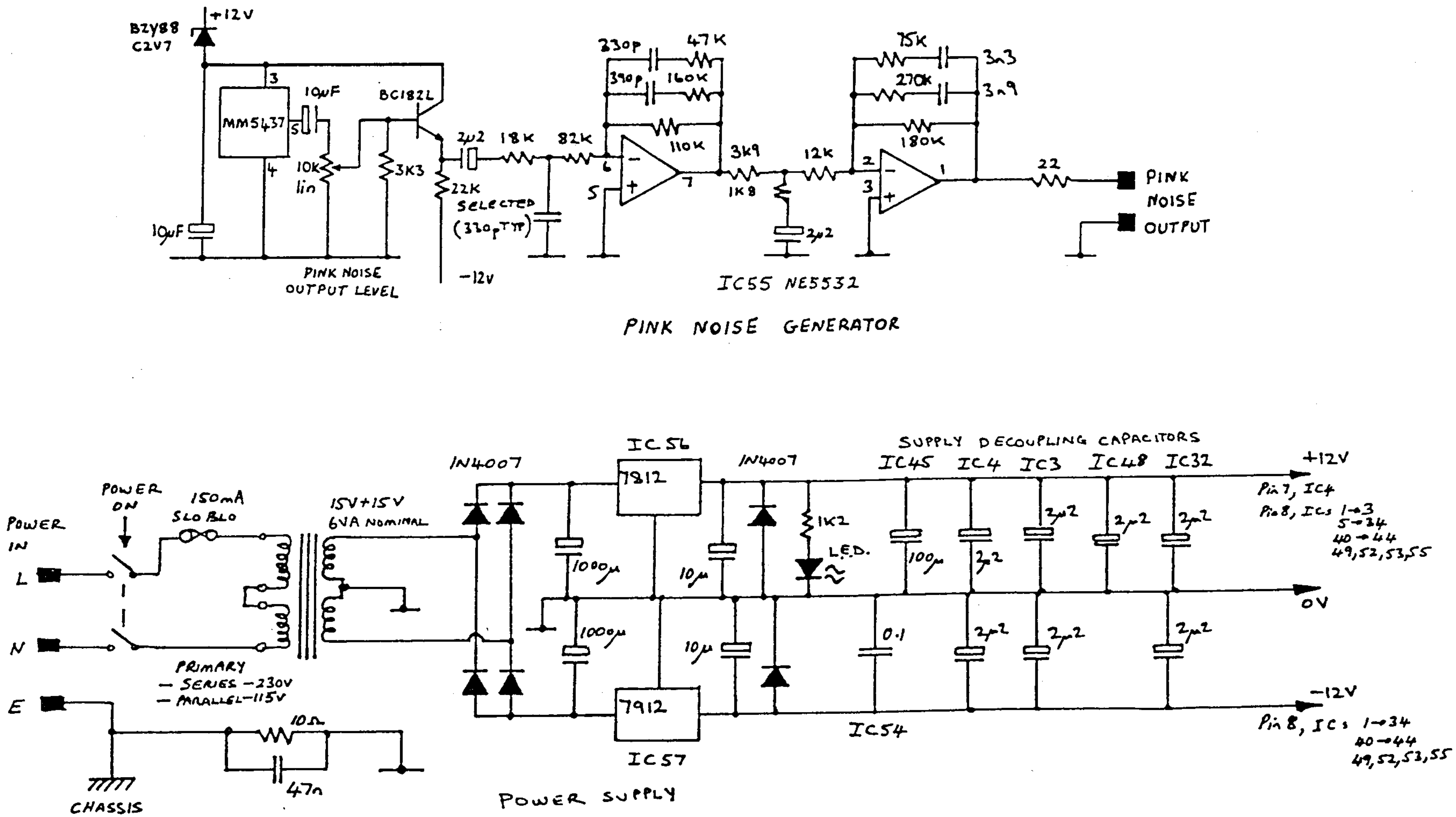

Fig.15. Pink Noise Generator and Power Supply

②

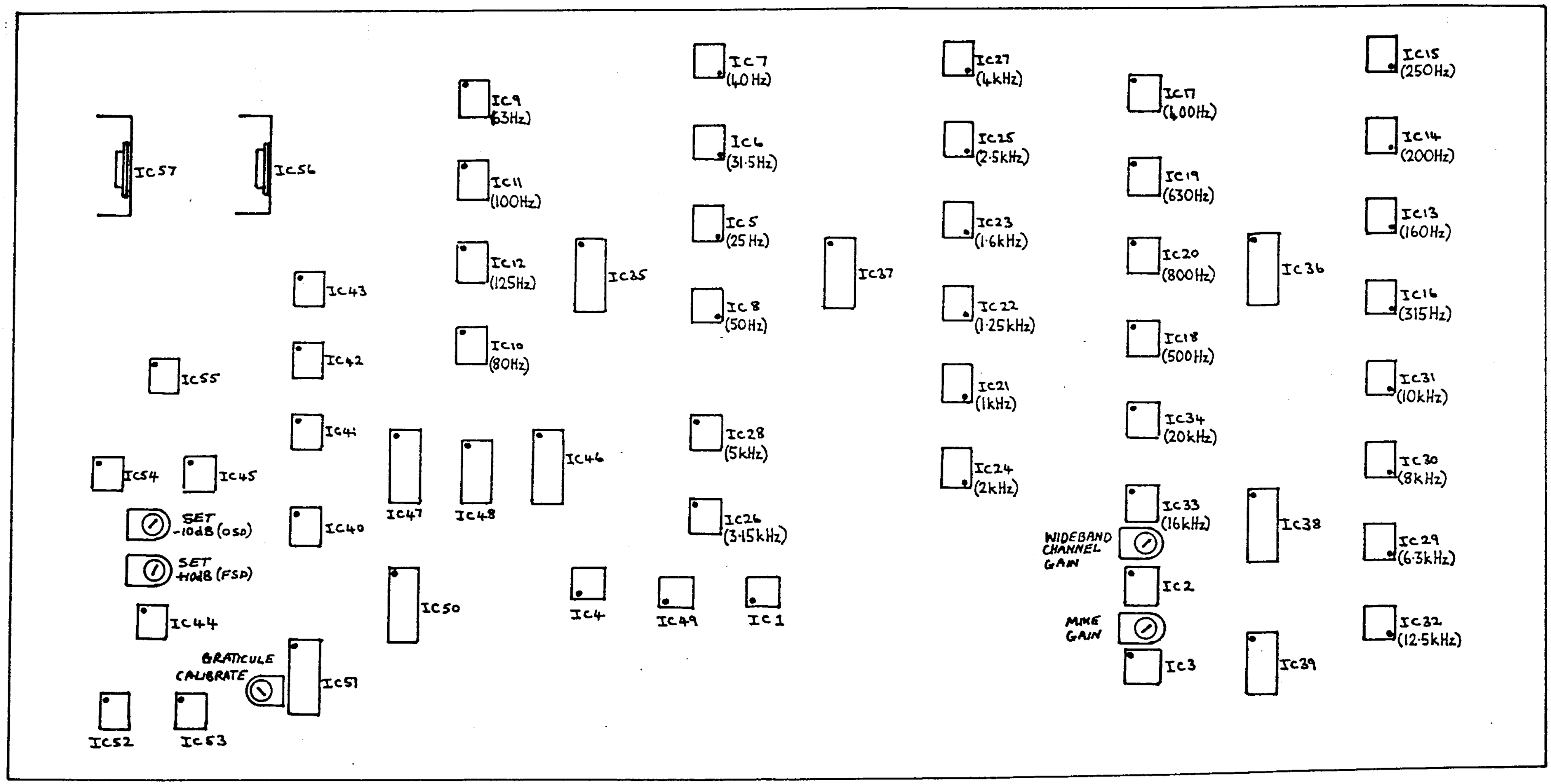

Fig.16. Component Placement

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ARTA 600 AUDIO SPECTRUM ANALYSER

ADHESIVE LABEL FOR OSCILLOSCOPE SCREEN

In order that individual frequency bands may be more easily noted on the oscilloscope screen when using the ARTA 600 Audio Analyser Adaptor an adhesive label is provided.

This label assumes that the oscilloscope has ten graticule divisions horizontally of one centimetre width - this is the most common size - and that the ARTA 600 has been aligned as per the handbook with three third-octave divisions for each horizontal graticule division. The central band for each graticule division has been labelled - ie every octave.

The label should be positioned over the lower part of the oscilloscope screen so that the trace is not obscured. The label may need to be trimmed.

32 63 125 250 500 1k 2k 4k 8k 16k
Frequency Hertz

32 63 125 250 500 1k 2k 4k 8k 16k
Frequency Hertz

UK Reg. No. 2174723 VAT Reg. No. 224 8657 47