

APHEX DRIVE

This controls the amount of drive to the Aphex side chain. It should be set so the red/green level indicator is green, flashing red on signal peaks. The effect is level dependent and sufficient drive is necessary for proper harmonic generation.

TUNING

Sets the corner frequency of the high pass network between 700 Hz and 7KHz. Initial setting should be 12 o'clock. A lower setting is suggested for bass rich limited mediums. A most effective setting may also depend on the program material. (e.g. voice over, a setting tuned to maximize intelligibility on voices.

DAMPING

Adjusts the damping ratio of the side chain filter network giving somewhat of an equalizing effect. CCW produces a flatter, more even response, while CW will result in a brighter, peaker sound. The overall effect will be somewhat interactive with the tuning control. A 12 o'clock setting is suggested for initial set up.

TIMBRE

The most subtle yet useful control, Timbre varies the spectral quality of the generated harmonics. Pure even (CW) are sharp, round and musical. Pure odd (CW) are sharp, round and will greatly enhance the percussive edge of the signal. Settings will depend greatly on

the harmonic structure of the particular tracks being processed and how prominent the tracks are within the mix. This control will be finally set more by "feel" than by listening.

LIMITER

Because the generated harmonics are level dependent, high signal peaks may cause "splashes" to prevent this, the Limiter is used on the side chain only. The level at which the Limiter is engaged is set by threshold. Release sets the release time of the Limiter from fast CCW to slower CW. If the Limiter is used only to prevent "splashes" release should be set at approximately 11 o'clock. Leaving the release will cause the Limiter to act more like a compressor,

allowing greater amounts of side chain to be added back into the output. This will concentrate the brightness effect but may tend to diminish overall transparency.

MIX

Sets the amount of Aphex side chain output added back into the total output. CCW is pure source, moving clockwise adds more effect. At the full CW position there is a clickstop which eliminates sources so that the output is only the side chain. The latter position would be used for external mixing (e.g. echo sends/returns).

LIMIT L.E.D.

Shows onset of Limiting action.

LEVEL

Attenuates the level of the total output from unity gain (cal position) to -20dB.

DRIVE LEVEL

(green/red) L.E.D. Shows drive level to Aphex side chain.

PEAK L.E.D.

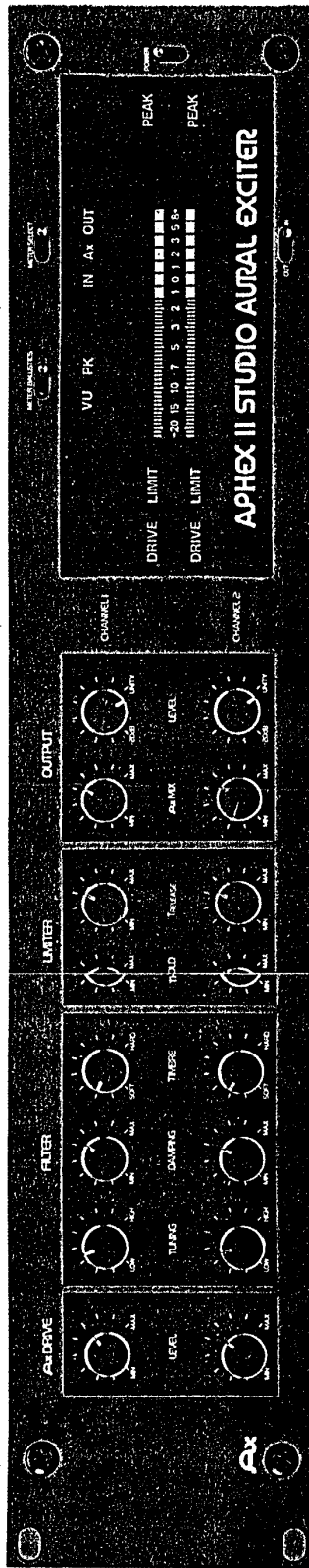
Lights when output is 2dB below clipping level.

IN-OUT SWITCH

Disables side chain for instant comparison between processed and unprocessed signal.

ON-OFF SWITCH

AC power to unit.



APHEX II A NEW GENERATION OF AURAL EXCITEMENT

FROM
APEX SYSTEMS, LTD.
—THE ORIGINATORS OF
AURAL EXCITEMENT

**ALL NEW DESIGN
COMPLETE CONTROL OF
ENHANCEMENT PARAMETERS
FLEXIBILITY TO COMPLEMENT ANY PROGRAM MATERIAL
MOST ADVANCED ELECTRONIC COMPONENTRY
FAST, ACCURATE ELECTRONIC METERING
EASILY INTERFACED WITH ANY SYSTEM**

The Aphex Aural Exciter has become a standard in the music industry and has been used for years on thousands of albums, movies, broadcast productions, commercials and concerts. The Aural Exciter is now accepted as a unique method to achieve clarity, definition and dimensionality in reproduction of sound. The program material literally "opens up", possessing more detail and intelligibility, as well as greater apparent frequency and dynamic range. The sound quality is less subject to degradation through the various generations and transmissions from production to final consumer.

The Aphex Aural Exciter achieves these effects by creating a signal composed of frequency dependent phase shift, amplitude dependent harmonics, and mixing this signal with the original.

In any natural acoustic environment a listener will hear the primary signal as well as slightly delayed, low level reflections. The phase shifted signal, when mixed back into the original signal, provides a simulation of these reflections, thus generating more natural ambient information. Because the phase shift creates time delays too short to be perceived as an echo or reverb, it is

perceived as an increase in the impulse duration. Tests have shown that listeners presented with two signals of equal amplitude and different duration will perceive the signal with longer duration as louder.

The Fletcher-Munson curves show that a listener with normal hearing is most sensitive to changes in the 3 to 5 KHz range. This range is critical for direct perception and intelligibility. Since the Aural Exciter is especially effective in that frequency range, the increase in detail and presence, due to the Aural Exciter, is most dramatic.

The only way a listener can differentiate between instruments is through overtones. The louder the fundamental the greater the amount of these overtones. The Aural Exciter generates harmonics in the same manner. The harmonic structure of each instrument is thus strengthened, allowing it to stand out from the other instruments.

An equalizer can only cut or boost a partial section of the audio spectrum. Therefore, if an equalizer is used to brighten the high end, all the noise and distortion will increase also. The high end of the input to the Aural Exciter can be rolled off and the Aural Exciter will

generate a brighter, cleaner, more natural high end.

Another important difference between the Aural Exciter and other processing equipment is, the Aural Exciter will not induce listener fatigue the way large amounts of equalization or other processing will.

In summary, the total effect of the Aural Exciter is directed towards a sound closer to the original acoustic event.

STUDIO USE

Aphex processing gives the best results and the greatest flexibility in mixdown applications, but can also be used in tracking and mastering.

It is best used in a foldback configuration similar to echo or other external effects, where channel sends can be individually mixed. If separate monitor, echo or cue sends are not available, the mix or stereo busses can be used with reduced flexibility in a "blanketing" effect. It sounds best if the Aural Exciter pan follows the original track pan. This is easiest if two post-ladder sends are used to Aural Exciter channels A and B.

The send levels must be high enough for proper harmonic generation. The return faders should then be set 10 to 20 dB below the main signal according to the desired effect. The effect is additive, and discretion is advised so that the unit is not overused.

SOUND ENFORCEMENT

The Aural Exciter can be used with most public address systems in the same manner as studio equipment. If separate echo or monitor sends are not available, the unit can be connected in series between the mixer and power amp. In this situation, the Aural Exciter mix would be introduced into the chain in the mix pot.

Aphex processing is especially useful in reverberant halls or halls that have "dead spots". It will spread the sound more evenly without adding any level to the total mix. The unit's ability to bring voices and instruments out makes it especially useful for monitor mixing, without increasing feedback.

FILM AND VIDEO USE

The Aural Exciter has been used on many videotape and motion picture productions to enhance the sound track by recapturing the live feeling

often lost or impaired in location takes. It is unique in its ability to sharpen dialogue, making voices more intelligible while retaining their natural quality. The looping process often required to complete a film or video work is greatly aided by the use of the unit as the Aural Exciter allows the engineer to tie the loop sound much more closely to the live sound. The effect is maintained in transfer from magnetic tape to optical and kept intact through duplication.

Video and film audio are both bandwidth limited and compressed. The Aphex II is especially useful in creating the perception of higher frequencies and greater dynamics, thus bringing more presence and clarity to the final product.

LEVELS

For best results, establishing correct levels is important. For that purpose, the dynamic range is internally selectable to maximize signal to noise ratio for any particular reference level. Metering reference level is selectable from 0 VU = 0, -4, +8 dBm. or user definable position.

APHEX II

CIRCUIT DIAGRAMS & LAYOUTS

① SIGNAL PATH & PROCESSING CIRCUITS

- Group 200
Balanced instrumentation type Input Amplifier
Input Level Selection (+27, +24, +21dB or option)
Calibration Trimmers - VTF Meter Input Level Feed
- Group 300
Side Chain Circuit - Highpass Filter - Tuning
Damping - External Sidechain Access & Reference
Drive Control - Drive (Green-Red) Detector Feed
Timbre Control (Odd/Even Harmonics)
- Group 400
VCA Circuit - Bias Trimmer
Proof Operate In/Out Circuit
Remote Ax In/Out Opto Isolator
- Group 500
Limit Detector Circuit
Threshold Control - T-Release Control
Limit LED Indication Feed
- Group T-600
Output Circuits - Ax Solo/Mix Switching
Ax Solo/Mix Switching & Ax Level Control
Total Output Level Control and Calibration Trimmer
Output Level Select (+27, +24, +21dB or option)
Output Amplifier - Balanced Floating Transformer
Peak LED Indication Feed - VTF Meter Ax Feed
VTF Meter Output Level Feed
- Group E-600
Transformerless Output Option

② METER & INDICATOR CIRCUITS

- Group 700
Peak LED Indicator Circuit
Limit LED Indicator Circuit
- Group 800
VTF Meter (Signal Level) Meter Circuits
Meter Source Select (Input/Ax/Output)
Meter Calibration - VU/Peak Mode Selection
- Group 900
Ax Drive LED Indicator Circuit (Green-Red)
Green-Red Threshold Trimmer

③ POWER SUPPLY

- Group 100
Line Input - Fuse - RF Filter - Voltage Selector
Power Transformers - Rectifiers
Bipolar Audio Supply - Bipolar Meter Supply
VTF Meter Supplies (+18VDC, +32VDC, +2.7VAC)
Power Distribution Header Pin-number Delegation

④ PC BOARDS & PARTS LAYOUT

- Audio Board - Power Board - Meter Board

APHEX II POWER SUPPLY

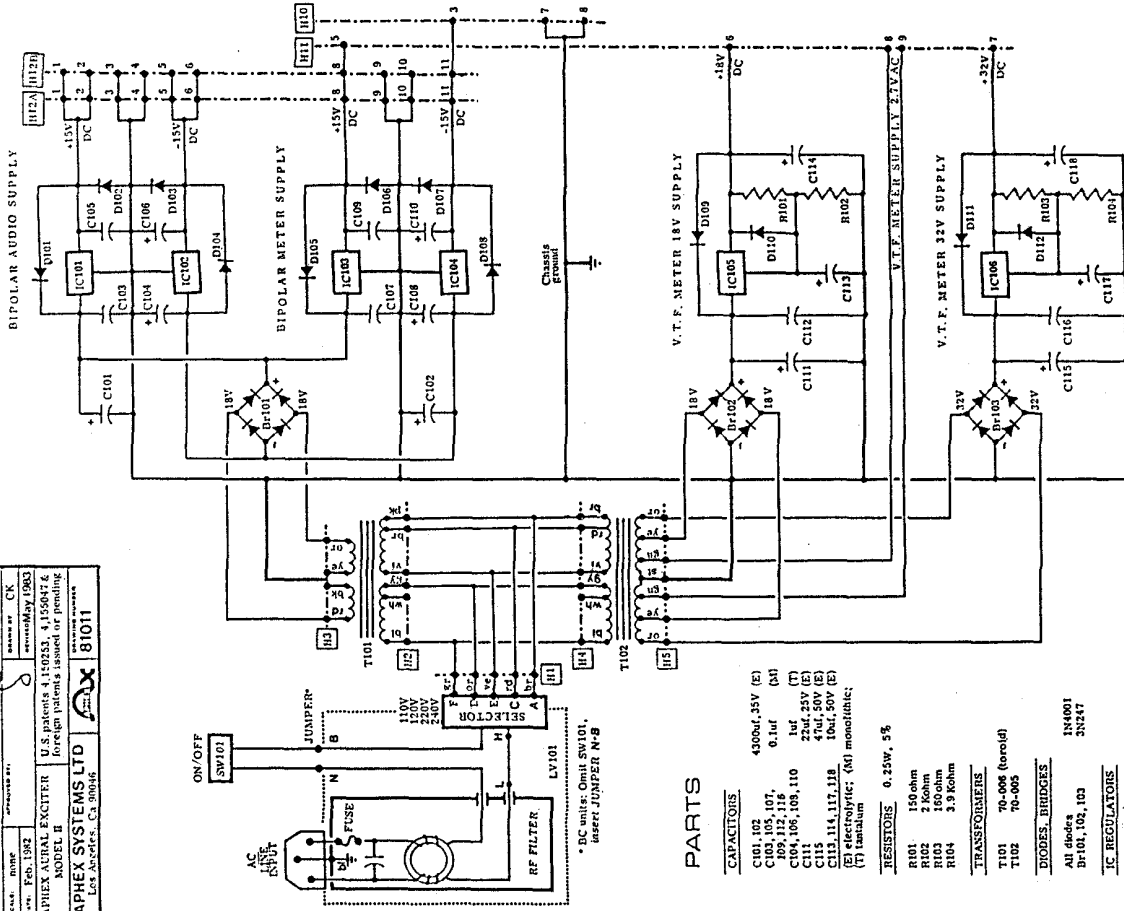
APHEX II SCHEMATIC: POWER SUPPLY

REV. DATE APPROVED BY: CK

APHEX ACURAL EXCITER MODEL II
U.S. Patents 4,150,233, 4,155,647 & foreign patents issued or pending

APHEX SYSTEMS LTD
Los Angeles, CA 90046

81011



PARTS

- CAPACITORS**
- C101, 102 4300uf, .35V (E)
 - C103, 105, 107, 108 0.1uf (M)
 - C104, 106, 109, 110 1uf (T)
 - C111 22uf, .35V (E)
 - C115 47uf, .50V (E)
 - C113, 114, 117, 118 10uf, .50V (E)
- (E) electrolytic; (M) monolithic; (T) tantalum
- RESISTORS** 0.25W, 5%
- R101 150 ohm
 - R102 150 ohm
 - R103 150 ohm
 - R104 3.9 Kohm

TRANSFORMERS

- T101 70-006 (coreld)
- T102 70-005

DIODES, BRIDGES

- D1 4u4cs
- D106, 102, 103 3N247

IC REGULATORS

- IC108, 103 LM315
- IC109, 104 LM317LZ
- IC105, 106 LM317LZ

AC CONNECTOR ASSEMBLY

- LV100 G74 (by Corcom), 40V, .5A
- RV100 100V, 100VA, 50V, .5A

WIRE COLOR CODE

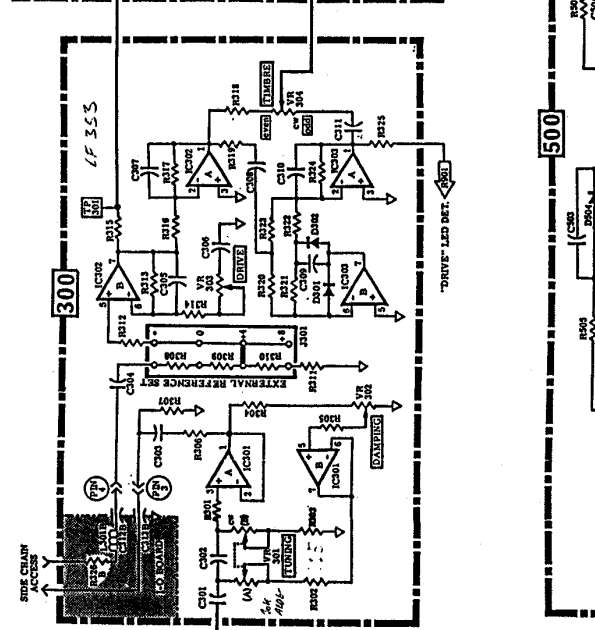
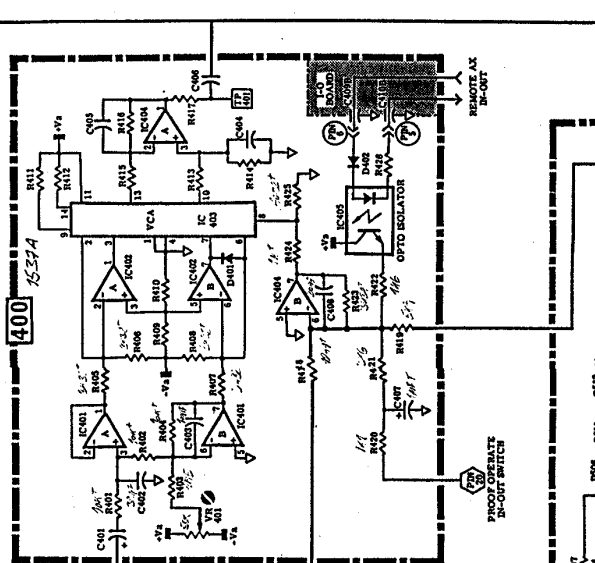
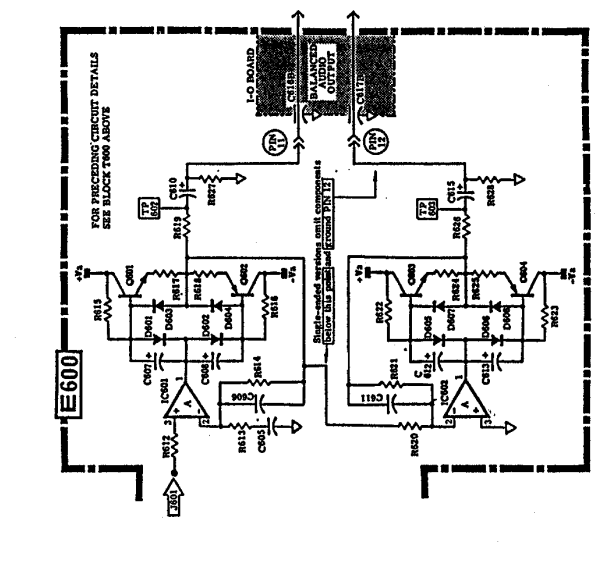
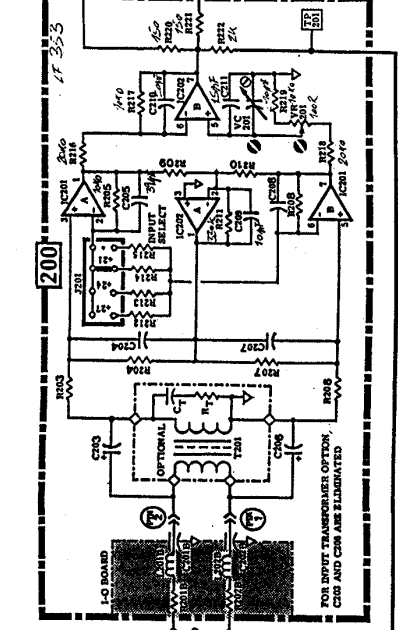
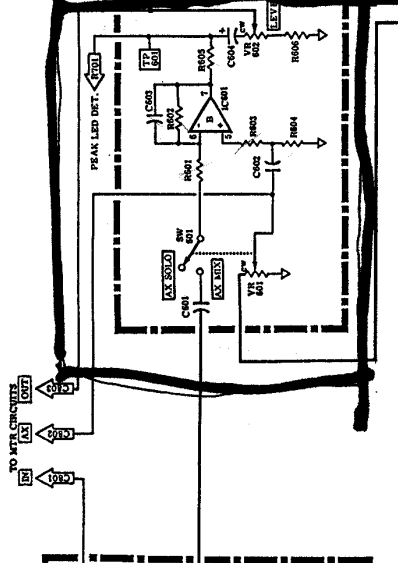
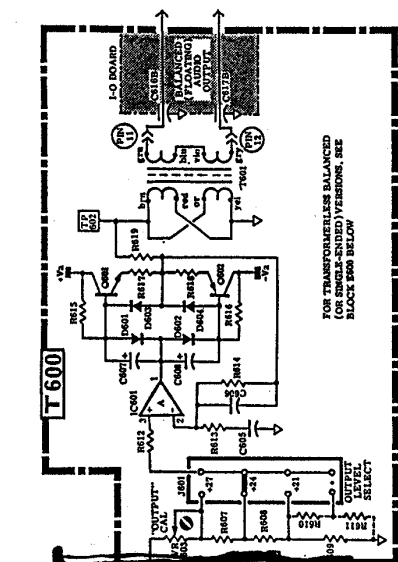
- bl blue
- br brown
- gn green
- gy gray
- or orange
- pk pink
- rd red
- st striped
- wh white
- yl yellow

HEADER DELEGATIONS

- H1 Fr. switching select
- H2 To T101 primary
- H3 Fr. T101 secondary
- H4 To T102 primary
- H5 Fr. T102 secondary
- H10 To meter board
- H11 To meter board A
- H12A To audio board A
- H12B To audio board B



APHEX II SIGNAL PATH & PROCESSING CIRCUITS



APHEX II SCHEMATIC SIGNAL PATH & PROCESSING CIRCUITS

Model II

APHEX SYSTEMS LTD

1000 S. GARDEN ST. SUITE 100

LOS ANGELES, CA 90006

TELEPHONE (213) 412-1111

FAX (213) 412-1112

NOTES: DISCONNECT C815
NOT SHOWN

RESISTORS: STABLY, * = DETACHABLE

V_M = METERING SUPPLY
V_A = AUDIO SUPPLY

TO/FROM COMPONENT NUMBER

RESISTOR SYMBOLS: □ = 10K, ○ = 100K, ○ = 1M, ○ = 10M, ○ = 100M, ○ = 1K, ○ = 10K, ○ = 100K, ○ = 1M, ○ = 10M, ○ = 100M

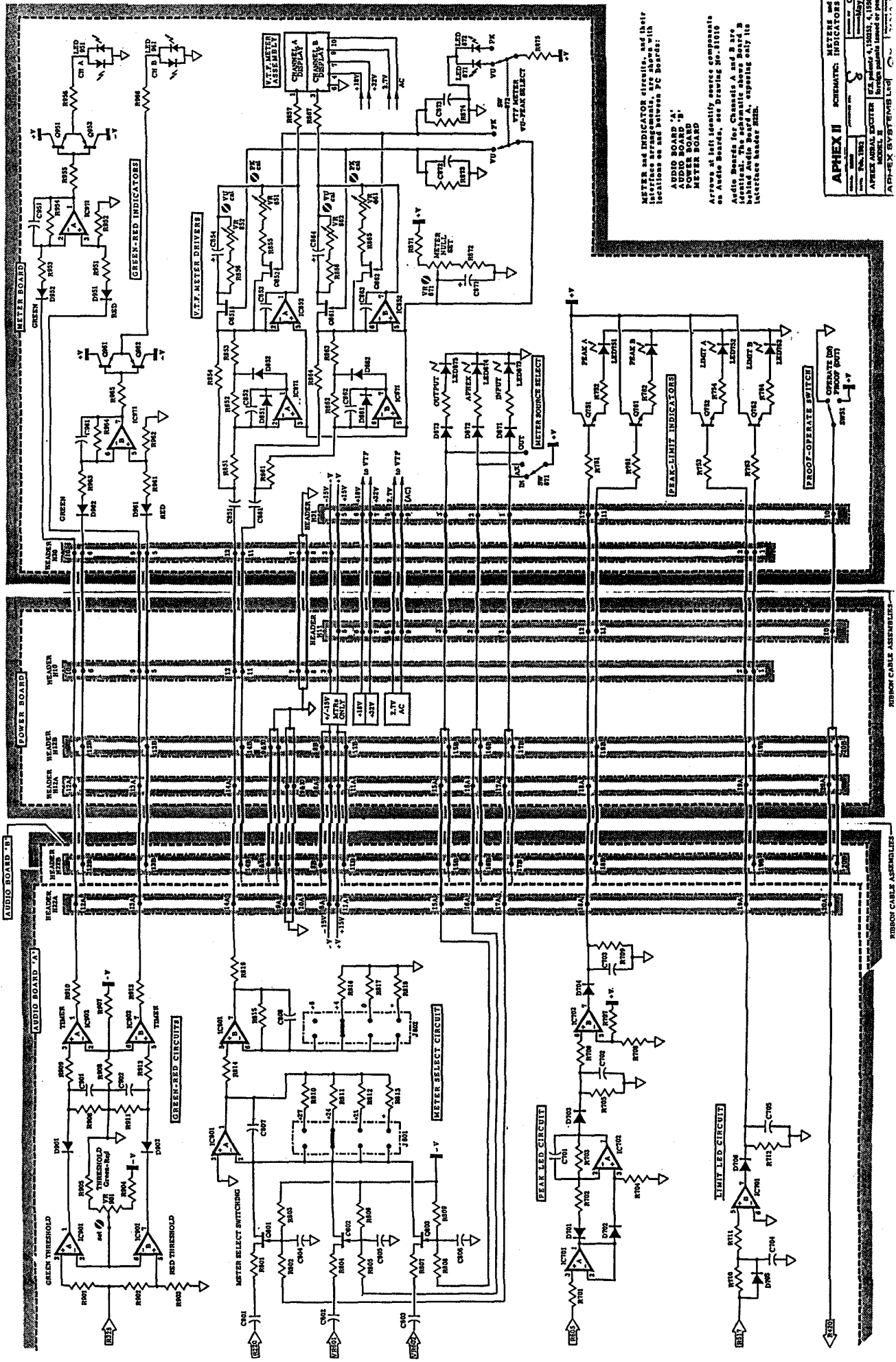
TEST POINTS: TP

GROUND: GND

CHASSIS GROUND: CHASSIS GND

GROUND: GROUND

APHEX II METER & INDICATOR CIRCUITS



METER and INDICATOR circuits, and their interface arrangements, are shown with locations on and between PC Boards:

AUDIO BOARD 'A'
 AUDIO BOARD 'B'
 METER BOARD

Arrows at left identify source components on Audio Boards, see Drawing No. F1010

Arrows at right identify source components on Audio Boards, see Drawing No. F1010

Identical to the schematic above Board B behind Audio Board A, appearing only in Lecturer Board 222L.

APHEX II		SCHEMATIC: METERS and INDICATORS	
Part No.	Rev.	Drawn by	Checked by
APHEX-AMAL-000001	1	J. S. LINDSAY	J. S. LINDSAY
Model No.	Issue	Date	Project
222L	1	1967-10-15	APHEX II

RIBBON CABLE ASSEMBLIES

THE SCHEMATIC IN DRAWING NO. B1010 IS ARRANGED BY FUNCTION GROUPS WITH IDENTIFYING COMPONENT NUMBERS GROUPS (200 THROUGH 600). THE SAME SYSTEM IS ALSO USED IN THIS LISTING AND ON PC BOARDS. APHEX II BROADCAST AND STUDIO VERSIONS DIFFER IN SOME COMPONENT IMPLEMENTATION AND VALUES. SUFFIXES 'D' AND 'S' RESPECTIVELY DESIGNATE SUCH COMPONENTS.

FOR FUNCTION/COMPONENT GROUPS 100, 700, 800, AND 900, SEE RESPECTIVE DOCUMENTATION.

200	300	400	500	600
INPUT	SIDE CHAIN	VCA	LIMIT DETECTOR	SUMMING and OUTPUT

RESISTORS

R201B, 202B	1K4 1	R301	100K 5	R401, 402	R501	10K 5	R601, 602	10K 5
R202B	68K 1	R302	10K 5	R403	R502	20K 5	R603	10K 5
R203B	82K 1	R303	10K 5	R404	R503	10K 5	R604	10K 5
R204B	82K 1	R304	10K 5	R405	R504	10K 5	R605	10K 5
R205B, 207-210	33K 5	R305	10K 5	R406	R505	20K 5	R606	10K 5
R211	10K 5	R306	10K 5	R407	R506	10K 5	R607	10K 5
R212	10K 5	R307	10K 5	R408	R507	10K 5	R608	10K 5
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R319	10K 5	R414	10K 5	R614	R614	10K 5	R715	10K 5
R320	10K 5	R415	10K 5	R615	R615	10K 5	R716	10K 5
R321	10K 5	R416	10K 5	R616	R616	10K 5	R717	10K 5
R322	10K 5	R417	10K 5	R617	R617	10K 5	R718	10K 5
R323	10K 5	R418	10K 5	R618	R618	10K 5	R719	10K 5
R324	10K 5	R419	10K 5	R619	R619	10K 5	R720	10K 5
R325	10K 5	R420	10K 5	R620	R620	10K 5	R721	10K 5
R326	10K 5	R421	10K 5	R621	R621	10K 5	R722	10K 5
R327	10K 5	R422	10K 5	R622	R622	10K 5	R723	10K 5
R328	10K 5	R423	10K 5	R623	R623	10K 5	R724	10K 5
R329	10K 5	R424	10K 5	R624	R624	10K 5	R725	10K 5
R3								

A. "Dyna-Set" Jumpers

The Aphex II Aural Exciter operates at an internal clipping level of +21 dBV. To accommodate systems operating at other levels, Dyna-Set allows the user to optimize the gain structure of the Aphex II for best signal-to-noise performance as well as selecting any 0vu reference point for metering ease. The calibration tag on the rear of the unit shows where it was set at the factory. Should the levels need to be changed, it can be done as follows:

1. J.201 Input Select - Set this jumper for the maximum level expected from your signal source. Fixed options are +21, +24 or +27 dBV (0dBV = 0.775v) other levels may be accommodated by choosing the appropriate value for position R215, and putting the selector in the *position.
2. J.601 Output Level Select - This is normally set to correlate with J201 "input level", in all units with balanced outputs. For units with single-ended transformerless outputs the jumper must be set to read 6 dB higher than the actual intended output level. For example, to set +21 dBV output level, the jumper will be set at the +27 position.
3. "Meter Refs" J.801 and J802 correlate internal clipping and VU settings to the user's system. Set J801 to match J301. Set J802 to match user's choice of VU reference. R818 may be chosen to match a non-standard reference. Standard settable references are 0, +4, and +8 dBV = 0VU. In semi-pro or consumer applications where 0VU = -10dBV and clipping + 10dBV, use the 0VU = 0dBV position since the meter sensing point occurs before the signal level is padded and sent to the output.

4. "External Ref" J301 sets the sidechain input headroom to minimize noise gain at a given operating level. The '0' position allows about 20 dB of headroom above your selected 0VU level (see sec. 3, "meter ref").

In situations using already processed material, the headroom (and noise) can be lowered by moving the jumper to the +4 or +8 positions, giving 16 or 12 dB of headroom, respectively. Conversely, the * position can be used for increased headroom, if necessary.

B. Calibrating the Aphex II

Once the Dyna-Set jumpers have been set, minimal calibration adjusts will fine trim the entire unit.

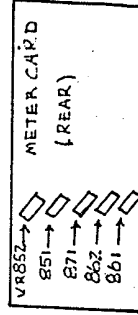
I. Unity Gain and Meter Calibration

- a. Make sure test equipment input is loaded with the same impedance as the circuit in which unit is to be used (600 or correct bridging impedance).

b. Set-Up:

- Meter Ballistics: "VU"
- Meter Select: "Out"
- In/Out (Proof/Operate): "Out" or "Proof"
- Output Level: "Cal" (Max. cw)
- Ax Mix: Anyplace but "solo"
- All Other Controls: Does not matter

Meter Trimmer Locations: See Figure ---



PROCEDURE:

1. With no signal, adjust Meter 0 Null Adj. Trimmer VR871 for no display. This is a "0 centering" type of adjust.
2. Apply signal to CH.B at chosen 0 VU

Procedure, cont

- 3. Adjust Output Cal trim VR603 for exactly unity gain. (This is why the correct load is essential. There is sufficient reserve gain to bring the unit into cal with a 600 load if used.)
- 4. Adjust CH B cal VR861 so meter barely reads "0".
- 5. Switch Meter Ballistics selector to "PK" and adjust CH B PK cal VR862 as in step 4.
- 6. Repeat steps 2 - 5 for CH A, using VR851 and VR852 for VU and PK respectively.

2. Red/Green "Drive" Led Calibration

Note: Since this circuit is calibrated to internal levels, it will not usually need recalibration unless an IC in this circuit or a power supply regulator is replaced. Even then, change will be non-critical ($\pm .5dB$).

- Set-Up: "Drive": Min. (Full ccw)
- "Tuning": Min. " "
- "Damping": Min. " "

Procedure:

- 1. Insert signal at about 0VU into input. $> 2kHz$
- 2. Place probe at test point TP301.
- 3. Adjust "Drive" (VR303) for +6dBv at this point.
Note: This is a measured value ref 0 dBv = 0.775 volts, not +6VU
- 4. Adjust Red/Green Threshold trimmer VR901 so that Drive LED just goes from green to red.
- 5. Reduce signal about 12dB. LED should go from green to off at approximately this setting (0 12 to 13dB "window" between off and red is correct.

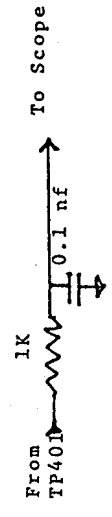
3. D.C. Offset trim on VCA:

(Harmonics and Limiting function, section #400)

SET-UP: In/Out (Proof/Operate) switch: "Out". (Proof)
all Filter Controls: Full ccw (min)

EQUIPMENT: Shielded Probe
Noise (low pass) filter
Scope - 10MV sensitivity min.

NOTE: An appropriate noise filter can be made with a fixture which puts this filter in line with the probe at the scope input:



PROCEDURE:

- 1. Place probe at TP401 (VCA output).
- 2. With scope on 10mv/division scale D.C. with no signal adjust vertical center of scope so trace is centered.
- 3. Switch "IN/OUT" switch to "In" (OPERATE) and adjust VR401 so that trace centers at same location as previously noted.
- 4. Repeat until no difference is seen between IN and OUT conditions. $\pm 1MV$ adjust is easily achieved. VR401 will only affect circuit output when circuit is in "IN" (OPERATE) mode.

Once unit is burned in, D.C. drift is not normally a problem. Readjustment usually becomes necessary only if a power supply regulator or 1C401, 402, or 403 is replaced.
