APPENDIX F:

Trouble Diagnosis and Correction

This Appendix is the first place you should go to obtain information on what to do if OPTIMOD-FM develops a fault. Many problems experienced in the field can be resolved or conclusively diagnosed with the following diagnostic routines. Even if the repair cannot be done in the field, the information provided by these diagnostic routines can speed the work of the factory service department in making the repair. Please perform these routines and make notes if you observe anything exceptional or unusual.

1) Use systematic troubleshooting techniques to positively determine that the problem is in fact being caused by OPTIMOD-FM, and not by other equipment. If a standby processor/stereo generator chain is available, it should be substituted for the supposedly faulty OPTIMOD-FM to see if the problem vanishes. If a standby processor/stereo generator is not available, audio quality at the OPTIMOD-FM audio input terminals should be checked with a high-quality monitor system. Note that even slight distortion can be seriously exaggerated by "heavy" processing, and that this sort of processing can only be successful if the input audio is extremely clean. A relatively minor problem which develops in the station's audio chain or STL can therefore be magnified by the action of OPTIMOD-FM, even if OPTIMOD-FM is in no way defective.

If the audio is clean going into OPTIMOD-FM, problems can still arise in the exciter. If a standby exciter is available, it should be substituted to see if the problem vanishes. If no standby exciter is available, you can connect the baseband output of the 8100A/1 stereo generator directly into the baseband input of your stereo monitor (bypassing the FM monitor) to see you still observe the problem on the monitor. (Be sure that the problem is not in the stereo monitor by verifying that the problem can be observed on more than one receiver.)

If the problem vanishes when you observe the stereo monitor, the exciter (or composite STL) is strongly suspect. An exciter, for example, may appear to work in mono mode (with OPTIMOD-FM bypassed), yet exhibit noise and/or distortion when asked to pass stereo signals. Some exciters have well-known characteristic problems!

Changes in or deterioration of grounding and/or exterior lead dress can sometimes cause RFI or hum problems to appear in a good OPTIMOD-FM.

If it seems impossible to conclusively isolate the problem to OPTIMOD-FM, yet no other definite cause is found, then performing the **Field Audit-Of-Performance** procedure in **Appendix D** may help diagnose a problem.

2) If the fault has been positively isolated to OPTIMOD-FM, the **Problem Localization Routine** described below should be performed to identify the faulty PC card.

> The installation and servicing instructions in this manual are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified personnel.
>
> (per UL 813)

PROBLEM LOCALIZATION ROUTINE

General Principles: The most powerful and general technique for localizing a problem within OPTIMOD-FM is signal tracing. This simply means that the signal is observed at various points as it passes from OPTIMOD-FM's input to its output. If the signal is normal at some point "A" in the circuit, and is abnormal at a point "B" further towards the output, then the problem clearly lies in circuitry between points "A" and "B".

Signal tracing in OPTIMOD-FM is facilitated by the fact that much of the circuitry is duplicated for stereo, and is arranged so that the bad channel can be readily compared with the good one, which serves as a "normal" reference.

Power Supply Tests: Some circuitry is common to both channels, and failures will therefore affect both channels in a symmetrical way. In particular, problems in the power supply may affect many OPTIMOD-FM circuits simultaneously. For this reason, the first step in any troubleshooting procedure is to check the power supply for normal output. Gross changes in power supply voltage can be detected with the "+15VDC" and "-15VDC" positions on the VU meter. Normal readings are 0VU $\pm$0.5VU. If normal readings are obtained, skip to the next section on **VU Meter Technique.**

If either "+" or "-" power supply output is significantly low, it could indicate a defect in the supply itself. But it is more likely to indicate a shorted IC or capacitor somewhere in the circuit that is overloading the supply and causing it to current-limit.

The power supply is electronically protected against excessive current demand by other parts of the circuitry. If a failure causes a high current demand on the power supply, its output voltage will drop as far as necessary to reduce output current to approximately 0.75A. If the power supply voltage is observed to be abnormally low, unplug each circuit card in turn and check if the power supply recovers by observing the "-15VDC" meter position. (The negative regulator tracks the +15V supply. So the -15V supply will go down if the +15V supply does, even if the -15V supply or load is completely normal. A normal "-15VDC" reading thus assures a normal "+15VDC" reading.) If recovery occurs, then troubleshoot the unplugged board. Ordinarily, the defective component will become very hot, and is easily detected by touch. (Wet your finger first to avoid burns!) If all cards are removed and an undervoltage problem does not disappear, examine the meter card, motherboard, and chassis wiring before suspecting the supply itself. (A wiring problem will be indicated by an ohmmeter's indicating very low resistance between the "+15V" or "-15V" power busses with AC power OFF.)

Even if power supply voltages appear normal on the VU meter, subtle problems such as hum, noise, or oscillation may still exist with the supply. To check for this, test the regulated DC with a well-calibrated DVM, scope, and AC VTVM with 20-20k Hz bandpass filter. Voltages should be +15.00V $\pm$0.075V, -15.00V $\pm$0.375V. Ripple must be less than 2mV rms, 20-20,000Hz. There must be no high frequency oscillation.

VU Meter Technique: If one channel goes dead, the VU meter provides a means for fast signal tracing. Note, however, that problems other than gross gain changes or total failure to pass signal may not be detected by the meter alone.

First, switch through the first six VU meter functions (which monitor the audio processing) to see where the signal disappears (or the VU meter pegs, implying that a defective IC opamp has latched up to the power supply rail.) Refer to the block diagram (p. J-21) to locate the exact points in the signal path monitored by the meter.

If the signal is normal at the input terminals and abnormal in either INPUT BUFFER position, then the problem lies with Card #3 (left channel) or Card #4 (right channel), or with the incoming audio circuitry prior to these cards.

If the signal is normal at the INPUT BUFFER positions but abnormal in the COMPRESSOR OUT position, then the problem probably lies with Card #3 (left channel), with Card #4 (right channel), or, if both channels are equally affected, with Card #5.

If the signal is normal at the COMPRESSOR OUT positions, but abnormal in either FILTER OUT position, then the problem may lie with Card #6 (which contains both channels), Card #8 (left channel), or Card #9 (right channel). The **Card Swap Technique** (below) must be used to localize the problem more precisely.

Abnormal readings in the three Stereo Generator positions on the VU meter switch (19KHZ OSC; 38KHZ AGC, 38KHZ PLL) are almost always due to problems with Card #7, or with the power supply. (L-R can read abnormally if the rear-panel NORMAL/TEST switch is left in TEST, and no inputs are provided to the rear-panel TEST jacks.)

The instructions below provide more detailed information on troubleshooting at the "card exchange" level. Servicing on the "component replacement" level requires more profound understanding of OPTIMOD-FM circuit operation, which is provided by **Appendix A (SYSTEM DESCRIPTION)** and **Appendix B (CIRCUIT DESCRIPTION).** If the technician wishes to troubleshoot OPTIMOD-FM 8100A/1 at the component level, he should first use **Appendix A** to help track down the fault to a given subsystem, and then refer to **Appendix B** for an extremely detailed explanation of the circuitry at the component level.

Card Swap Technique: If the defective card has not yet been conclusively identified and if the fault appears on one channel only, the next step involves a card swap technique. The PC cards in OPTIMOD-FM Model 8100A/1 have been specifically configured to aid troubleshooting if a fault appears in one stereo channel only. Cards #3 and #4 are identical, as are Card #8 and #9. Therefore, these card pairs can be interchanged one pair at a time to see if the problem moves from one channel to the other (implying that the fault is with one of the cards just moved), or stays the same (implying that the problem lies elsewhere in the system).

If interchanging these card pairs fails to affect the location of the problem, then Card #6 should be investigated. This card passes both left and right audio. To aid troubleshooting, a jumper is provided at the output of the card to interchange the outputs of the left and right channels (See Fig. F-1). If this jumper is moved and the fault moves from one channel to the other, then Card #6 is probably faulty.

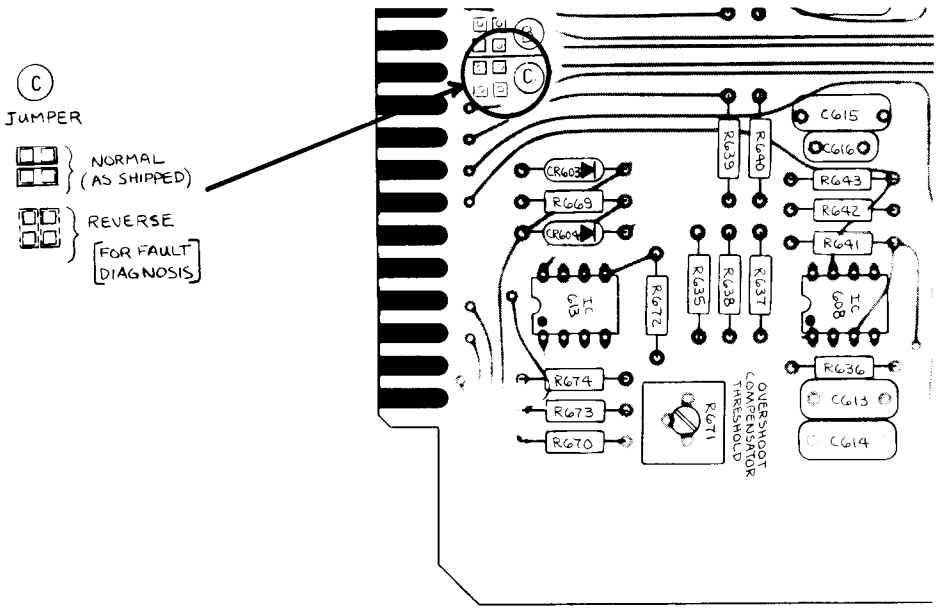


Fig. F-1: Card #6 Left and Right Jumpers

Cards Common To Both Channels: Cards #1 (Power Supply), #5 (Compressor Control Circuitry), and #7 (Stereo Generator) are common to both channels. Card #6 contains the common ±4.2V clipper bias supply used by Cards #8 and #9.

Diagnosis of power supply problems was discussed above.

A failure in Card #5 (the common processing control card that controls both Card #3 and #4) can manifest itself on both channels as distortion (too little gain reduction), low loudness (too much gain reduction), pumping or other dynamic problems (failure in the timing circuitry), or failure of the gating circuitry (which is usually indicated by abnormal behavior of the front-panel GATE lamp). First-order problems in card #5 are often indicated by a failure to produce the "standard level" under "standard control setup" conditions. (See **c.1** and **c.2** in **Appendix D** for instructions on how to make this test.)

Problems in Card #7 (Stereo Generator) can be isolated by use of the rear-panel TEST jacks. When the rear-panel TEST/NORMAL switch is in NORMAL, these jacks carry the output of the audio processing. If on-air problems are observed (and you have determined that they are not due to the exciter, monitor, or other external causes), yet audio from these jacks (listened to through standard deemphasis) sounds normal, suspect the stereo generator (or possibly the power supply.)

FAILURES WHICH CANNOT BE DIAGNOSED BY CARD-SWAPPING

Phase Corrector Failures: One possible problem which is difficult to diagnose by means of a card swap is failure of a phase corrector on Cards #6, #8, or #9. Some failures can grossly change the phase response of a given channel without significantly affecting the frequency response. While each channel sounds normal by itself, the mono sum will exhibit gross frequency response aberrations due to phase cancellations. If the 8100A/1 is driven by mono material, the "L-R" meter position will fail to null.

The principal difficulty is determining which channel is abnormal, since phase corrector failures will cause audible problems (most often increased distortion) only with certain types of program material. The following describes listening tests to detect phase corrector failures. If the ear can detect the usually subtle effect of the corrector failure by listening to one channel only, then the card-swap technique can be successfully applied to isolate the problem. In these tests, it is important to drive both channels with identical program material, as the usual differences between the left and right channels can totally mask any differences due to phase corrector failure. The easiest way to assure identical L and R drive is simply to drive both L and R inputs in parallel from a single signal.

A phase corrector failure on Card #6 will cause slightly more high frequency clipping than would otherwise be expected, so the failed channel may sound slightly grittier when program material containing large amounts of high frequency energy is processed.

A phase corrector failure in the Smart Clipper (first part of Cards #8 and #9) will cause the distortion cancellation function to work incorrectly, and will result in sibilance distortion (splattered "ess" sounds on voices).

A phase corrector failure in the FCS Overshoot Compensator (second part of Cards #8 and #9) will result in inaccurate overshoot cancellation. This will result in overdriving the safety clipper when significant high frequency energy is present, which will in turn cause out-of-band frequency components to be generated. These components will cause aliasing distortion when decoded in a stereo receiver.

To test for this, drive one channel at a time with bright program material. Check separation by listening to the undriven channel as decoded by your stereo monitor. If one channel causes notably more "garbage" in the other (undriven) channel, then the channel causing the high amounts of "garbage" is suspect.

CATALOG OF TYPICAL SYMPTOMS AND PROBABLE CAUSES

This troubleshooting guide is a catalog of some possible failure modes in the 8100A/1. It should be used in conjunction with **Appendices A** and **B** to aid troubleshooting at the component level.

F

ALWAYS BE SURE THAT THE PROBLEM IS NOT IN THE SOURCE MATERIAL FEEDING OPTIMOD-FM.

Whistle is heard on air, perhaps only in stereo reception.

1. Power supply oscillation. Suspect C111, C112, IC101, IC102.
2. IC711 oscillating due to value shift in passive component. 38kHz no longer phase-locked to 19kHz. 38KHZ PLL and 38KHZ AGC meter positions will read abnormally.
3. Whistle on one stereo channel only probably due to oscillating IC. Use signal tracing techniques to isolate defective IC.

Buzz or hum.

1. Improper grounding. Chassis not properly grounded to rack. Circuit and chassis grounds connected through excessively long path. No direct connection between 8100A/1 circuit ground and circuit ground of exciter with balanced input.
2. RFI. Improve grounding scheme. Relocate 8100A/1 chassis. Change length of baseband output coax to retune it.
3. Low line voltage causing regulator to drop out and pass ripple.
4. C101, C102 in unregulated power supply failed, resulting in extremely high ripple. Power supply regulator drops out on each ripple cycle which instantaneously goes lower than 17.5 volts.

Loss of modulation control.

1. Make sure LIMITER PROOF/OPERATE switch (on Card #6) is in OPERATE.
2. Check for tightly-controlled peak levels at rear-panel TEST jacks. If levels not well-controlled, check ±4.2V supply on Card #6.
3. If levels are well-controlled, check stereo generator. Loss of modulation control will be accompanied by gross failures to meet separation and/or crosstalk specifications. Alternately, there may be a large spurious output, like 38 or 76kHz.

Bass incorrectly balanced.

1. It is normal when operating the 8100A/1 "independent" to have it accentuate bass on many records (particularly older ones). If you want the frequency balance between "Air" and "Program" to be substantially identical, operate the BASS COUPLING control closer to "wideband".
2. Possible misalignment or failure in exponential converter circuitry for either "Master" or "Bass" compressors. This will cause frequency response to be non-flat even in PROOF mode. If this is the case, check circuitry associated with IC501, IC502, IC506, IC507.
3. Failure in Input Conditioning Filter (on Cards #3 and #4). This will be revealed in PROOF mode.
4. Failure in either "Bass" or "Master" VCA, causing gain shift.

Insufficient high frequency response.

1. Due to the FM preemphasis curve, some high frequency loss is inevitable when the 8100A/1 is operated aggressively for maximum loudness (i.e., large amounts of clipping, and fast release time). To obtain more highs, back off both the CLIPPING and RELEASE TIME controls.
2. In "independent" mode, the increase in bass response on certain records may cause an apparent loss of highs. Try operating "wideband" temporarily to see if the highs are then balanced like the input material.
3. R626 (left channel) or R660 (right channel) misadjusted, such that IC603A (left channel) or IC603B (right channel) is always turned ON, thus partially defeating the preemphasis.
4. HF limiter working too hard. Check IC605B, IC607 (left channel); IC611B, IC612 (right channel) for correct rectifier action and correct hf limiting threshold. (These circuits are independent. Thus, the bad channel can be compared to the good channel with a mono source.)

Gross distortion.

1. Power supply voltage low. (Check AC power line voltage first.)
2. IC opamp failure. This must be diagnosed by signal tracing.

3. Failure in clipper-diode bias supplies. Low bias voltage will cause excessive clipping, and will also result in abnormally low modulation. Check IC806B, IC808 and associated circuitry (on Cards #8 and #9) to make sure that the output is approximately ±1.5VDC under no-signal conditions, and approximately ±1.35VDC when a 5kHz sinewave at level sufficient to cause gain reduction is applied to the input of the appropriate channel. Check IC613 and associated circuitry (on Card #6) to make sure that the output is approximately ±4.2VDC under all OPERATE conditions.

4. Gross failure in a sidechain, such as IC latchup. This will either misbias the main signal path, or add distortion to the main signal, without causing the main signal to disappear. IC's in sidechains include IC601A, IC608A, IC602B, IC609B, IC604, IC610 (on Card #6); IC802A, IC802B, IC803A, IC804A, IC804B (on Card #8 and Card #9).

5. Exponential converter(s) IC501, IC502, IC506, IC507, or timing module(s) A1, A2 (on card #5) defective, causing very low (or no) control current to VCA's on Cards #3 and #4, thus causing these VCA's to take very high gain. Timing module failure will be indicated by MASTER COMPRESSOR G/R or BASS G/R meter's pegging at the top of the scale (beyond 0).

Moderate to Subtle Distortion.

1. Distorted program material and/or distortion problems in studio or STL (see **Appendix K** for further discussion).

2. Check points listed in "Gross Distortion" (immediately above), for moderate deviations from normal parameters.

3. CLIPPING control misadjusted.

4. Failure in rectifiers IC503A, IC504, IC503B, IC505, IC508A, IC509, IC508B, IC510, or in timing modules A1, A2 on card #5. These problems will usually be indicated by failure to produce standard level under standard conditions (see **c.1** and **c.2** in **Appendix D**).

5. Safety clipper misalignment (R841). This alignment is most unlikely to drift by itself from its factory-adjusted condition. But humans with alignment tools sometimes do strange things. If you are in doubt about this alignment, it can be checked (and readjusted if necessary) by performing Part 7 of **Appendix E.**

6. Phase corrector failure. See "Phase Corrector Failures" earlier in this Appendix for a further discussion.

7. Failure in distortion-cancel sidechain on Cards #8 and #9. This is indicated by a "gritty" high end with severe sibilance splatter.

L-R does not null on mono material.

1. This is caused by gain, frequency response, or phase response differences between the left and right channels. So before assuming that the problem is internal to OPTIMOD-FM, make sure that the feed is really 100% mono. This can be reliably assured by driving both left and right OPTIMOD-FM inputs in parallel from a single signal source.

2. If L-R will not null in PROOF mode, then the problem is static, and is caused by abnormal frequency and/or phase response in one channel. If the frequency response is normal, suspect the phase correctors on Cards #6, #8, and #9 (including A1, the phase delay network module).

3. If L-R will null in PROOF mode, then the left and right VCA's or high frequency limiter circuitry are failing to track dynamically under gain reduction conditions. In the case of the VCA's, the dual gain block (IC305, for example) is suspect. In the case of the HF limiter, the rectifiers or timing modules are suspect.

Lack of 38kHz suppression.

1. Drift in power supply voltage.
2. Excessive offset in IC701. Extreme offset or latchup of this IC will be indicated by a constant deflection of the VU meter in the L-R mode.
3. Failure of IC805A, IC806A or IC905A, IC906A (on Card #8 or #9) such that considerable DC offset appears between the left and right audio processing outputs. If the offset changes by only 40mV, this is sufficient to change the 38kHz from being perfectly nulled to being suppressed only -40dB.
4. Defective L-R modulator IC702, IC703.

Pilot phase unstable.

1. Leaky Q710.
2. Bad IC704B or leaky C716.
3. R769 intermittent.
4. Power supply voltage unstable.
5. Bad phase detector IC708.

Separation unstable.

1. Power supply voltage unstable.
2. R772 intermittent
3. IC710 defective.

SCA interference.

1. Loss of suppression of 76kHz or its sidebands. (See **7.h** in **Appendix B** for a complete discussion.)
2. Out-of-band emissions caused by FCS overshoot compensator failure forcing safety clipper to perform overshoot compensation. This will also cause loss of dynamic separation.
3. Power supply oscillation.

Sibilance Distortion.

1. Source material at OPTIMOD-FM input terminals distorted.
2. Failure of distortion-cancelling sidechain on Cards #8 or #9.
3. Failure of the HF limiter. If the HF limiter isn't working at all, then even a properly-operating distortion-cancelling clipper may generate some audible distortion.

Unit drops out of stereo mode.

1. Logic failure in IC713, IC714.
2. False pulses such as noise or rectified RF on remote terminals.

Unit drops out of mono mode.

1. See "Unit drops out of stereo mode", immediately above.
2. CROSSTALK TEST switch accidentally left in a TEST mode. Both TEST modes will force the logic into STEREO mode.

19kHz frequency out-of-tolerance.

1. It is normal for the frequency to be somewhat "off-center", as long as it is within ±2Hz of 19kHz per specifications and government requirements. If the problem is verified by your monitor service or by a high-precision calibrated frequency counter, then replace crystal Y701. (No frequency trim is provided.)

FACTORY ASSISTANCE

Orban maintains a Customer Service Department to help Orban product users who experience difficulties. Orban Customer Service is supplied at two levels. The first is telephone consultation. Often, a problem is due to misunderstanding, or is relatively simple and can be fixed by the customer aided by phone advice from the factory. Telephone consultation should always be the first step in any factory service transaction. Units will be accepted for factory service (the second level) only after consultation, and only after a Return Authorization (RA) code number has been provided by phone or letter. The RA number flags the returned unit for priority treatment when it arrives on our dock, and ties it to the appropriate information file.

The purpose of this formality is to save both the customer and the factory time and trouble by attempting to weed out problems which are caused by equipment other than OPTIMOD-FM, misapplication, or environment, and to identify those problems that lend themselves to quick field repair.

Before calling Customer Service, be prepared to give the model number (8100A/1) and serial number of your unit. If the unit is in its warranty period and the Registration Card was never returned, we will also need the name of the dealer from which the unit was bought, the invoice number, and the invoice date.

Be prepared to accurately describe the the problem. What is the complaint? Is it constant or intermittent? If it is intermittent, can it be correlated to environmental conditions like line voltage, temperature, humidity, electrical storms, vibration, etc? Do problems only occur with certain program material (live voice, very bright music, music with heavy bass transients, etc.)? What about source: cart, disc, reel-to-reel, live microphone?

Be prepared to describe any unusual observations made during the **Problem Localization Routine** you performed using the instructions above.

Then, contact the Customer Service Department by telephone, letter, or Telex (see title page for numbers). A Customer Service Engineer is ordinarily available during local business hours, Monday through Friday. The Customer Service Engineer will do everything practical to help correct the fault and have your OPTIMOD-FM up and running again as quickly as possible.

In many cases, field repairs can be effected by merely exchanging a single circuit card, rather than by returning the entire OPTIMOD-FM chassis for repair. The factory ordinarily maintains a small number of "loaner cards". One of these may be provided as a spare circuit card for use while your card is being repaired at the factory. In most cases, factory service of defective cards is preferable to field service because the factory maintains a supply of exact-replacement spare parts, and has the experienced technicians and special test fixtures necessary to assure that the repaired card meets factory specifications in all respects. Instructions for packing and shipping cards or the complete chassis are found at the end of this Appendix.

DIAGNOSIS AT THE COMPONENT LEVEL

After following the above diagnostic procedure to localize the problem to a single card, you may want to troubleshoot the card on the component level instead of returning the card to the factory for service.

Here are some suggestions....

Troubleshooting IC Opamps

IC opamps are operated such that the characteristics of their associated circuits are essentially independent of IC characteristics and dependent only on external feedback components. The feedback forces the voltage at the "-" input terminal to be extremely close to the voltage at the "+" input terminal. Therefore, if the technician measures more than a few millivolts between these two terminals, the IC is probably bad.

Exceptions are IC's used without feedback (as comparators) and IC's whose outputs have been saturated due to excessive input voltage because of a defect in an earlier stage. However, if an IC's "+" input is more positive than its "-" input, yet the output of the IC is sitting at -14 volts, this almost certainly indicates that it is bad. The same holds if the above polarities are reversed. Because the characteristics of OPTIMOD-FM are essentially independent of IC opamp characteristics, an opamp can usually replaced without need for recalibration.

NOTE

THE DUAL CURRENT-CONTROLLED GAIN BLOCKS EMPLOYED IN THE VCA's AND STEREO GENERATOR L-R MODULATOR (IC 305, 309, 405, 409, & 703) ARE NOT OPAMPS. IF THEY ARE REPLACED, RECALIBRATION IS ABSOLUTELY NECESSARY.

A defective opamp may appear to work, yet it may have extreme temperature sensitivity. If parameters appear to drift excessively, freeze-spray may aid in diagnosing the problem. Freeze-spray is also invaluable in tracking down intermittent problems. But, use sparingly, because it can cause resistive short circuits due to moisture condensation on cold surfaces.

SELECTING AND ORDERING REPLACEMENT PARTS

Nearly all parts used in Optimod-FM have been very carefully chosen to make best use of both major and subtle characteristics. For this reason, parts should always be replaced with exact duplicates as indicated on the Parts List. It is very risky to make "close-equivalent" substitutions because of the possibility of materially altering performance and/or compliance with FCC requirements. The Factory is ordinarily able to supply any replacement part rapidly at an uncommonly reasonable price.

Specifically, such parts include all FET's and precision metal-film resistors, almost all capacitors, trimmer resistors, and integrated circuits, most transistors, and certain diodes.

Certain cards contain potted modules which, if diagnosed as defective, must be replaced as a unit. Ordinarily, this requires return of the entire card to the factory.

Certain parts are selected by the factory to tighter-than-normal specifications in order to obtain circuit performance which meets our exacting standards. Such parts are footnoted in the Parts Lists.

Certain parts, if replaced, require partial recalibration which may or may not be practical in the field. Such parts are footnoted in the Parts Lists. The recalibration requirements are outlined in the appropriate section of **Appendix B (Circuit Description)** and/or **Appendix E (Alignment).**

Service in areas involving selected parts or recalibration is best referred to the factory, which, as a result of training, experience, availability of special equipment, and availability of exact replacement parts, is generally far better qualified to perform repairs efficiently and correctly.

Ordering Parts From The Factory: If parts are ordered from the factory, we require all of the following information:

-- The Orban part number, if ascertainable from the Parts List
-- The Reference Designator (e.g., R503)
-- A brief description of the part
-- And, from the serial label on the rear of the unit:
  - the exact Model Number
  - the Serial Number
  - the "M" number, if any

REPLACEMENT OF COMPONENTS ON PRINTED CIRCUIT CARDS

It is important to use the correct technique for replacing components mounted on PC cards. Failure to do so may result in circuit damage and/or intermittent problems.

Many components, if replaced, will cause a change in calibration which will require returning the affected circuit card to the factory for recalibration. Also, some components are selected for characteristics which are not indicated by the manufacturer's part number. Most of these components are listed as "selected" on the parts list, but not all. In addition, the selection criteria are not generally described. It is therefore almost always wiser to return the defective card to the factory for service.

Most circuit cards used in OPTIMOD-FM are of the double-sided plated-through variety. This means that there are traces on both sides of the card, and that the through-holes contain a metallic plating in order to conduct current through the card. Because of the plated-through holes, solder often creeps 1/16" up into the hole, requiring a sophisticated technique of component removal to prevent serious damage to the card.

If the technician has no practical experience with the elegant and demanding technique of removing components from double-sided PC cards without card damage, it is wiser to cut each of the leads of an offending component from its body while the leads are still soldered into the card. The component is then discarded, and each lead is heated independently and pulled out of the card with a pair of long nose pliers. Each hole may

then be cleared of solder by carefully heating with a low-wattage soldering iron and sucking out the remaining solder with a spring-activated desoldering tool. THIS METHOD IS THE ONLY SATISFACTORY METHOD OF CLEARING A PLATED-THROUGH HOLE OF SOLDER IN THE FIELD!

The new component may now be installed by following the directions below starting with step (4).

Otherwise, use the following technique to replace a component:

1) Use a 30-watt soldering iron to melt the solder on the solder side (underneath) of the PC card. Do not use a soldering gun or a high-wattage iron! As soon as the solder is molten, vacuum it away with a spring-actuated desoldering tool like the Edsyn Soldapullt®. AVOID OVERHEATING THE CARD; overheating will almost surely damage the card by causing the conductive foil to separate from the card base.

Even with care, you are likely to blister the enamel solder-mask coating on the card, which, in most cases, is no cause for concern. The coating exists mainly to prevent moisture from condensing between the traces and to simplify wave-soldering.

2) Repeat step (1) until each lead to be removed has been cleared of solder and freed.

3) Now release the component by gently wiggling each of the leads to break solder webs. Then lift the component out.

4) Bend the leads of the replacement component until they will fit easily into the appropriate PC card holes. Using a good brand of rosin-core solder, solder each lead to the bottom side of the card with a 30-watt soldering iron. Make sure that the joint is smooth and shiny. If no damage has been done to the plated-through hole, soldering of the topside pad is not necessary. However, if the removal procedure did not progress smoothly, it would be prudent to solder each lead at the topside as well in order to avoid potential intermittent problems.

5) Cut each lead of the replacement component close to the solder (underneath) side of the PC card with a pair of diagonal cutters.

6) Remove all residual flux with a cotton swab moistened with a solvent like 1,1,1 trichloroethane, naptha, or 99% isopropyl alcohol. The first two solvents are usually available in supermarkets under the brand name Energine® Fire-proof Spot Remover and Regular Spot Remover, respectively. The alcohol, which is less effective, is usually available in drug stores. Rubbing alcohol is highly diluted with water and is ineffective.

It is good policy to make sure that this defluxing operation has actually removed the flux and has not just smeared it so that it is less visible. While most rosin fluxes are not corrosive, they can slowly absorb moisture and become sufficiently conductive to cause progressive deterioration of performance.

SHIPPING INSTRUCTIONS

Circuit Cards: A circuit card is best shipped in the special Orban Associates shipping carton used to supply loaner cards. If you wish to ship a card without this carton, cut two pieces of 1" or thicker soft foam to 6.5" x 9" (17cm x 23cm) or larger. Sandwich the card between the two foam pieces, and ship the foam "sandwich" in a rigid cardboard carton.

A "JIFFY-BAG" OR SIMILAR SOFT MAILING BAG DOES NOT PROVIDE SUFFICIENT PROTECTION FOR THE CARD, AND MUST NOT BE USED!

Shipping The Complete Chassis: If the original packing material is available, it should be used. Otherwise, a sturdy, double-wall carton of at least 200 pounds bursting test and no smaller than 22" x 15" x 12" (56 x 38 x 31 cm) should be employed.

OPTIMOD-FM should be packed so that there is at least 2" of packing material protecting every point. A plastic wrap or bag around the chassis will protect the finish. Cushioning material such as Air-Cap, Bubble-Pak, foam "popcorn", or thick fiber blankets are acceptable. Folded newspaper is not suitable. Blanket-type materials should be tightly wrapped around OPTIMOD-FM and taped in place to prevent the unit from shifting out of its packing and contacting the walls of the carton.

The carton should be packed evenly and fully with the packing material filling all voids such that the unit cannot shift in the carton. Test for this by closing but not sealing the carton and shaking vigorously. If the unit can be felt or heard to move, use more packing. The carton should be well-sealed with 3" (8 cm) reinforced fiber glass or polyester sealing tape applied across the top and bottom of the carton in an "H" pattern. Narrower or parcel-post type tapes will not stand the stresses applied to commercial shipments.

The package should be marked with the name of the shipper, and the words in red: DELICATE INSTRUMENTS, FRAGILE!. Even so, the freight people will throw the box around as if it were filled with junk. The survival of the unit depends almost solely on the care taken in packing!

After a formal Return Authorization (RA) number is obtained from the factory, units should be shipped to the Service Manager at the address shown on the title page.

YOUR RETURN AUTHORIZATION NUMBER MUST BE SHOWN ON THE LABEL, OR THE PACKAGE WILL NOT BE ACCEPTED!

INSURE YOUR SHIPMENTS APPROPRIATELY!

SHIP PREPAID -- DO NOT SHIP COLLECT!

DO NOT SHIP PARCEL POST!

(Otherwise, have a nice day.)

APPENDIX G:

Changing Preemphasis

Unless specially ordered with a different preemphasis, the OPTIMOD-FM Model 8100A/1 is normally configured with 75us preemphasis. If your country's standard is 50us and you therefore wish to change the preemphasis on your unit from 75us to 50us, you must replace resistors and capacitors on card #6, as indicated in the following table. Refer to **Appendix J** for location of components.

The parts required may be obtained as kit **OPT-11** from the factory at nominal charge. When ordering, please specify both the model number and the preemphasis desired.

If you have not had much experience reworking double-sided printed circuit boards, see **Replacement of Components on PC Boards** in **Appendix F.** Verify correct operation when the modification has been completed (see **Appendix D** for a suggested method of verification).

COMPONENTS TO BE CHANGED ON CARD #6

		75us		50us	
Component	Notes	Value	ORBAN Part #	Value	ORBAN Part #
R602, R636	1	27.4k	20042.274	26.7k	20042.267
R603, R637		23.7k	20042.237	23.2k	20042.232
R604, R638	2	5.90k	20051.590	1.24k	20051.124
R605, R639		4.99k	20041.499	1.05k	20041.105
R607, R641		4.02k	20041.402	4.32k	20041.432
R608, R642		165.0k	20043.165	261.0k	20043.261
R614, R648		9.09k	20041.909	8.87k	20041.887
R617, R651		51.1k	20042.511	49.9k	20042.499
R619, R653		1.37k	20041.137	2.00k	20041.200
C603, C615	3	0.01uF	21702.310	0.047uF	21702.347
C604, C616	4	150pF	21018.115	100pF	21018.110

NOTES:

1) All resistors are Metal Film, 1/8-Watt, 1%, Style RN55D, except as noted.
2) R604 and R638 must be within 1/2% of their nominal values.
3) 2%, Polypropylene, 50V (Noble CQ15P style).
4) 1%, Mica, 500V (CM05 style CD-15).

APPENDIX H:

Detailed Exciter Interface Instructions

This Appendix provides instructions on interfacing OPTIMOD-FM to certain exciters requiring special wideband interfaces. Most exciters have straightforward wideband inputs, and no special considerations are involved.

Collins 310Z-1(B)

Prior to installing the required Continental 785-1 Wideband Interface card, this exciter must be modified using a kit of parts and instructions provided by Continental. Once this modification has been performed, proceed as in the case of the Continental 510R-1 (immediately below).

Continental 510R-1 (Collins 310Z-2)

1. Obtain a 785E-1 interface card directly from Continental.

2. Remove the 53kHz phase-linear baseband filter (FL-1), Continental Part # 673-1162-020. The filter is located on the opposite side of the chassis under the protective grill in the rear of the exciter. To access this filter, first remove the entire rear grill of the exciter. Next, the circuit board that covers the screws that secure the filter in its socket must be removed. The filter is plugged into an octal socket and can be readily unplugged once its hold-down screws are removed.

Despite the inconvenience, it is IMPERATIVE that this filter be removed as it shunts the baseband input to the FM modulator and its continued presence would seriously degrade separation.

3. Replace the hardware and grill removed in step (2).

4. Install the 785E-1 Interface Card in its designated slot in the card cage.

5. Be certain that the Interface Card is not being overloaded by OPTIMOD-FM. This can happen easily if the B/B LEVEL control on the modulator card of the Continental exciter is set excessively low and the OPTIMOD-FM output level is increased to make up the gain. The problem may not be immediately noticeable under test conditions, but will seriously degrade the normal operation of the system.

To avoid this condition, do not change the adjustment of the B/B LEVEL control from the setting appropriate for use with the Continental stereo generator. If there is any reason to suspect that this control has been misadjusted, it is worthwhile to check the input sensitivity. The B/B LEVEL control is correctly adjusted when a sinewave of 1.24V rms (3.5v p-p) applied to the Continental Wideband Input produces 100% modulation at any frequency.

Gates (Harris) TE-1 and TE-3

1. If you do not have a Gates (Harris) Wideband Interface Kit (P/N 994 6672 001), order the Orban ATE-3F Interface Kit (Orban P/N 04014-000-00) directly from Orban.

2. Both the Gates (Harris) and Orban interface kits contain complete instructions for installation. Bear in mind that the Gates (Harris) interface provides a balanced input. This means that the OPTIMOD-FM circuit and chassis grounds will ordinarily be jumpered together on the rear barrier strip. The Orban interface provides an unbalanced input, and the OPTIMOD-FM circuit and chassis grounds will ordinarily be unjumpered.

RCA BTE-15

1. If your exciter is not equipped with an RCA "Monaural Audio Module" (RCA P/N MI-561072), then order Orban Accessory RCA-1 (Orban P/N 05004-000) directly from Orban.

2. Install OPTIMOD-FM directly above the exciter, allowing at least 1 3/4" (1 rack unit) of air space between the units. You may want to switch the OPTIMOD-FM's LINE VOLTAGE selector to "230V" so that it can be operated from the same 230 volt circuit that ordinarily powers the exciter.

3. Using the BNC/BNC cable provided with your OPTIMOD-FM, connect the OPTIMOD-FM baseband output to the WIDEBAND BNC connector (J108) on the right rear apron of the exciter mainframe. The WIDEBAND input is the second BNC connector from the top. Be careful not to connect to the TELEMETRY input.

4. Remove the RCA BTS-1B stereo generator from the BTE-15 mainframe. If the RCA "Monaural Audio Module" is available, install it in place of the RCA stereo generator. S201, which is located on the Monaural Audio Module circuit board, must be in the EXTERNAL position.

If the "Monaural Audio Module" is not available, install the "RCA Jumper Plug" obtained in step (1) in the jack vacated by the RCA stereo generator.

5. If any of the following conditions are noted after installing OPTIMOD-FM, your BTE-15 probably has a defective varactor diode:

   a) The peak modulation level, as indicated on your modulation monitor peak flasher, seems to vary several percent with transmitter room temperature.

   b) Modulation is asymmetric.

   c) OPTIMOD-FM cannot supply enough level to modulate the exciter to 100%.

Any of these conditions should make you suspect RCA modulated oscillator diodes CR2 and/or CR3. Replacement of these diodes and realignment of the modulator is critical, and should probably be left to RCA Service.

APPENDIX J:

Schematics, Parts Locators, and Parts List

The documents in this Appendix reflect the actual construction of your unit as accurately as possible. If changes are made, they will be found in an Addendum inserted in the front of this Manual. If there is a disagreement between these drawings and your actual unit, it more likely reflects an error in documentation than an error in the construction of your unit.

If you intend to replace parts, please consult the section in **Appendix F** on **Selecting And Ordering Replacement Parts.**

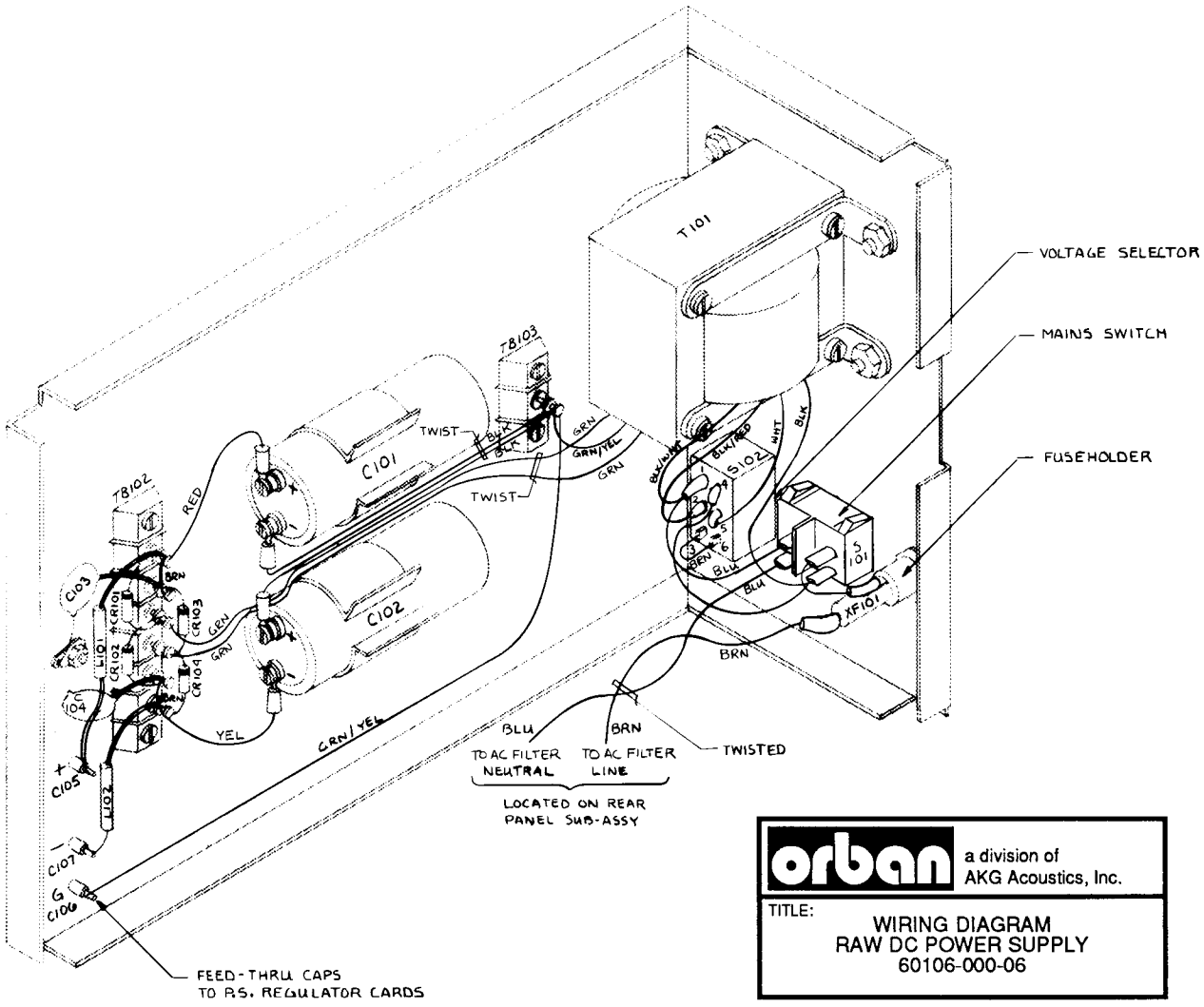
Schematic drawings for the major cards face the corresponding Parts Locator Drawing.

Schematic Drawings and Parts Locator Drawings for miscellaneous assemblies and the chassis interwiring follow.

TABLE OF CONTENTS

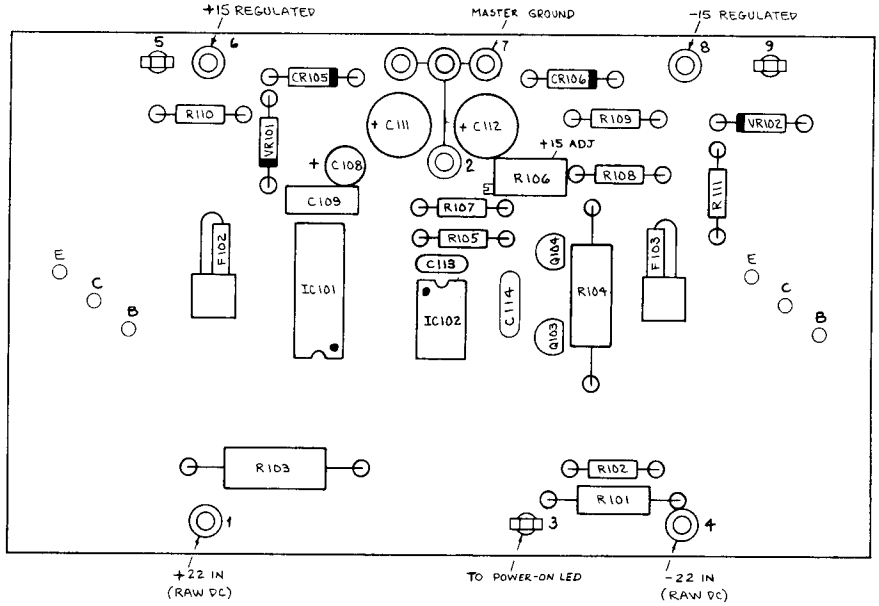
J

INS



orban a division of AKG Acoustics, Inc.

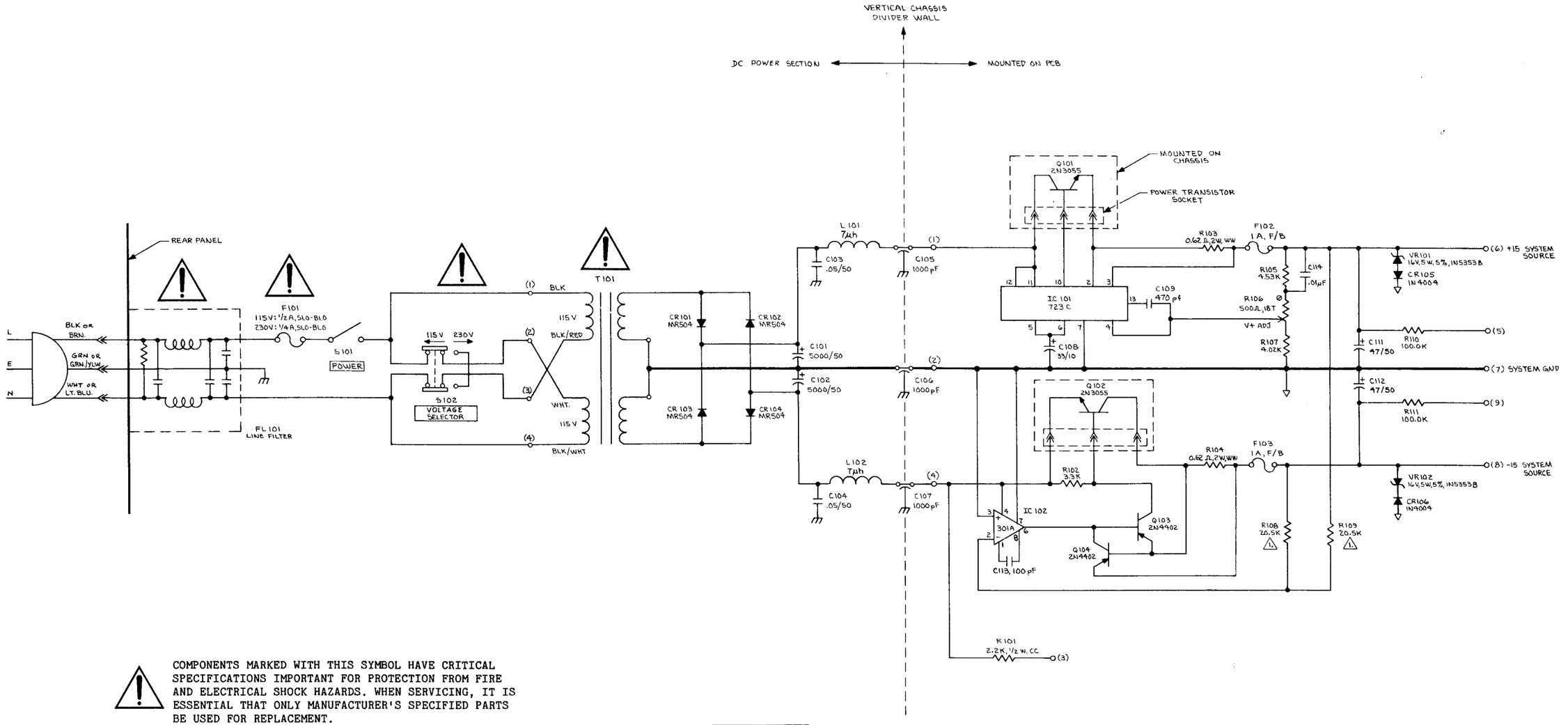
TITLE:
WIRING DIAGRAM
RAW DC POWER SUPPLY
60106-000-06



NOTE: Q101 and Q102 are mounted on Rear Panel

orban a division of AKG Acoustics, Inc.

TITLE:
ASSEMBLY DRAWING
POWER SUPPLY REGULATOR
30310-000-07



⚠ COMPONENTS MARKED WITH THIS SYMBOL HAVE CRITICAL SPECIFICATIONS IMPORTANT FOR PROTECTION FROM FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING, IT IS ESSENTIAL THAT ONLY MANUFACTURER'S SPECIFIED PARTS BE USED FOR REPLACEMENT.
PRIOR TO THE RETURN OF THIS APPLIANCE TO THE CUSTOMER, AND UPON COMPLETION OF SERVICING, SERVICE PERSONNEL ARE REQUIRED TO TEST THIS UNIT FOR ADEQUATE INSULATION RESISTANCE BETWEEN THE POWER SUPPLY AND EXPOSED PARTS.

⚠1 SELECTED: MATCHED TO 1/4%

NOTES:

REFERENCE DESIGNATORS		
ITEM	LAST USED	NOT USED
C	C114	C110
CR	106	—
IC	102	—
Q	104	—
R	111	—
S	102	—
VR	102	—
FL	101	—
T	101	—
L	102	—
F	103	—

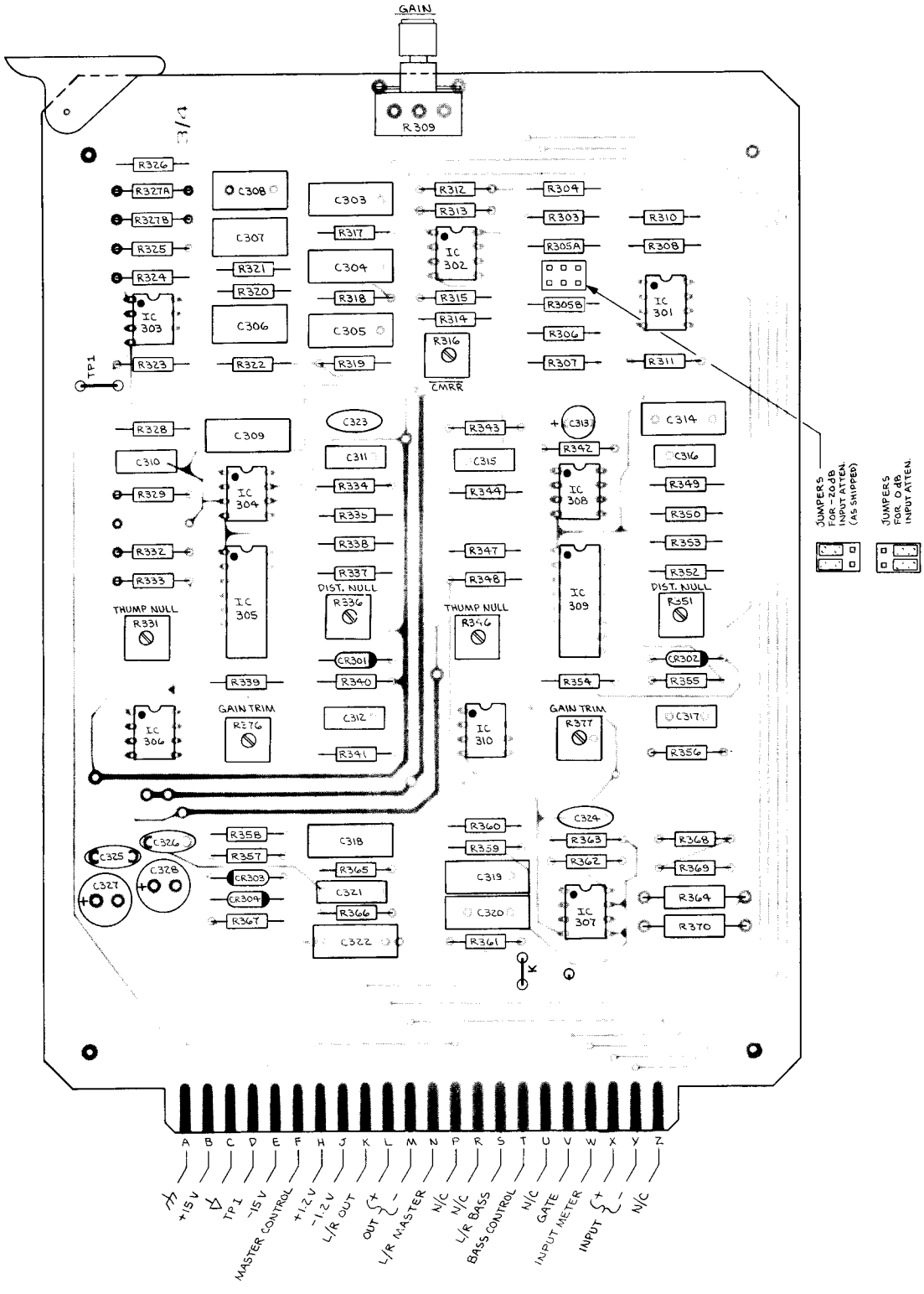
orban a division of AKG Acoustics, Inc.

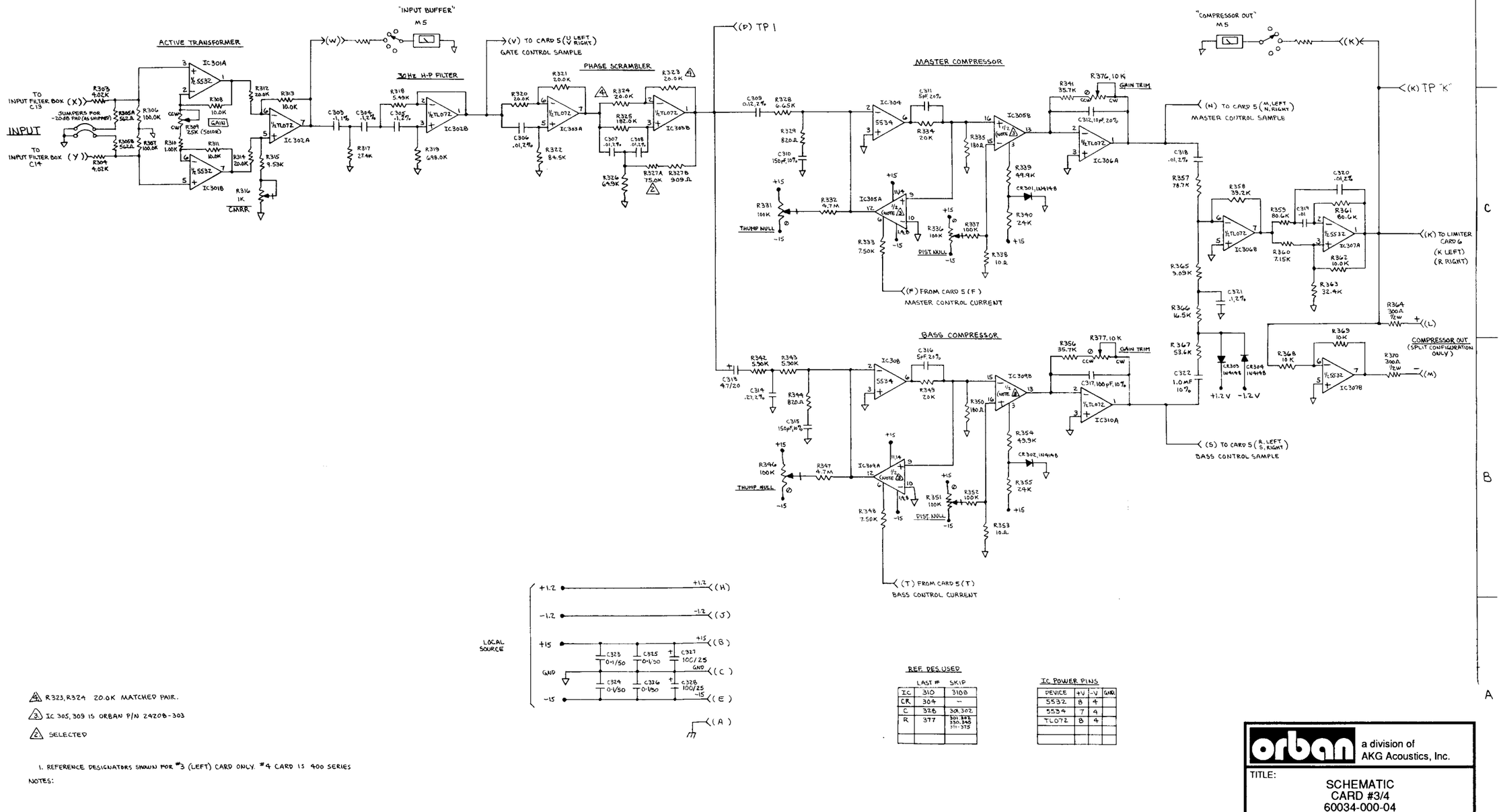
TITLE:
SCHEMATIC
POWER SUPPLY
60021-000-07

J

orban a division of AKG Acoustics, Inc.

TITLE: ASSEMBLY DRAWING
CARD #3/4
30430-000-05





4 R323, R324 20.0K MATCHED PAIR.

3 IC 305, 309 IS ORBAN P/N 24208-303

2 SELECTED

NOTES:

1. REFERENCE DESIGNATORS SHOWN FOR #3 (LEFT) CARD ONLY. #4 CARD IS 400 SERIES

REF. DES. USED

	LAST #	SKIP
IC	310	3108
CR	304	--
C	328	301, 302,
R	377	301, 323, 330, 345, 371-375

IC POWER PINS

PEVICE	+V	-V	GND
5532	8	4	
5534	7	4	
TL072	8	4	

orban a division of AKG Acoustics, Inc.

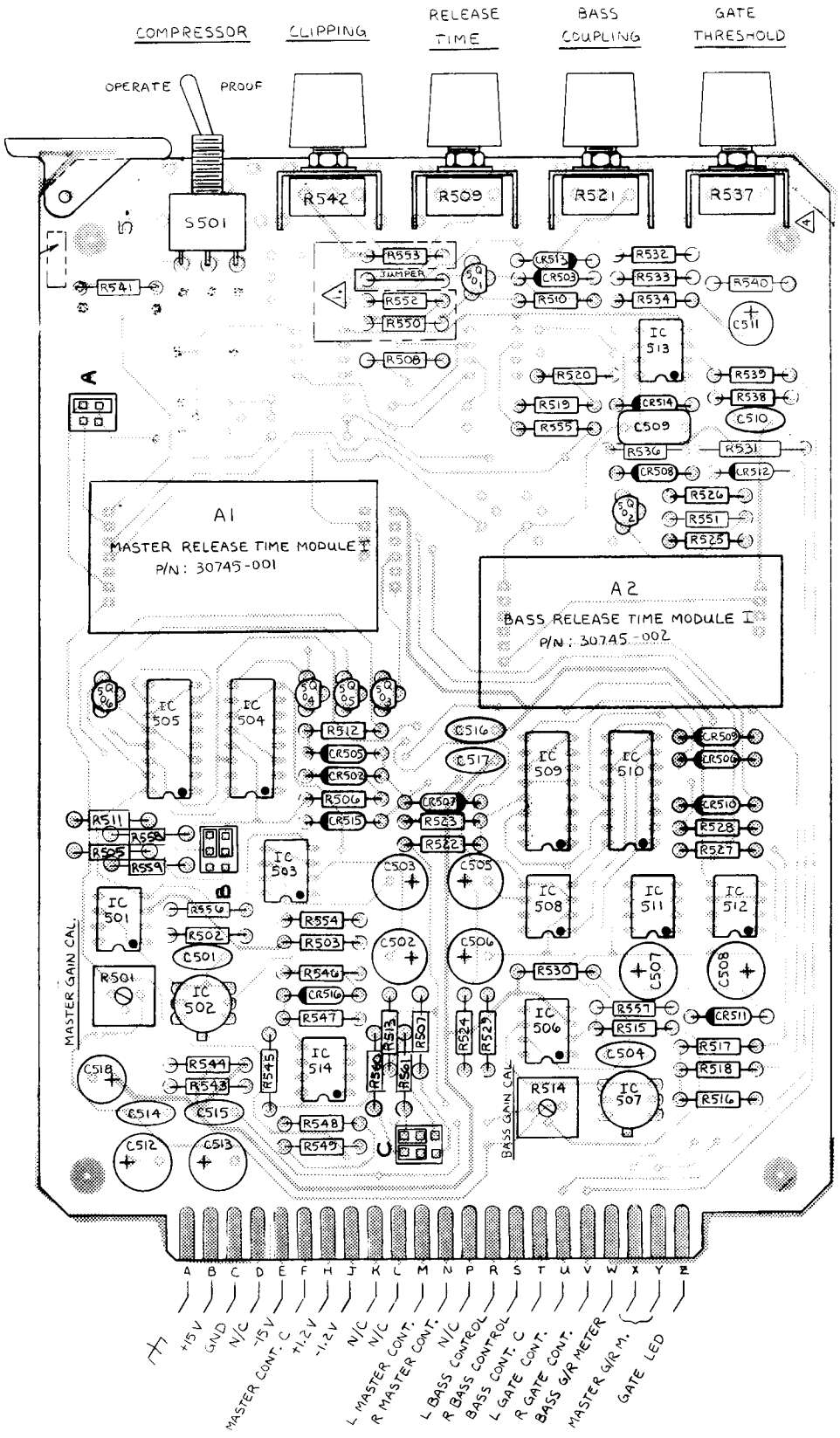
TITLE:

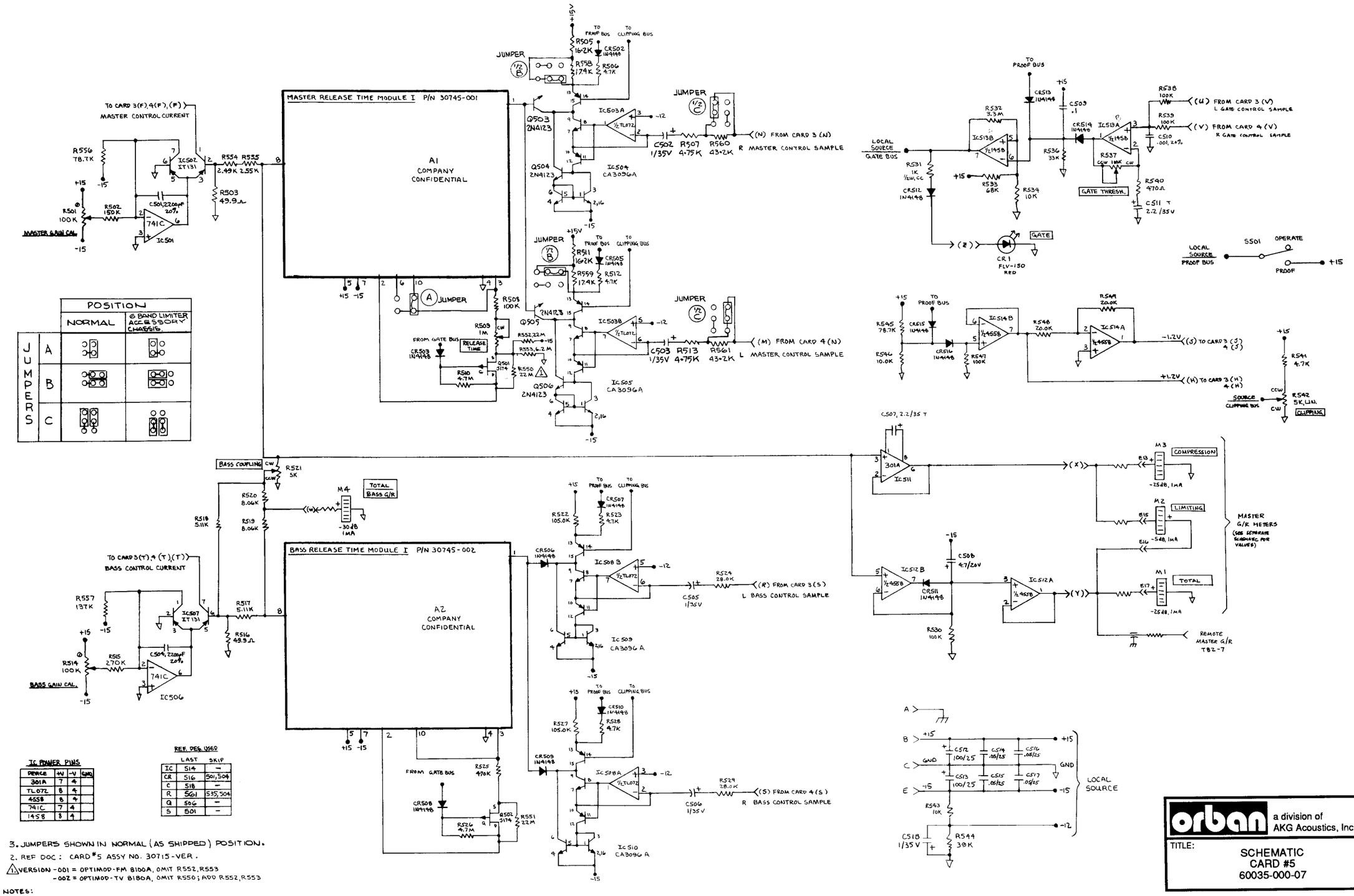
SCHEMATIC
CARD #3/4
60034-000-04

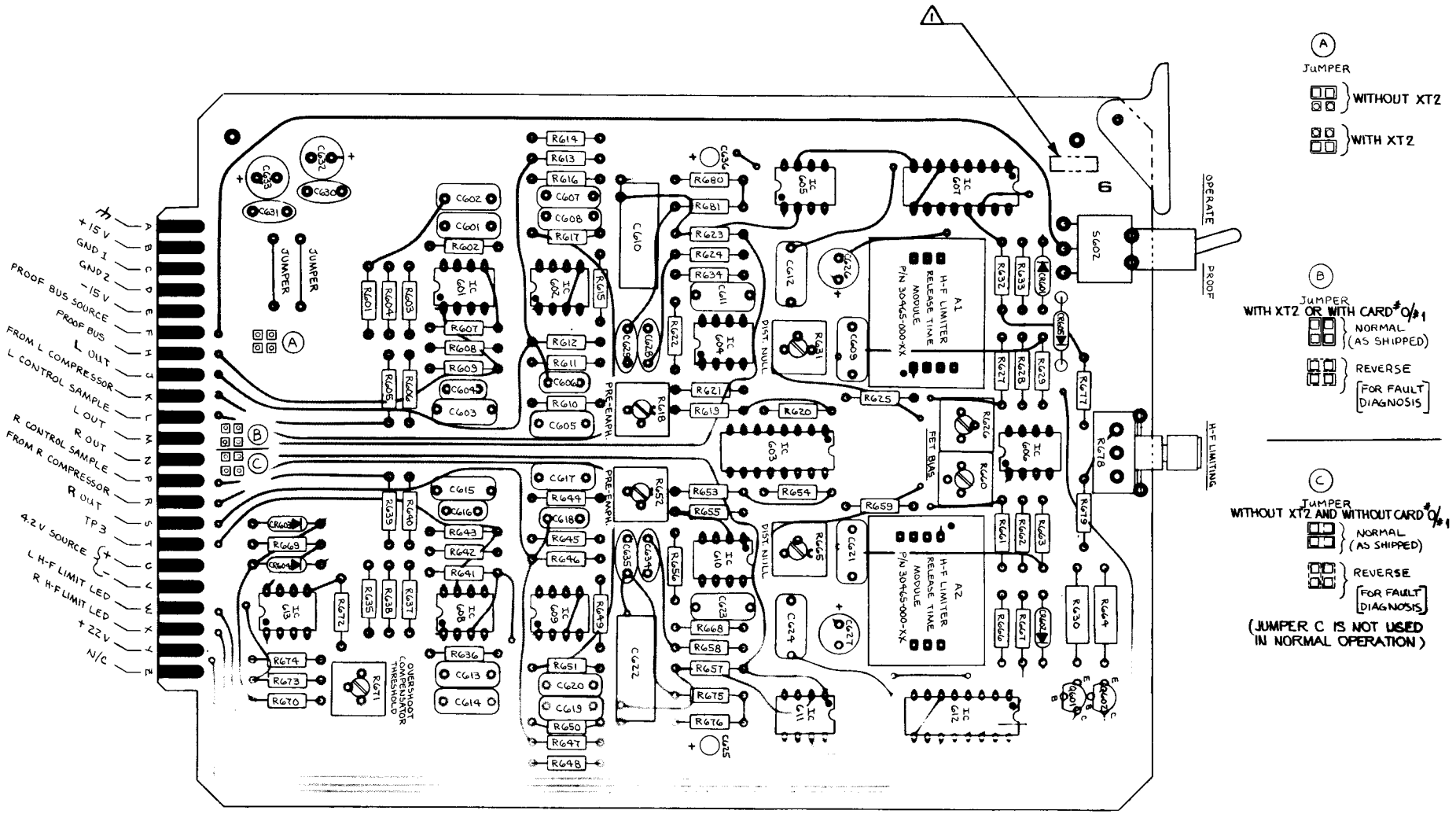
J

orban a division of AKG Acoustics, Inc.

TITLE: ASSEMBLY DRAWING
CARD #5
30715-000-03




MASTER RELEASE TIME MODULE I P/N 30745-001
A1
COMPANY
CONFIDENTIAL
TO CARD 3(F),4(F),(F)
MASTER CONTROL CURRENT
MASTER GAIN CAL
JUMPER
POSITION
NORMAL
6 BAND LIMITER ACCESSORY CHASSIS
JUMPERS
A
B
C
(N) FROM CARD 3 (N)
R MASTER CONTROL SAMPLE
(M) FROM CARD 4 (N)
L MASTER CONTROL SAMPLE
LOCAL SOURCE GATE BUS
GATE
GATE THRESH.
(U) FROM CARD 3 (V)
L GATE CONTROL SAMPLE
(V) FROM CARD 4 (V)
R GATE CONTROL SAMPLE
LOCAL SOURCE PROOF BUS
OPERATE
PROOF
-1.2V (S) TO CARD 3 (S) 4 (S)
+1.2V (H) TO CARD 3 (H) 4 (H)
SOURCE CLIPPING BUS
CLIPPING
BASS RELEASE TIME MODULE I P/N 30745-002
A2
COMPANY
CONFIDENTIAL
TO CARD 3(T),4(T),(T)
BASS CONTROL CURRENT
BASS GAIN CAL
BASS COUPLING
TOTAL BASS G/R
(R) FROM CARD 3 (S)
L BASS CONTROL SAMPLE
(S) FROM CARD 4 (S)
R BASS CONTROL SAMPLE
(X)
(Y)
COMPRESSION
LIMITING
TOTAL
MASTER G/R METERS
(SEE SOFTWARE SCHEMATIC FOR VALUES)
REMOTE MASTER G/R TBZ-7
LOCAL SOURCE
GND
IC PINOUT PINS
REF. DES. USED
3. JUMPERS SHOWN IN NORMAL (AS SHIPPED) POSITION.
2. REF DOC: CARD #5 ASSY NO. 30715-VER.
1. VERSION -001 = OPTIMOD-FM 8100A, OMIT R552, R553
-002 = OPTIMOD-TV 8180A, OMIT R550; ADD R552, R553
NOTES:
orban a division of AKG Acoustics, Inc.
TITLE:
SCHEMATIC
CARD #5
60035-000-07



A
JUMPER
WITHOUT XT2
WITH XT2

B
JUMPER
WITH XT2 OR WITH CARD #0/#1
NORMAL (AS SHIPPED)
REVERSE [FOR FAULT DIAGNOSIS]

C
JUMPER
WITHOUT XT2 AND WITHOUT CARD #0/#1
NORMAL (AS SHIPPED)
REVERSE [FOR FAULT DIAGNOSIS]
(JUMPER C IS NOT USED IN NORMAL OPERATION)

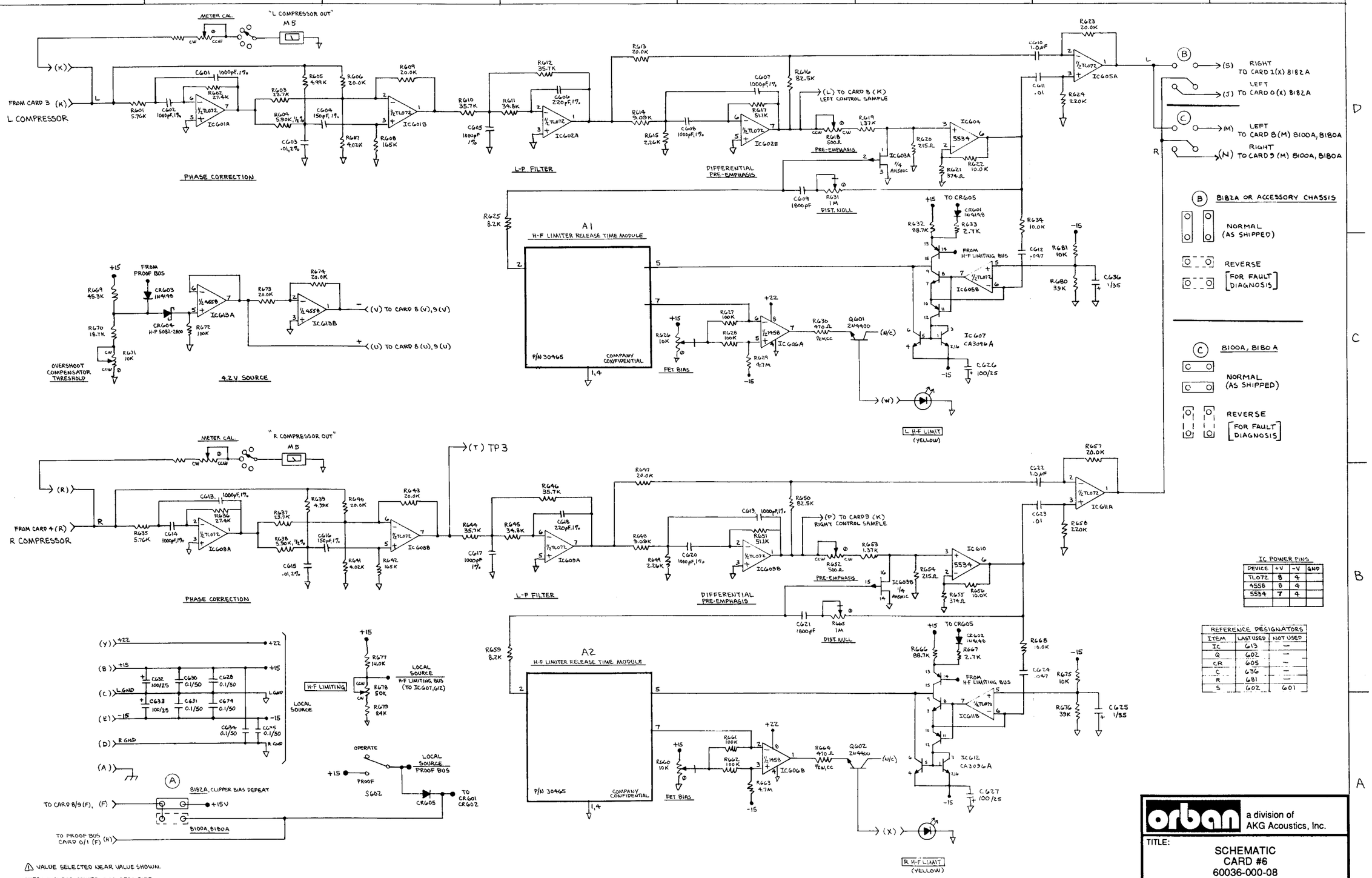
VERSION CODE	
001	75uS
002	50uS
003	25uS

NOTES:

1. MARK APPROPRIATE VERSION IN μS NEXT TO CARD EJECTOR IN RED

orban a division of AKG Acoustics, Inc.

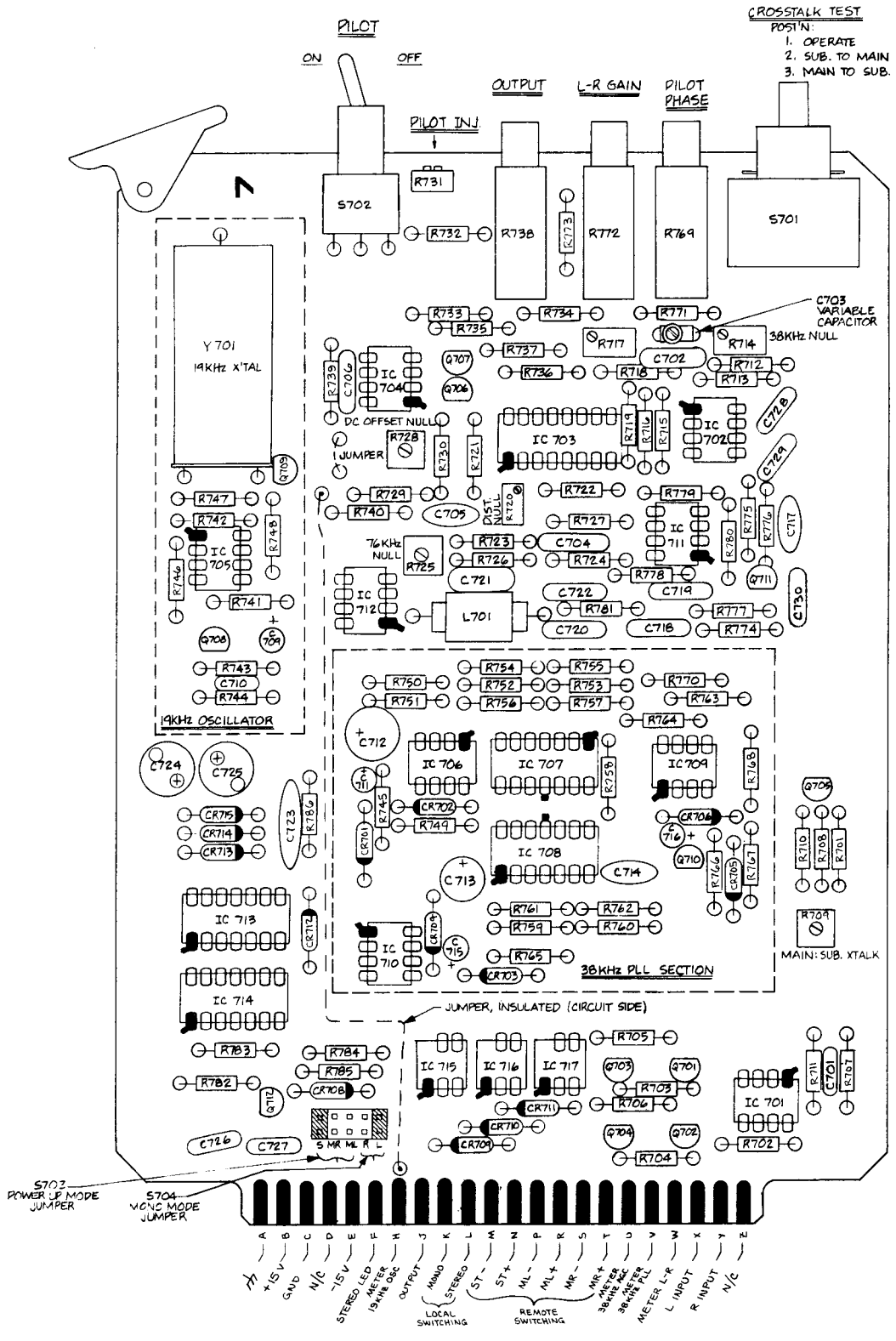
TITLE:
ASSEMBLY DRAWING
CARD #6
30460-000-09



⚠ VALUE SELECTED NEAR VALUE SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED.

See **Appendix G: Changing Preemphasis.**



NOTES:

1. TRIMPOTS: R709, "MAIN: SUB XTALK"
R714, "38KHz NULL"
R717, "SUB: MAIN XTALK"
R720, "DIST NULL"
R725, "76KHz NULL"
R728, "DC OFFSET NULL"

orban a division of AKG Acoustics, Inc.

TITLE: ASSEMBLY DRAWING
CARD #7
30470-000-05

AUDIO TEST JACKS (REAR PANEL)

TEST / NORMAL

CARD 8 (X)

CARD 9 (Y)

INPUT

CROSSTALK TEST

(SEE LOGIC TABLE BELOW)

1. OPERATE
2. SUB TO MAIN
3. MAIN TO SUB

5701A

IC 701

MAIN: SUB XTALK

SUB: MAIN XTALK

METER "L-R" M5

38KHz NULL

IC 702

IC 703A

DC OFFSET NULL

DIST. NULL

IC 703B

76 KHz NULL

PILOT

PILOT INJ

OUTPUT LEVEL

IC 704

Q706 J113

Q707 J111

L-R

L, R, OR L+R

FROM 38KHz SOURCE

FROM 19KHz SOURCE

METER "38KHz AGC" M5

+12V SOURCE (TO ALL 711 I.C.'s)

+15V (B)

GND (C)

-15V (E)

(A)

Q701 J111

Q702 J111

Q703 2N4400

Q704 2N4400

Q705 J113

TP1

METER "19KHz OSC." M5

19KHz OSCILLATOR

IC705

V701 19KHz

19KHz SOURCE

38KHz PLL SECTION

IC 707

IC 706

IC 708

IC 709A

IC 709B 1/2

IC 710

IC 711

IC 712A 1/2

38 KHz SOURCE

METER "38KHz PLL" M5

PILOT PHASE

S701A

S701B

IC 713A

IC 713B

IC 713C

IC 713D

IC 714A

IC 714B

IC 714C

Q712 2N4402

GRN STEREO

POWER UP MODE

MONO MODE

JUMPER

MONO

STEREO

IC 715 SFH-601-1

IC 716 SFH-601-1

IC 717 SFH-601-1

INPUT FILTER BOX

REMOTE MONO/STEREO

FERRITE BEADS 4 PL

COMPOSITE OUTPUT (BNC)

RED

BLK

(CHASSIS PLATE)

DEVICE		Q707 L+R GAIN CHANGE	Q706 PILOT + SUBCHANNEL	Q709 19KHz OSC SQUELCH	Q705 DIFFERENTIAL AMP GAIN CHANGE	Q701 R AUDIO	Q702 L AUDIO
	NODE	A		B	C	D	E
S701 MODE	OPERATE STEREO	1		0	1	1	1
	OPERATE MONO L	0		1	1	0	1
	OPERATE MONO R	0		1	1	1	0
	CROSSTALK SUB TO MAIN	1		0	0	0	1
	CROSSTALK MAIN TO SUB	1		0	1	1	1

KEY: 1=ON (GATE AT GND) 0=OFF (GATE AT -15V)

FET SWITCHING LOGIC

REF DESIGNATORS

ITEM	LAST USED	NOT USED
IC	717	712B
Q	712	-
CR	715	707
C	737	707 708
R	786	-

I.C. POWER & GND PINS

DEVICE	+V	-V	GND
IC 703	11,14	1,4,8	10
TL072	8	4	-
518	7	4	-
4558	8	4	-
4131	7	4	-
301A	7	4	-
5534	7	4	3
318	7	4	-

(5) SELECTED

4. ∅ = TRIMPOT.

(3) IC 703 IS ORBAN P/N: 24208-502.

2. SEE AUXILIARY SCHEMATICS FOR COMPONENTS RELATED TO METERING, INDICATORS & CONTROLS.

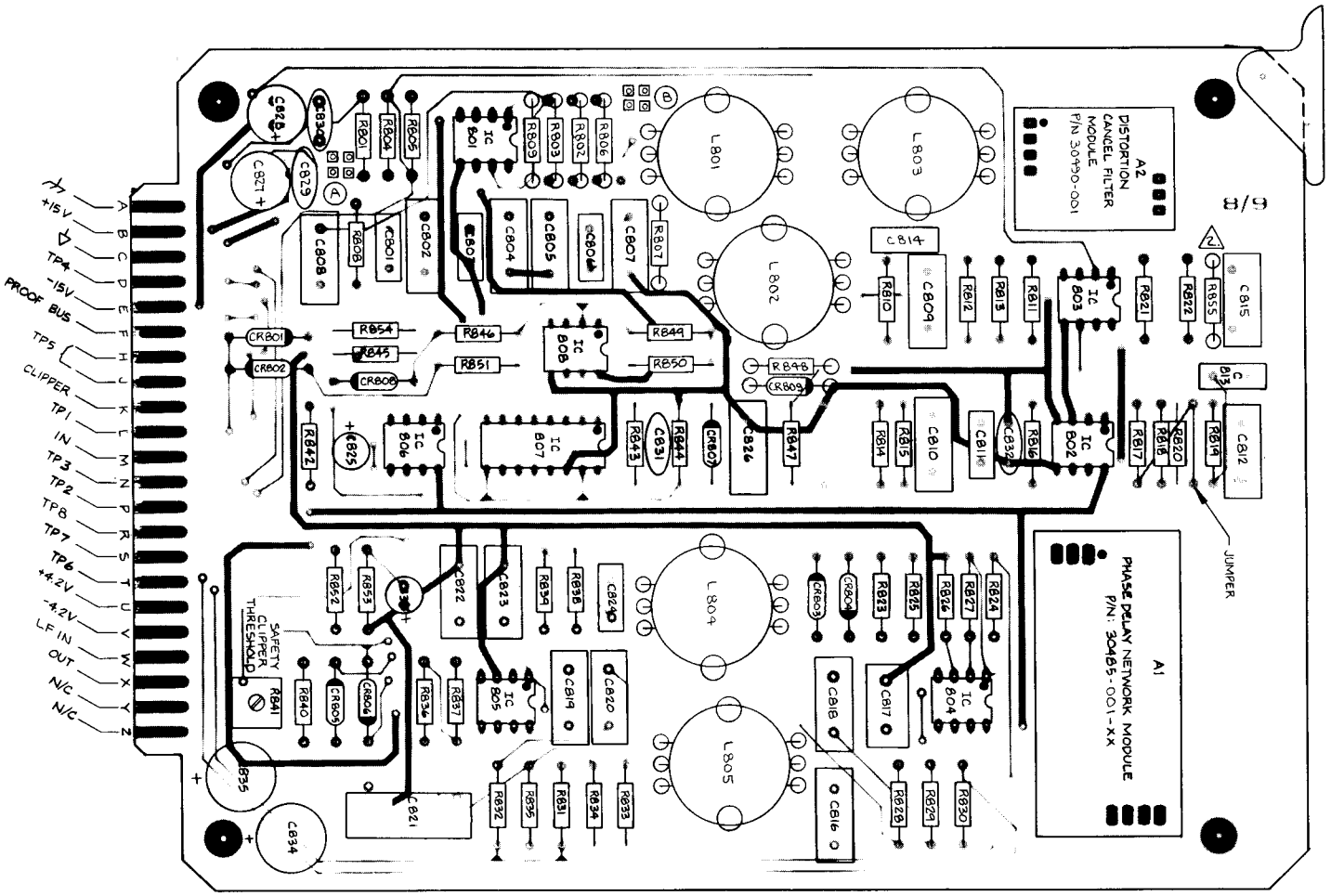
1. ALL DIODES ARE IN4148.

NOTES: UNLESS OTHERWISE SPECIFIED -

orban a division of AKG Acoustics, Inc.

TITLE:

SCHEMATIC
CARD #7
60037-000-05



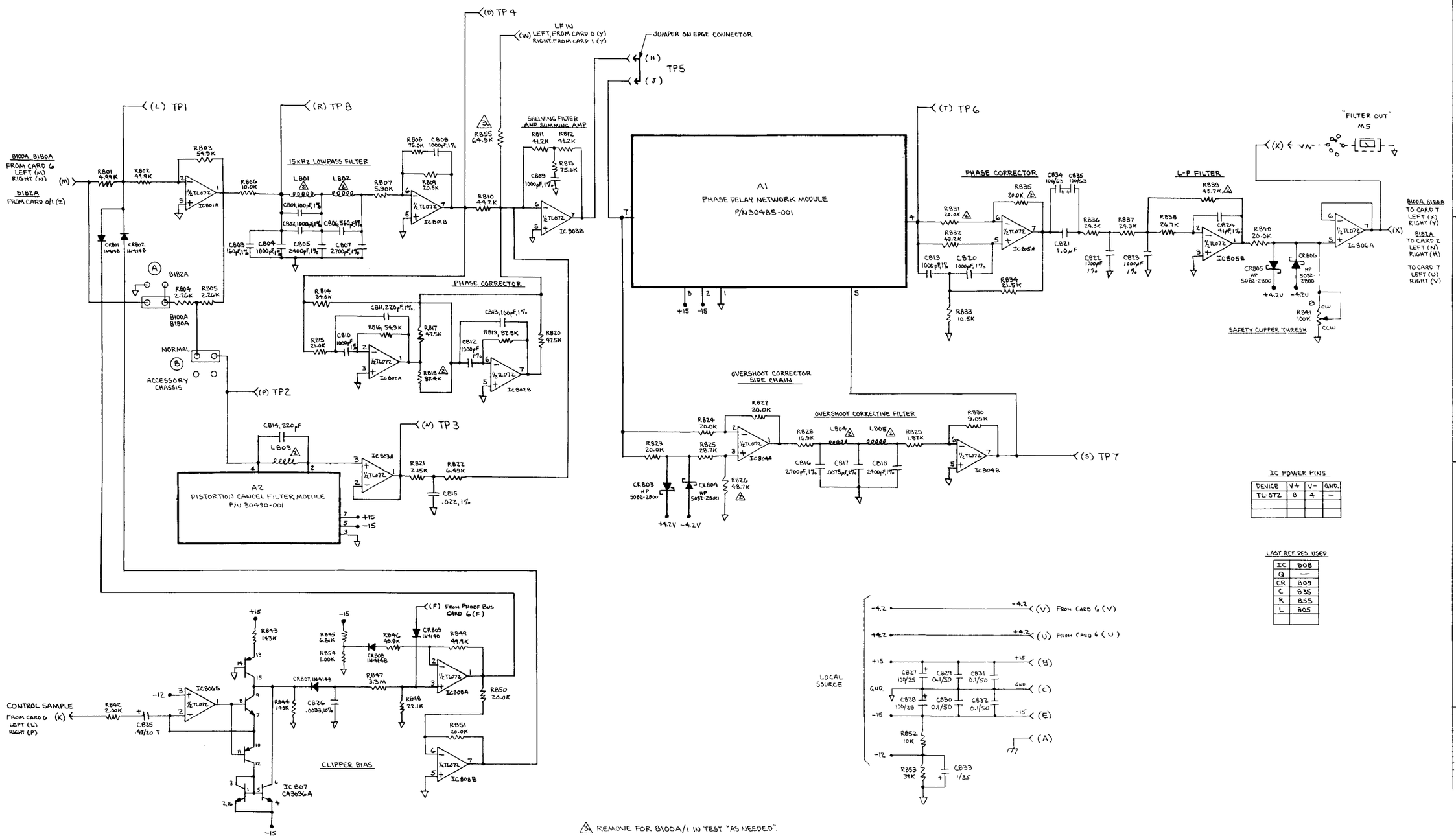
⚠2 REMOVE FOR 8100A IN TEST "AS NEEDED"

1. VERSIONS: -001 = CARD 8 } 8100A, 8180A, 8182A
-002 = CARD 9

NOTES:

orban a division of AKG Acoustics, Inc.

TITLE:
ASSEMBLY DRAWING
CARD #8/9
30480-000-06



IC POWER PINS

DEVICE	V+	V-	GND.
TL-072	8	4	—

LAST REF. DES. USED

IC	B08
Q	—
CR	B09
C	B35
R	B55
L	B05

△3 REMOVE FOR B100A/1 IN TEST "AS NEEDED".

△2 SELECTED

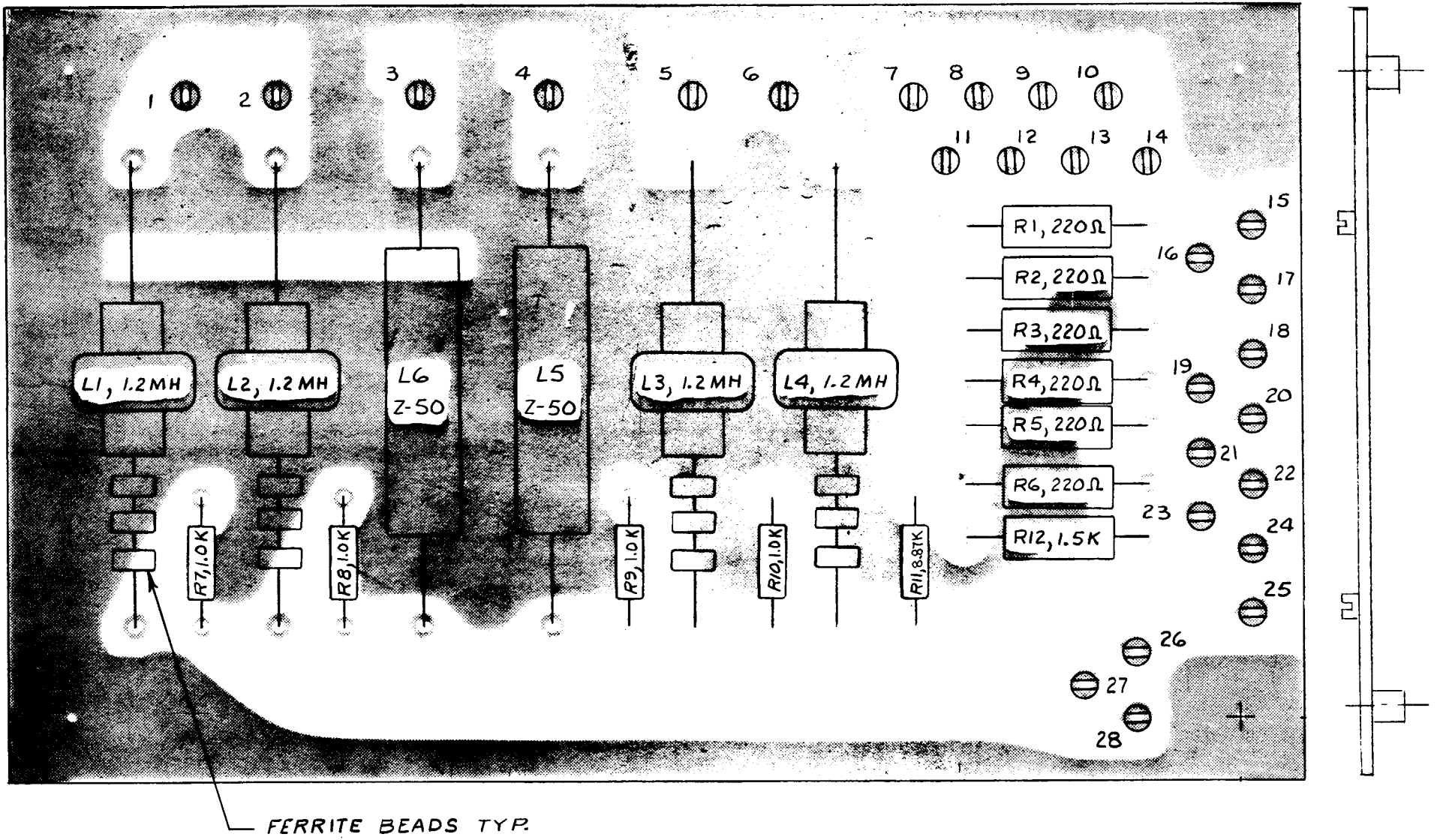
1. REFERENCE DESIGNATORS SHOWN FOR #8 (LEFT) CARD ONLY #9 CARD IS 900 SERIES.

NOTES: UNLESS OTHERWISE SPECIFIED

orban a division of AKG Acoustics, Inc.

TITLE:

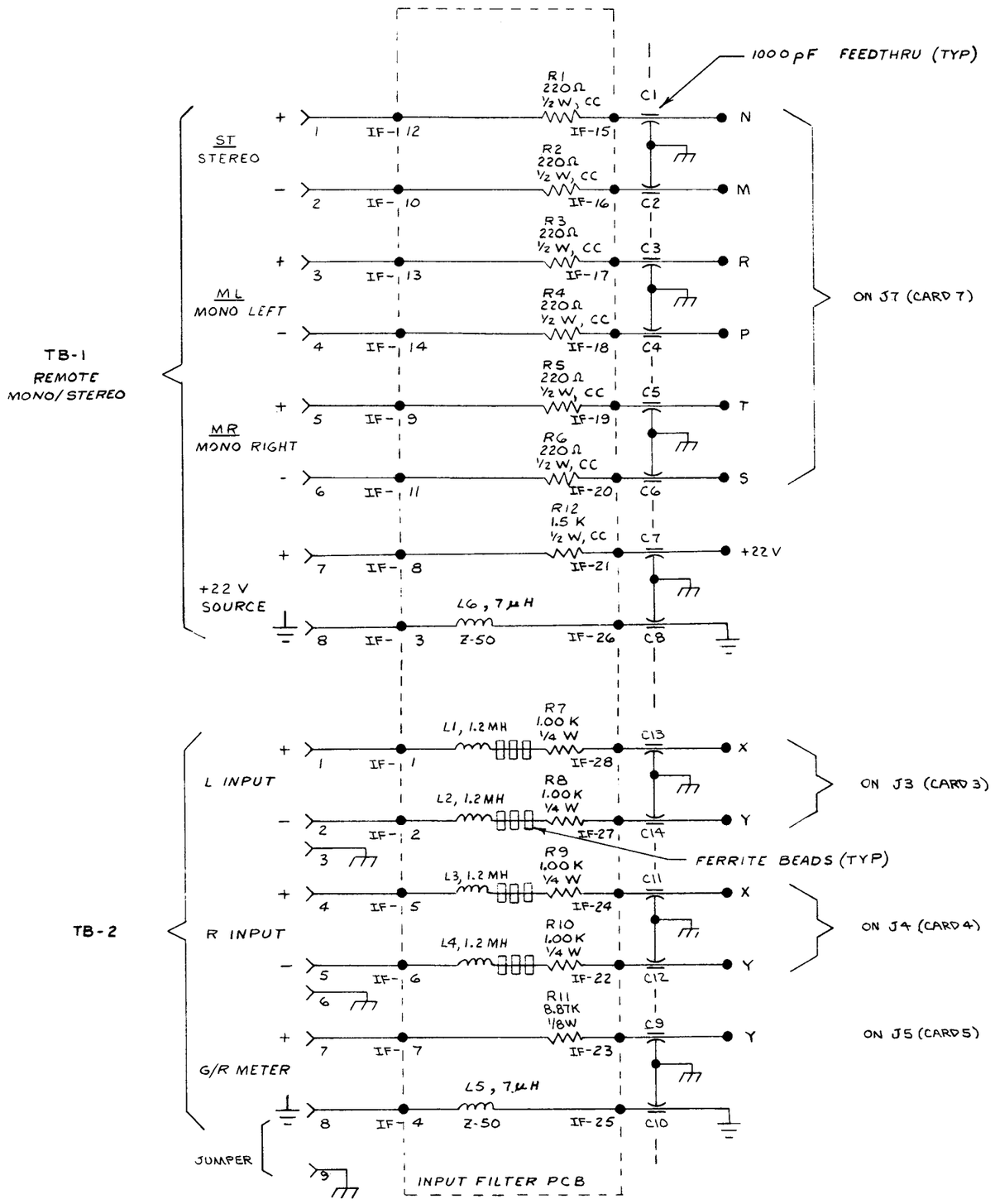
SCHEMATIC
CARD #8/9
60038-000-08



COMPONENT SIDE VIEW

orban a division of AKG Acoustics, Inc.

TITLE:
ASSEMBLY DRAWING
INPUT FILTER BOARD
30495-000-02

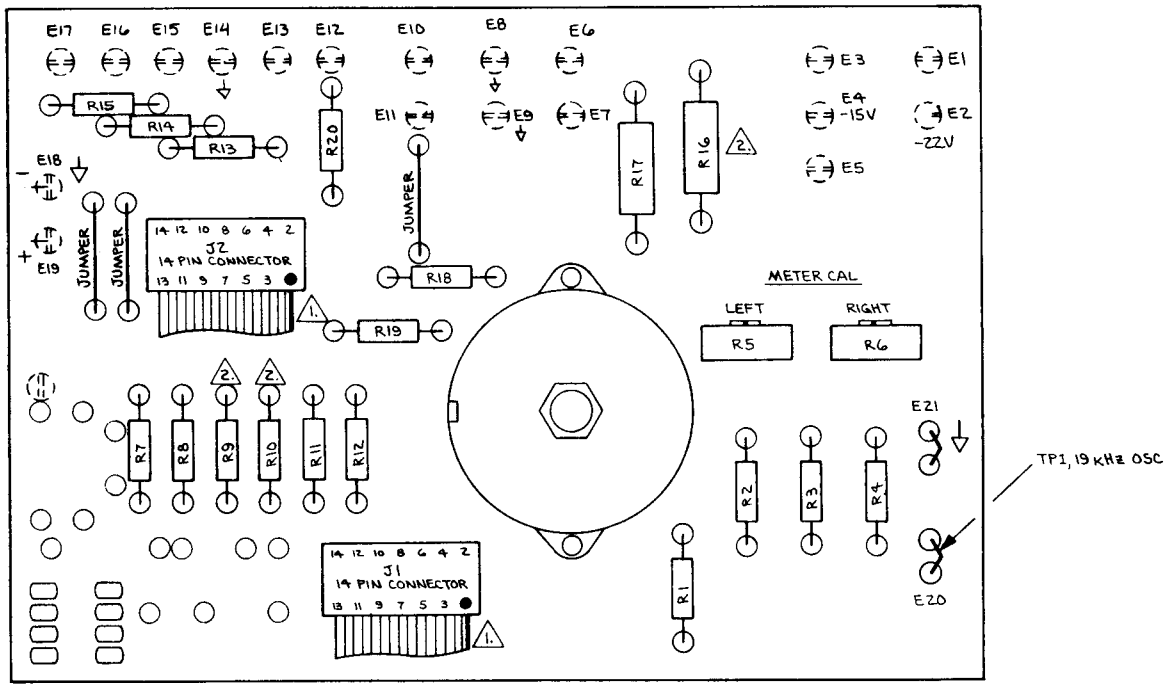


LAST REF. DES.
C14
R12
L6

J

orban a division of AKG Acoustics, Inc.

TITLE:
SCHEMATIC
INPUT FILTER BOARD
60039-000-03



COMPONENT SIDE

orban a division of AKG Acoustics, Inc.

TITLE:
ASSEMBLY DRAWING
METER RESISTOR CARD
30440-000-07

L IN

METER "L INPUT BUFFER"

INPUT BUFFER ¶1.a

30 Hz HP ¶1.b

INPUT ATTEN

PHASE SHIFT & PRE-EMPHASIS ¶1.c

200 Hz CROSSOVER ¶2.b

MASTER VCA ¶2.c

200 Hz CROSSOVER ¶2.b

BASS VCA ¶2.c

200 Hz CROSSOVER ¶2.c

SOFT CLIP ¶2.c

200 Hz CROSSOVER ¶2.c

DE-EMPHASIS ¶1.c

METER "L COMPRESSOR OUT"

L

-1

USED FOR SPLIT CONFIGURATION ONLY

STL

BUFFER

LEVEL

PHASE CORRECT ¶3

LOWPASS ¶3

BANDPASS ¶4.a

VCA ¶4.a

PRE-EMPHASIZED AUDIO OUT

CONTROL SAMPLE

RECTIFIER WITH THRESHOLD ¶4.b

TIMING ¶4.b

H-F LIMITING ¶4.b

TO R CHANNEL RECTIFIER

H-F LIMIT LED

LEFT CHANNEL

CARD 3

LEFT COMPRESSOR

BASS COUPLING ¶2.d

RECTIFIER WITH THRESHOLD ¶2.d

RELEASE TIME

RECTIFIER WITH THRESHOLD ¶2.d

MASTER AGC BUFFER ¶2.d

TIMING ¶2.d

"OR" ¶2.d

GATE THRESHOLD

GATING DETECTOR ¶2.F

GATING LED

GATING LINE

THRESHOLD LINE

CLIPPING ¶2.d

MASTER G/R TOTAL LIMITING COMPRESSION

BASS G/R TOTAL

BASS AGC BUFFER ¶2.d

TIMING ¶2.d

"OR" ¶2.d

PEAK DETECT / SLOW LIMIT ¶2.e

RECTIFIER WITH THRESHOLD ¶2.d

RECTIFIER WITH THRESHOLD ¶2.d

CARD 5

CONTROL CARD

CARD 6

H-F LIMITER

RIGHT CHANNEL

R IN

METER "R INPUT BUFFER"

INPUT BUFFER ¶1.a

30 Hz HP ¶1.b

INPUT ATTEN

PHASE SHIFT & PRE-EMPHASIS ¶1.C

200 Hz CROSSOVER ¶2.b

MASTER VCA ¶2.c

200Hz CROSSOVER ¶2.b

BASS VCA ¶2.c

200 Hz CROSSOVER ¶2.c

SOFT CLIP ¶2.c

200 Hz CROSSOVER ¶2.c

DE-EMPHASIS ¶1.C

METER "R COMPRESSOR OUT"

R

-1

USED FOR SPLIT CONFIGURATION ONLY

STL

BUFFER

LEVEL

PHASE CORRECT ¶3

LOWPASS ¶3

BANDPASS ¶4.a

VCA ¶4.a

PRE-EMPHASIZED AUDIO OUT

CONTROL SAMPLE

RECTIFIER WITH THRESHOLD ¶4.b

TIMING ¶4.b

H-F LIMITING ¶4.b

TO R CHANNEL RECTIFIER

H-F LIMIT LED

CARD 4

RIGHT COMPRESSOR

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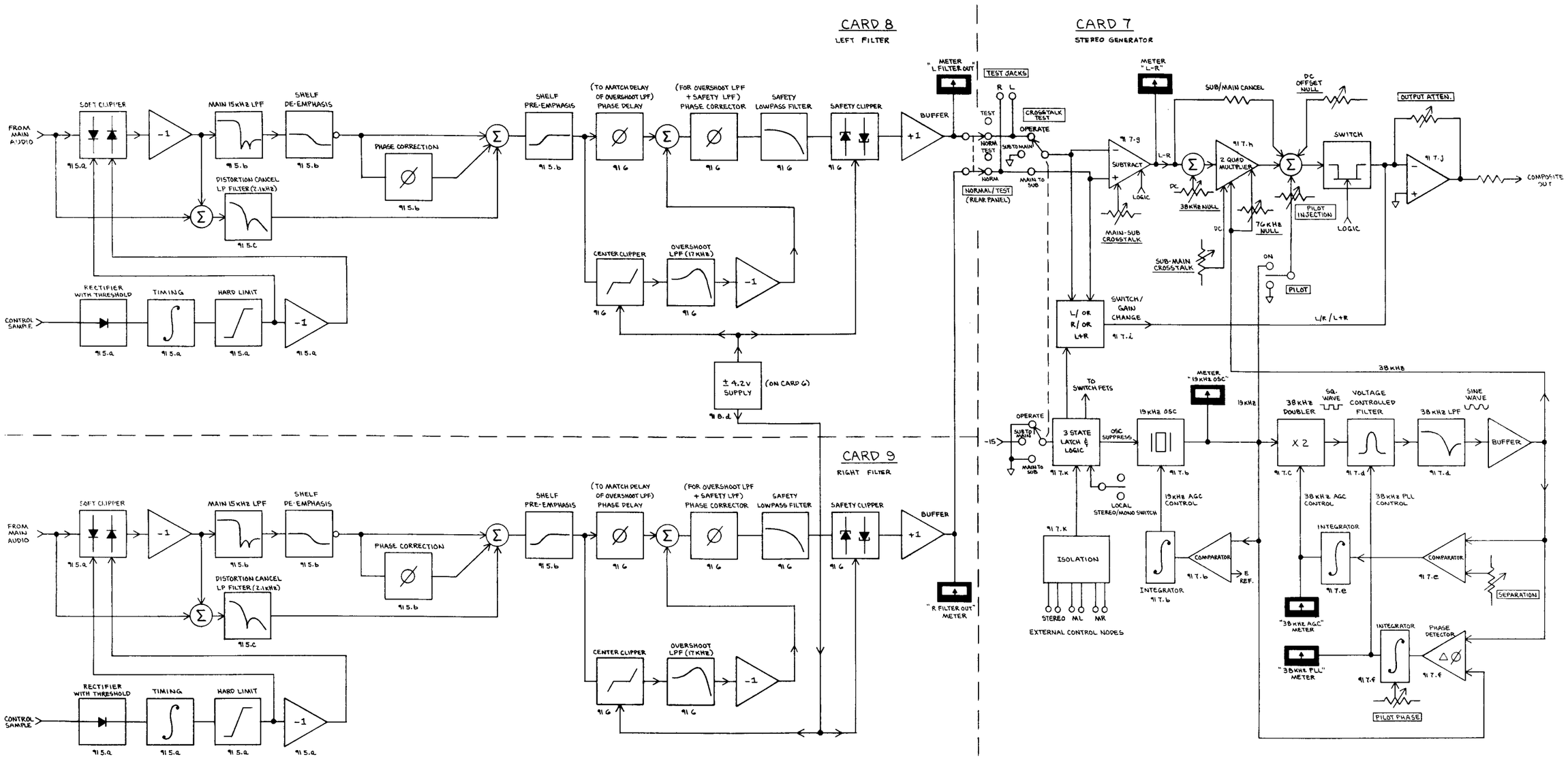
TITLE: BLOCK DIAGRAM 60117-000-01 1 of 2



When used, the 8100A/XT Six-Band Limiter Accessory Chassis is inserted between the #6 card and the #8 and #9 cards (see Block Diagram in the 8100A/XT Operating Manual).

When used, the FM Filter Card (ACC-22, Card #0) is inserted between Card #7 and Cards #8 and #9 in this block diagram.

J

orban a division of AKG Acoustics, Inc.

TITLE:
BLOCK DIAGRAM
60117-000-01
2 of 2

Parts List

Because special or subtle characteristics of certain components have been exploited to produce an elegant design at a reasonable cost, *it is unwise to make substitutions for listed parts.* Consult with Orban Customer Service (see page 5-18) if the parts list indicates that a part is specially selected, or that realignment is required when the part is replaced.

Orban maintains an inventory of tested, exact replacement parts that can be supplied quickly at nominal cost. Spare parts kits are also available. When ordering parts from Orban, please be ready to supply the following information:

Orban part number
Reference designator (e.g., C#, R78, IC14)
Description of part
Model, serial, and M number of unit—see rear-panel
(not all units have M numbers)

Parts are listed by card or assembly (except for widely used common parts, which are described below), and the parts on each card are grouped by type. See the assembly drawings for locations of components.

To facilitate future maintenance, we have used components from well-established manufacturers with worldwide distribution whenever possible. The abbreviations used for manufacturers are listed on page 6-59, along with their USA headquarters' addresses.

Widely used common parts:

Diodes: Unless specified by reference designator in the following, all signal diodes are 1N4148 (Orban part number 22101-000). This is a silicon, small-signal diode with ultra-fast recovery and high conductance. It may also be replaced with 1N914 (BAY-61 in Europe). (BV: 75V min. @I_r = 5µA, I_r: 25nA max. @ V_r = 20V, V_f:1.0V max. @I_f = 100mA t_{rr}: 4ns max.)

Resistors: Resistors should only be replaced with the same style and with the *exact* value marked on the resistor body. If the value marking is not legible, check the schematic or contact Orban Customer Service (see page 5-18). Performance and stability will be compromised if you do not use exact replacements.

Unless specified by reference designator in the following, the resistors in this unit are:

Metal film resistors with conformally-coated bodies, value identified with five color bands or printed on body; rated 1/8-watt @70°C, with a ±1% tolerance, and with a temperature coefficient of 100 PPM/°C; Orban part numbers 20038-xxx through 20045-xxx, USA Military Specification MIL-R-10509 style RN55D, manufactured by R-Ohm (CRB-1/4FX), TRW/IRC, Beyschlag, Dale, Corning, Matsushita.

Carbon film resistors with conformally-coated bodies, value identified with four color bands; rated 1/4-watt @ 70°C, with a tolerance of ±5%; Orban part numbers 20001-xxx, manufactured by R-Ohm (R-25), Piher, Beyschlag, Dale, Phillips, Spectrol, Matsushita.

Carbon composition resistors with molded phenolic bodies, value identified with four color bands; rated 1/4-watt for the 0.09 x 0.25-inch (2.3 x 6.4mm) size, and rated 1/2-watt for the 0.14 x 0.375-inch (3.6 x 9.5mm) size @ 70°C, with a tolerance of ±5%; Orban part numbers 2001x-xxx, USA Military Specification MIL-R-11 style RC-07 or RC-20, manufactured by Allen-Bradley, TRW/IRC, Matsushita.

Cermet trimmer resistors with 3/8-inch (9mm) square bodies, value printed on side; rated 1/2-watt @ 70°C, with a tolerance of ±10%, and a temperature coefficient of 100 PPM/°C; Orban part numbers 20510-xxx and 20511-xxx, manufactured by Beckman (72P, 68W-series), Spectrol, Matsushita.

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS(1)	NOTES
CARD #3/4						
Capacitors						
C301,302	Not Used					
C303	Met. Polycarb., 100V, 1%; 0.1uF	21601-410	ECI	652A1B104F	IMB	
C304,305	Met. Polycarb., 100V, 2%; 0.1uF	21602-410	ECI	652A1B104G	IMB	
C306-308	Polystyrene, 50V, 2%; 0.01uF	21504-310	SPR	287P1032R5A3		
C309	Met. Polycarb., 100V, 2%; 0.12uF	21602-412	ECI	652A1B124G	IMB	
C310	Mica, 500V, 5%; 150pF	21020-115	CD	CD15-FD151J03	SAN	
C311	Mica, 500V, +1/2pF -1/2pF; 5pF	21017-005	CD	CD15-CD050D03	SAN	
C312	Mica, 500V, +1/2pF -1/2pF; 10pF	21017-010	CD	CD15-CD100D03	SAN	
C313	Tantalum, 35V, 10%; 4.7uF	21307-547	SPR	196D475X9035JA1	MANY	
C314	Met. Polycarb., 100V, 2%; 0.27uF	21602-427	ECI	652A1B274G	IMB	
C315	Mica, 500V, 5%; 150pF	21020-115	CD	CD15-FD151J03	SAN	
C316	Mica, 500V, +1/2pF -1/2pF; 5pF	21017-005	CD	CD15-CD050D03	SAN	
C317	Mica, 500V, 5%; 100pF	21020-110	CD	CD15-FD101J03	SAN	
C318-320	Polystyrene, 50V, 2%; 0.01uF	21504-310	SPR	287P1032R5A3		
C321	Met. Polycarb., 100V, 2%; 0.1uF	21602-410	ECI	652A1B104G	IMB	
C322	Met. Polyester, 100V, 10%; 1.0uF	21441-510	WES	60H105K100	WIM,SIE	
C323-326	Monolythic Ceramic, 50V, 20%; 0.1uF	21106-326	SPR	1C25Z5U104M050B		
C327,328	Alum., Radial, 25V, -20% +100%; 100uF	21206-710	PAN	ECE-A1EV101S		
C4xx	Subtract 100 and refer to C3xx series					
Integrated Circuits						
IC301	Linear, Dual Opamp	24207-202	SIG	NE5532N	TI,EXR	
IC302,303	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC304	Linear, Single Opamp	24014-202	SIG	NE5534N	TI	
IC305	Linear, Dual Opamp	24208-303	ORB	24208-303		
IC306	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC307	Linear, Dual Opamp	24207-202	SIG	NE5532N	TI,EXR	
IC308	Linear, Single Opamp	24014-202	SIG	NE5534N	TI	
IC309	Linear, Dual Opamp	24208-303	ORB	24208-303		
IC310	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC4xx	Subtract 100 and refer to IC 3xx Series					
Resistors						
R309	Pot, Single, 25K, (5010R)	20742-000	CTS	270-Series	AB,BRN	10% CCW Log
R409	Pot, Single, 25K, (5010R)	20742-000	CTS	270-Series	AB,BRN	10% CCW Log

FOOTNOTES:
(1) See last page for abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

OPTIMOD-FM 8100A/1 -- CARD #3/4
CAPACITORS thru RESISTORS

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS(1)	NOTES
CARD #5						
Capacitors						
C501	Ceramic Disc, 1KV, 20%; 0.0022uF	21113-222	CRL	DD-222	SPR	
C502,503	Aluminum, Radial, -20% +100%; 1uF	21209-510	SPR	502D105G063BBIC	MANY	
C504	Ceramic Disc, 1KV, 20%; 0.0022uF	21113-222	CRL	DD-222	SPR	
C505,506	Aluminum, Radial, 63V, -20% +100%; 1uF	21209-510	SPR	502D105G063BBIC	MANY	
C507	Tantalum, 35V, 10%; 2.2uF	21307-522	SPR	196D225X9035JA1	MANY	
C508	Tantalum, 35V, 10%; 4.7uF	21307-547	SPR	196D475X9035JA1	MANY	
C509	Met. Polyester, 100V, 10%; 0.1uF	21441-410	WES	60C104K100	WIM,SIE	
C510	Ceramic Disc, 1KV, 10%; 0.001uF	21112-210	CRL	DD-102		
C511	Tantalum, 35V, 10%; 2.2uF	21307-522	SPR	196D225X9035JA1	MANY	
C512,513	Alum., Radial, 25V, -20% +100%; 100uF	21206-710	PAN	ECE-A1EV101S		
C514-517	Monolythic Ceramic, 50V, 20%; 0.1uF	21123-410	SPRC	IC25Z5U104M050B	MANY	
C518	Aluminum, Radial, 63V, -20% +100%; 1uF	21209-510	SPR	502D105G063BBIC	MANY	
Integrated Circuits						
IC501	Linear, Single Opamp	24002-202	TI	UA741CJG	RAY	
IC502	Multiple Discrete	24407-101	INS	IT131		
IC503	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC504,505	Multiple Discrete	24406-302	RCA	CA3096AE		
IC506	Linear, Single Opamp	24002-202	TI	UA741CJG	RAY	
IC507	Multiple Discrete	24407-101	INS	IT131		
IC508	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC509,510	Multiple Discrete	24406-302	RCA	CA3096AE		
IC511	Linear, Single Opamp	24003-202	RCA	CA301CN	NAT,TI	
IC512	Linear, Dual Opamp	24202-202	RAY	4558NB	MOT,FSC	
IC513	Linear, Dual Opamp	24203-201	MOT	MC1458CPI		
IC514	Linear, Dual Opamp	24202-202	RAY	4558NB	MOT,FSC	
Modules						
A1	Module Assy, Master Release Time	30455-001	ORB			
A2	Module Assy, Bass Release Time	30455-002	ORB			
Resistors						
R509	Pot, Single, 1 Meg, (5020)	20737-000	CTS	270-Series		20% CW Log
R521	Pot, Single, 5K, (5050)	20735-000	CTS	270-Series	BRN	Linear
R537	Pot, Single, 100K, (5020R)	20736-000	CTS	270-Series		20% CCW Log
R542	Pot, Single, 5K, (5050)	20735-000	CTS	270-Series	BRN	Linear
Switches						
S501	Switch, Toggle, Min.	26037-009	CK	7101SYA		
Transistors						
Q501,502	Transistor, JFET/P	23407-101	NAT	J174		

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FOOTNOTES:
(1) See last page for abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

OPTIMOD-FM 8100A/1 -- CARD #5
CAPACITORS thru TRANSISTORS

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS (1)	NOTES
CARD #6						
Capacitors						
C601,602	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C603	Polystyrene, 50V, 2%; 0.01uF	21504-310	SPR	287P1032R5A3		
C604	Mica, 500V, 1%; 150pF	21018-115	CD	CD15-FD151F03	SAN	
C605	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C606	Mica, 500V, 1%; 220pF	21018-122	CD	CD15-FD221F03	SAN	
C607,608	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C609	Mica, 500V, 5%; 1800pF	21024-218	CD	CD19-FD182J03	SAN	
C610	Met. Polycarb., 100V, 10%; 1.0uF	21604-510	ECI	652A1B105K	IMB	
C611	Polystyrene, 50V, 2%; 0.01uF	21504-310	SPR	287P1032R5A3		
C612	Polyester, 100V, 10%; 0.047uF	21401-347	SPR	225P47391WD3	PAN,PAK	
C613,614	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C615	Polystyrene, 50V, 2%; 0.01uF	21504-310	SPR	287P1032R5A3		
C616	Mica, 500V, 1%; 150pF	21018-115	CD	CD15-FD151F03	SAN	
C617	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C618	Mica, 500V, 1%; 220pF	21018-122	CD	CD15-FD221F03	SAN	
C619,620	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C621	Mica, 500V, 5%; 1800pF	21024-218	CD	CD19-FD182J03	SAN	
C622	Met. Polycarb., 100V, 10%; 1.0uF	21604-510	ECI	652A1B105K	IMB	
C623	Polystyrene, 50V, 2%; 0.01uF	21504-310	SPR	287P1032R5A3		
C624	Polyester, 100V, 10%; 0.047uF	21401-347	SPR	225P47391WD3	PAN,PAK	
C625	Tantalum, 35V, 10%; 1uF	21307-510	SPR	196D105X9035HA1	MANY	
C626,627	Alum., Radial, 25V, -20% +100%; 100uF	21206-710	PAN	ECE-A1EV101S		
C628-631	Monolythic Ceramic, 50V, 20%; 0.1uF	21123-410	SPR	1C25Z5U104M050B	MANY	
C632,633	Alum., Radial, 25V, -20% +100%; 100uF	21206-710	PAN	ECE-A1EV101S		
C634,635	Monolythic Ceramic, 50V, 20%; 0.1uF	21123-410	SPR	1C25Z5U104M050B	MANY	
C636	Tantalum, 35V, 10%; 1uF	21307-510	SPR	196D105X9035HA1	MANY	
Diodes						
CR604	Diode, Signal, Hot Carrier	22102-001	HP	5082-2800		

FOOTNOTES:
(1) See last page for abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

OPTIMOD-FM 8100A/1 -- CARD #6
CAPACITORS and DIODES

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS(1)	NOTES
Integrated Circuits						
IC601,602	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC603	Multiple Discrete	24405-303	NAT	AH5011CN		
IC604	Linear, Single Opamp	24014-202	SIG	NE5534N	TI	
IC605	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC606	Linear, Dual Opamp	24203-201	MOT	MC1458CPI		
IC607	Multiple Discrete	24406-302	RCA	CA3096AE		
IC608,609	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC610	Linear, Single Opamp	24014-202	SIG	NE5534N	TI	
IC611	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC612	Multiple Discrete	24406-302	RCA	CA3096AE		
IC613	Linear, Dual Opamp	24202-202	RAY	4558NB	MOT,FSC	
Modules						
A1,2	Module Assy, H-F Limiter Release Time	30465-000	ORB			
Switches						
S602	Switch, Toggle, Min.	26037-009	CK	7101SYA		
Transistors						
Q601,602	Transistor, Signal, NPN	23202-101	MOT	2N4400	FSC	

FOOTNOTES:
(1) See last page for abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS(1)	NOTES
CARD #7						
Capacitors						
C701	Mica, 500V, +1/2pF -1/2pF; 2pF	21017-002	CD	CD15-CD010D03	SAN	
C702	Mica, 500V, 5%; 22pF	21020-022	CD	CD15-ED220J03	SAN	
C703	Ceramic, Trimpot, 0.5pF-3pF	21811-000	ME	2502AOR503V		
C704	Met. Polyester, 100V, 10%; 0.1uF	21441-410	WIM	MKS-4100V5.0.1	WES,SIE	
C705	Ceramic Disc, 25V, 20%; 0.1uF	21106-410	CRL	UK25-104		
C706	Mica, 500V, +1/2pF -1/2pF; 3pF	21017-003	CD	CD15-CD030D03	SAN	
C707,708	Ceramic Disc, 25V, 20%; 0.1uF	21106-410	CRL	UK25-104		
C709	Tantalum, 35V, 10%; 1uF	21307-510	SPR	196D105X9035HA1	MANY	
C710	Monolythic Ceramic, 50V, 20%; 0.1uF	21123-410	SPR	1C25Z5U104M050B		
C711	Tantalum, 35V, 10%; 1uF	21307-510	SPR	196D105X9035HA1	MANY	
C712,713	Alum., Radial, 25V, -20% +100%; 100uF	21206-710	PAN	ECE-A1EV101S		
C714	Ceramic Disc, 50V, 20%; 0.015uF	21107-315	CRL	UK50-153		
C715,716	Tantalum, 35V, 10%; 1uF	21307-510	SPR	196D105X9035HA1	MANY	
C717	Monolythic Ceramic, 50V, 20%; 0.1uF	21123-410	SPR	1C25Z5U104M050B		
C718,719	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C720	Mica, 500V, 5%; 430pF	21024-143	CD	CD19-FD431J03	SAN	
C721,730	Mica, 500V, +1/2pF -1/2pF; 39pF	21017-039	CD	CD15-ED390G03	SAN	
C722	Mica, 500V, 5%; 430pF	21024-143	CD	CD19-FD431J03	SAN	
C723	Ceramic Disc, 25V, 20%; 0.1uF	21106-410	CRL	UK25-104		
C724,725	Alum., Radial, 25V, -20% +100%; 100uF	21206-710	PAN	ECE-A1EV101S		
C726-729	Monolythic Ceramic, 50V, 20%; 0.1uF	21123-410	SPR	1C25Z5U104M050B		
Inductors						
L701	Inductor, RF Choke, 50mH	29504-350	MIL	70F502AF		
Integrated Circuits						
IC701	Linear, Single Opamp	24008-202	TI	LM318P	NAT	
IC702	Linear, Single Opamp	24014-202	SIG	NE5534N	TI	
IC703	Linear, Dual Opamp	24208-302	RCA	CA3280A		
IC704	Linear, Single Opamp	24007-202	AD	AD518N		
IC705	Linear, Single Opamp	24010-202	RAY	LF357		
IC706	Linear, Single Opamp	24003-202	RCA	CA301AE	NAT,TI	
IC707,708	Special Function, Comparator	24701-302	NAT	LM711CN	RAY,TI	
IC709	Linear, Dual Opamp	24206-202	TI	TL072CP	NAT(LF353H)	
IC710	Linear, Single Opamp	24003-202	RCA	CA301AE	NAT,TI	
IC711	Linear, Single Opamp	24008-202	TI	LM318P	NAT	
IC712	Linear, Dual Opamp	24206-202	TI	TL072CP	NAT(LF353H)	
IC713	Digital, XOR Gate	24504-302	RCA	CD4030BE	SIG	
IC714	Digital, Nand Gate	24501-302	RCA	CD4011BE	MOT	
IC715-717	Optoisolator, NPN	25003-000	SIE	SFH-601-1		

FOOTNOTES:
(1) See last page for abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

OPTIMOD-FM 8100A/1 -- CARD #7
CAPACITORS thru INTEGRATED CIRCUITS

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS (1)	NOTES
Resistors						
R701,702	Resistor Set, MF, 0.1% 4.99K	28520-001	ORB			
R708	Trimpot, Cermet, 20 Turn, 25K; 20%	20512-325	BEK	89PR25K	BRN	
R731	Trimpot, Cermet, 25K, "Pilot Inj"	20520-325	BEK	82PA25K		
R738	Trimpot, Cermet, 20 Turn, 25K; 20%	20512-325	BEK	89PR25K	BRN	
R769	Trimpot, Cermet, 20 Turn, 50K; 20%	20512-350	BEK	89PR50K	BRN	
R772	Trimpot, Cermet, 20 Turn, 1K; 20%	20512-210	BEK	89PR1K	BRN	
Switches						
S701	Switch, Rotary, Min., 2P3T	26201-000	STK	80-Series		Alt:Electroswitch
S702	Switch, Toggle, Min.	26037-009	CK	7101SYA		
Transistors						
Q701,702	Transistor, JFET/N	23403-101	NAT	J111	INS	
Q703,704	Transistor, Signal, NPN	23202-101	MOT	2N4400	FSC	
Q705,706	Transistor, JFET/N	23406-101	NAT	J113		
Q707,708	Transistor, JFET/N	23403-101	NAT	J111	INS	
Q709	Transistor, JFET/N	23406-101	NAT	J113		
Q710	Transistor, Signal, PNP	23001-101	MOT	2N4125	FSC	
Q711	Transistor, JFET/N	23403-101	NAT	J111	INS	
Q712	Transistor, Signal, PNP	23002-101	MOT	2N4402	FSC	

FOOTNOTES:
(1) See last page for abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS(1)	NOTES
CARD #8/9						
Capacitors						
C801	Mica, 500V, 1%; 100pF	21018-110	CD	CD15-FD101F03	SAN	
C802	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C803	Mica, 500V, 1%; 160pF	21018-116	CD	CD15-FD161F03	SAN	
C804	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C805	Mica, 500V, 1%; 2400pF	21022-224	CD	CD19-FD242F03	SAN	
C806	Mica, 500V, 1%; 560pF	21022-156	CD	CD19-FD561F03	SAN	
C807	Mica, 500V, 1%; 2700pF	21022-227	CD	CD19-FD272F03	SAN	
C808-810	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C811	Mica, 500V, 1%; 220pF	21018-122	CD	CD15-FD221F03	SAN	
C812	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C813	Mica, 500V, 1%; 100pF	21018-110	CD	CD15-FD101F03	SAN	
C814	Mica, 500V, 1%; 220pF	21018-122	CD	CD15-FD221F03	SAN	
C815	Polystyrene, 50V, 2%; 0.022uF	21504-322	SPR	287P2232R5A3		
C816	Mica, 500V, 1%; 2700pF	21022-227	CD	CD19-FD272F03	SAN	
C817	Polystyrene, 50V, 2%; 0.0075uF	21504-275	SPR	287P7522R5A3		
C818	Mica, 500V, 1%; 2400pF	21022-224	CD	CD19-FD242F03	SAN	
C819,820	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C821	Met. Polycarb., 100V, 10%; 1.0uF	21604-510	ECI	652A1B105K	IMB	
C822,823	Mica, 500V, 1%; 1000pF	21022-210	CD	CD19-FD102F03	SAN	
C824	Mica, 500V, 1%; 41pF	21018-041	CD	CD15-ED410F03	SAN	
C825	Tantalum, 35V, 10%; 0.47uF	21307-447	SPR	196D474X9035HA1	MANY	
C826	Polyester, 100V, 10%; 0.0033uF	21401-233	SPR	225P33291WD3	PAN,PAK	
C827,828	Alum., Radial, 25V, -20% +100%; 100uF	21206-710	PAN	EVE-A1EV101S		
C829-832	Monolythic Ceramic, 50V, 20%; 0.1uF	21123-410	SPR	1C5Z5U104M050B	MANY	
C833	Tantalum, 35V, 10%; 1uF	21307-510	SPR	196D105X9035HA1	MANY	
C834,835	Aluminum Electrolytic, 50V, 100uF	21208-710	SPR	502D107F050DGIC	MANY	
C9xx	Subtract 100 and refer to C8xx series					
Diodes						
CR803-806	Diode, Signal, Hot Carrier	22102-001	HP	5082-2800		
CR9xx	Subtract 100 and refer to CR8xx series					
Inductors						
L801,802	Inductor, Variable	29702-004				
L803	Inductor, Variable	29702-003				
L804	Inductor, Variable	29702-002				
L805	Inductor, Variable	29701-002				
L9xx	Subtract 100 and refer to L8xx series					

FOOTNOTES:
(1) See last page for abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

OPTIMOD-FM 8100A/1 -- CARD #8/9
CAPACITORS thru INDUCTORS

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS(1)	NOTES
	Integrated Circuits					
IC801-806	Dual Opamp	24206-402	TI	TL072CJG	MOT	
IC807	Multiple Discrete	24406-302	RCA	CA3096AE		
IC808	Dual Opamp	24206-402	TI	TL072CJG	MOT	
IC9xx	Subtract 100 and refer to IC8xx series					
	Modules					
A1	Module Assy, Phase Delay Network	30485-000	ORB			
A2	Module Assy, Distortion Cancel Module	30490-001	ORB			
	CHASSIS					
	Inductors					
L1,2	Inductor, RF Choke, 7uH	29501-004	OHM	Z-50	(2)	
	Miscellaneous					
M1	Meter, Edge, 1mADC FS, 0-25dB	28009-104	EMI	132D5		900 Ohms
M2	Meter, Edge, 1mADC FS, 0-5dB	28009-105	EMI	132D5		900 Ohms
M3	Meter, Edge, 1mADC FS, 0-25dB	28009-104	EMI	132D5		900 Ohms
M4	Meter, Edge, 1mADC FS, 0-30dB	28009-102	EMI	132D5		900 Ohms
M5	Meter, VU, Brown/Tan	28002-007	DIX	330T	HOYT	
NONE	Connector, BNC	27101-000	AM	31-3376		
NONE	Connector, Card Edge, 22 Pos.	27035-004	SAE	SAC 22S/2-3	MANY	
	CHASSIS (BACK PANEL)					
	Capacitors					
C1-4	Ceramic Disc, 1KV, 10%; 0.0015uF	21112-215	CRL	DD-152		
	Transistors					
Q101,102	Transistor, Power, NPN	23601-501	RCA	2N3055	FSC	
	CHASSIS (FILTER BOX)					
	Capacitors					
C1-14	Ceramic, Feed-thru, 1000pF	21118-210	ERE	2404-000-Series		Alt: Murata

FOOTNOTES:
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(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS(1)	NOTES
POWER SUPPLY AND REGULATOR BOARD						
Capacitors						
C101,102	Alum., Electrolytic, CG, 40V, 5000uF	21250-850	CD	FAH-5000-40-A2	MAL	
C103,104	Ceramic Disc, 50V, 20%; 0.05uF	21107-350	CRL	UK50-503		
C105-107	Ceramic, Feed-thru, 1000pF	21118-210	ERE	2404-000-Series		
C108	Tantalum, 10V, 10%; 33uF	21303-633	SPR	196D336X9010KE3	MANY	
C109	Mica, 500V, 5%; 470pF	21024-147	CD	CD19-FD471J03	SAN	
C110	Not Used					
C111,112	Alum., Radial, 50V, -20% +100%; 47uF	21208-647	SPR	502D476G050CD1C	PAN	
C113	Mica, 500V, 5%; 100pF	21020-110	CD	CD15-FD101J03	SAN	
C114	Polyester, 100V, 10%; 0.01uF	21401-310	SPR	225P10391WD3	PAN,PAK	
Diodes						
CR101-104	Diode, Rectifier, 400V, 3A	22203-400	MOT	MR504		
CR105,106	Diode, Rectifier, 400V, 1A	22201-400	MOT	1N4004	MANY	
Inductors						
L101,102	Inductor, RF Choke, 7uH	29501-004	OHM	Z-50	(2)	
Integrated Circuits						
IC101	D.C. Regulator	24301-302	NAT	LM723CN		
IC102	Linear, Single Opamp	24003-202	RCA	CA301AE	NAT,TI	
Miscellaneous						
F101	Fuse, 3AG, Slo-Blo, 1/2A	28004-150	LFE	313.500	BUS	(Use 1/4A Fuse for 230VAC Main)
F102,103	Fuse, Pico, 1A, Axial	28011-210	LFE		BUS	(On P.S. regulator board)
T101	Transformer, Power, 39.6VCT, 40VA	55009-000	ORB			
VR101,102	Diode, Zener, 16V, 5W, 5%	22005-160	MOT	1N5353B	MANY	
Resistors						
R103,104	Resistor, Wirewound, 2W, 0.62 OHM; 5%	20028-862	IRC	BWF Series		
R106	Trimpot, Cermet, 18 Turn, 500 OHM; 20%	20508-150	BEK	68XR500	BRN	
R108,109	Resistor Set, MF, .25% 20.0K	28521-001	ORB			
Switches						
S101	Switch, Toggle, SPST, AC Power	26002-001	CH	8280K21C		
S102	Switch, Slide, AC Line	26140-000	SW	EPSI-SLI		
Transistors						
Q103,104	Transistor, Signal, PNP	23002-101	MOT	2N4402	FSC	

FOOTNOTES:
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(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

OPTIMOD-FM 8100A/1 -- POWER SUPPLY CAPACITORS thru TRANSISTORS

REF DES	DESCRIPTION	ORBAN P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS(1)	NOTES
FRONT PANEL						
Diodes						
CR1	LED, Red T-1 3/4	25103-000	GI	MV-5053	MANY	
CR2,3	LED, Yellow T-1 3/4	25105-000	GI	MV-5353	MANY	
CR4	LED, Green T-1 3/4	25104-000	GI	MV-5253	MANY	
Miscellaneous						
M5	Meter, VU, Brown/Tan	28002-007	DIX	330T	HOYT	
Switches						
S1	Switch, Toggle, Min., SPDT	26037-005	CK	7105P3		
INPUT FILTER BOARD						
Inductors						
L1-4	Inductor, RF Choke, 1.2mH	29503-000	MIL	73F123AF		
L5,6	Inductor, RF Choke, 7uH	29501-004	OHM	Z-50	(2)	
METER RESISTOR BOARD						
Resistors						
R5,6	Trimpot, Cermet, 1 Turn, 1K; 20%	20509-210	BEK	72XR1K	BRN	
Switches						
S2	Switch, Rotary, 1P12T, NS	26078-306	CTS	212 SERIES		
OTHER						
Miscellaneous						
NONE	Line Cord, IEC	28102-002	BEL	17500	MANY	
NONE	PCB Extender Board Assy	30705-000	ORB			

FOOTNOTES:
(1) See last page for abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

OPTIMOD-FM 8100A/1 -- FRONT PANEL, INPUT FILTER BD, METER RESISTOR BD

Vendor Codes

AB Allen-Bradley Co., Inc.
1201 South Second Street
Milwaukee, WI 53204

AD Analog Devices, Inc.
One Technology Way
PO BOX 9106
Norwood, MA 02062-9106

AM Amphenol Corporation
358 Fall Avenue
Wallingford, CT 06492

BEK Beckman Industrial Corporation
4141 Palm Street.
Fullerton, CA 92635-1025

BEL Belden Electronic Wire & Cable
PO BOX 1980
Richmond, IN 47374

BRN Bourns, Inc.
Resistive Components Group
1200 Columbia Avenue
Riverside, CA 92507

BUS Bussmann Division
Cooper Industries
PO BOX 14460
St. Louis, MO 63178

CD Cornell-Dubilier Elec.
Wayne Interchange Plaza 1
Wayne, NJ 07470

CH Cutler-Hammer
4201 N. 27th Street
Milwaukee, WI 53216

CK C & K Components, Inc.
15 Riverdale Avenue
Newton, MA 02158-1082

COR Corcom, Inc.
1600 Winchester Road
Libertyville, IL 60048

CRL Mepco/Centralab
A North American Philips Corp.
2001 W. Blue Heron Blvd.
Riviera Beach, FL 33404

CTS CTS Corporation
905 North West Blvd.
Elkhart, IN 46514

CW CW Industries
130 James Way
Southampton, PA 18966

DIX Dixson, Inc.
PO BOX 1449
Grand Junction, CO 81502

ECI Electrocube
1710 South Del Mar Avenue
San Gabriel, CA 91776

ELSW Electroswitch
180 King Avenue
Weymouth, MA 02188

EMI Emico Inc.
123 North Main Street
Dublin, PA 18917

ERE Murata Erie North America
2200 Lake Park Drive
Smyrna, GA 30080

EXR Exar Corporation
750 Palomar Ave
PO BOX 3575
Sunnyvale, CA 94088

FSC Fairchild Camera & Instr. Corp.
464 Ellis Street
Mountain View, CA 94042

GI General Instruments
Optoelectronics Division
3400 Hillview Avenue
Palo Alto, CA 94304

HP Hewlett-Packard Co.
640 Page Mill Road
Palo Alto, CA 94304

INS Intersil, Inc.
10600 Ridgeview Court
Cupertino, CA 95014

IRC International Resistive Co., Inc.
PO BOX 1860
Boone, NC 28607

JEN Jensen Transformers, Inc.
10735 Burbank Blvd.
North Hollywood, CA 91601

KEY Keystone Electronics Corp.
49 Bleecker Street
New York, NY 10012

LFE Littelfuse
A Subsidiary of Tracor, Inc.
800 E. Northwest Hwy
Des Plaines, IL 60016

LT Linear Technology Corp.
1630 McCarthy Blvd.
Milpitas, CA 95035

LUMX Lumex Opto/Components Inc.
292 E. Hellen Road
Palatine, IL 60067

MAL Mallory Capacitor Co.
Emhart Electrical/Electronic Gr.
3029 East Washington Street
Indianapolis, IN 46206

MAR Marquardt Switches, Inc.
67 Albany Street
Cazenovia, NY 13035

ME Mepco/Centralab
A North American Philips Corp.
2001 W. Blue Heron Blvd.
Riviera Beach, FL 33404

MID Midland-Ross Corporation
NEL Unit/Midtex Division
357 Beloit Street
Burlington, WI 53105

MIL J.W. Miller Division
Bell Industries
19070 Reyes Avenue
Rancho Dominguez, CA 90224-5825

MOT Motorola Semiconductor
PO BOX 20912
Phoenix, AZ 85036

NAT National Semiconductor Corp.
2900 Semiconductor Drive
PO BOX 58090
Santa Clara, CA 95052-8090

NOB Noble U.S.A., Incorporated
5450 Meadowbrook Ct.
Rolling Meadows, IL 60008

OHM Ohmite Manufacturing Company
A North American Philips Corp.
3601 Howard Street
Skokie, IL 60076

ORB Orban
a division of AKG Acoustics, Inc.
645 Bryant Street
San Francisco, CA 94107

PAN Panasonic Industrial Company
One Panasonic Way
PO BOX 1503
Seacaucus, NJ 07094

PB Potter & Brumfield Division
A Siemens Co.
200 S. Richland Creek Dr.
Princeton, IN 47671-0001

RCA RCA Solid State Division
Route 202
Somerville, NJ 08876

ROHM Rohm Corporation
8 Whatney
Irvine, CA 92718

SAE Stanford Applied Engineering, Inc
340 Martin Avenue
Santa Clara, CA 95050

SAN Sangamo Weston Inc.
Capacitor Division
PO BOX 48400
Atlanta, GA 30362

SCH ITT Schadow
8081 Wallace Road
Eden Prairie, MN 55344

SIE Siemens Components Inc.
186 Wood Avenue South
Iselin, NJ 08830

SIG Signetics Corporation
A Sub. of US Philips Corp.
811 E. Arques
PO BOX 3409
Sunnyvale, CA 94088-3409

SPR Sprague Electric Co.
41 Hampden Road
PO BOX 9102
Mansfield, MA 02048-9102

SW Switchcraft
A Raytheon Company
5555 N. Elston Avenue
Chicago, IL 60630

TI Texas Instruments
PO BOX 655012
Dallas, TX 75265

TOS Toshiba America, Inc.
2441 Michelle Drive
Tustin, CA 92680

TRW TRW Electronic Components
Connector Division
1501 Morse Avenue
Elk Grove Village, IL 60007-57

VARO Varo Quality Semiconductor, Inc.
1000 North Shiloh Road
PO BOX 469013
Garland, TX 75046-9013

WES Westlake
5334 Sterling Ctr Drive
Westlake Village, CA 91361

WIM The Inter-Technical Group Inc.
Wima Division
PO BOX 23
Irvington, NY 10533

APPENDIX K:

OMITTED

APPENDIX L:

Specifications

Frequency Response (System in PROOF mode)

Follows standard 75us preemphasis curve ±0.75dB, 50-15,000 Hz. 50us preemphasis available on special order. All preemphasis networks include a fourth-order lowpass filter and fourth-order phase corrector prior to the high-frequency limiter and clipper to prevent these elements from processing out-of-band program material and to minimize overshoot, thus minimizing the amount of high-frequency limiting and clipping.

Input Conditioning

Highpass Filter: Third-order Chebychev with 30Hz cutoff and 0.5dB passband ripple. Down 0.5dB at 30Hz; 10.5dB at 20Hz; 31.5dB at 10Hz. Protects against infrasonic destabilization of certain exciters' AFC's, as well as infrasonic gain modulation in the compressor.
Phase Scrambler: Allpass network makes peaks more symmetrical to best utilize the symmetrical peak overload characteristics of the FM medium.

Input

Impedance: greater than 10K ohms, electronically balanced by means of true instrumentation amplifier. Requires balanced source.
Common Mode Rejection: Greater than 60dB @60Hz.
Sensitivity: -10dBm produces 10dB "Master" Band gain reduction @1kHz. Removal of internal 20dB pad permits -30dBm to produce same effect.
Connector: Cinch-Jones 140-style barrier strip (#5 screw).

Noise

-75dB below 100% modulation, 50-15,000 Hz maximum; -81dB typical.

Total System Distortion (PROOF Mode; 100% Modulation)

Less than 0.05% THD, 50-15,000Hz (0.02% typical); less than 0.05% SMPTE Intermodulation Distortion (60/7000Hz; 4:1).

"Master" Band Compressor Characteristics

Attack Time: approximately 1ms.
Release Time: program-controlled -- varies according to program dynamics and amount of gain reduction (see text). Process can be scaled fast or slow by means of continuously variable RELEASE TIME control. Employs delayed release for distortion reduction.
Total Harmonic Distortion (measured at VCA output, OPERATE mode, RELEASE TIME control centered): Less than 0.1%, 50-15,000Hz, 0-25dB gain reduction
Available Gain Reduction: 25dB

Metering: Three dB-linear edgewise-reading gain reduction meters --
MASTER is true peak-reading with electronic acceleration and peak-hold (0-25dB).
COMPRESSOR indicates slow compression component of gain reduction (0-25dB).
LIMITER indicates fast peak limiting component of gain reduction (0-5dB).
Gain Control Element: True VCA. Proprietary Class-A design eliminates crossover notch distortion, modulation noise, and slewrate limiting found in competitive Class-AB designs.

"Bass" Band Compressor Characteristics

Attack Time: program-controlled; not adjustable.
Release Time: program-controlled; not adjustable. Incorporates delayed-release distortion reduction.
Total Harmonic Distortion (at VCA output, OPERATE mode): Less than 0.1% THD, 50-200Hz, 0-30dB gain reduction.
Available Gain Reduction: 30dB.
Metering: single dB-linear edgewise-reading gain reduction meter (0-30dB).
Gain Reduction Element: Proprietary Class-A true VCA.
Crosscoupling (U.S. patent #4,249,042): Enables gain of "Bass" band to track gain of "Master" band to any degree, from identical tracking to fully independent operation. Adjustable with BASS COUPLING control.

Crossover Characteristics

Control: 6dB/octave @200Hz.
Program: 12dB/octave @200Hz in unique "distributed crossover" configuration (U.S. patent #4,249,042).

High Frequency Limiter Characteristics

Attack Time: approximately 5ms.
Release Time: approximately 20ms. Delayed release included for distortion reduction.
Mode: Left and right channels operate independently to avoid high frequencies in one channel causing audible timbre modulation of opposite channel.
Control Element: Junction FET.
Metering: Two LED's indicate hf limiting in L and R channels.
Threshold of HF Limiting: User-adjustable over 3dB range to meet format requirements.

FM "Smart Clipper" Output Processor Characteristics

Nominal Bandwidth: 15.4kHz.
Distortion Cancellation: Clipping distortion (below overshoot compensator threshold) cancelled better than 30dB (40dB typical), 0-2200 Hz (U.S. patent #4,208,548).
Delay Correction: Fourth-order allpass.
Amount of Clipping: User-adjustable over 6dB range to match format requirements.

Frequency-Contoured Sidechain (FCS) Overshoot Compensator Characteristics (U.S. patent #4,460,871)

System Overshoot: The FCS circuit is best thought of as a "bandlimited safety clipper". It operates like a hard clipper, but does not produce out-of-band frequency components as a simple hard clipper would. Because the audio processing will sometimes limit steady-state material with high average energy (like sinewaves) or with very little high-frequency energy to levels below the threshold of clipping, it is difficult to state a clear and meaningful specification for the system overshoot performance of the FCS circuit.

The FCS circuit is followed by a safety clipper. The overshoot specification could be slightly improved if this safety clipper were set up to clip more frequently. However, the system is aligned at the factory such that the safety clipper is almost never active, thus fully preserving the bandlimiting provided by the FCS circuit. With this safety clipper alignment, the peak modulation will be controlled ±3.5% on arbitrary waveforms clipped to any degree by the FCS circuit (acting as a bandlimited safety clipper); peak modulation will not exceed this level on other material. With typical program material, peak modulation uncertainty is less than 2%.

Sinewave Modulation Ability: 93% modulation (i.e., 0.6dB below maximum overshoot level) at all sinewave frequencies, assuming sinewaves are applied to FCS input.
Dynamic Separation: better than 45dB.
Difference-Frequency Intermodulation: FCS circuit causes no more audible IM (such as sibilance splatter) than would a simple hard clipper clipping to the same depth. The entire 8100A/1 processing system is specifically configured to prevent the FCS circuit from audibly degrading the difference-frequency distortion-cancellation properties of the earlier FM "Smart Clipper".

System Separation

Greater than 45dB, 50-15,000Hz; 60dB typical.

Stereo Generator Characteristics

Crosstalk (Main Channel-to-Subchannel, or Subchannel-to-Main Channel):
better than -40dB, 50-15,000Hz as measured at input terminals to stereo generator, or using internal crosstalk test mode which applies left-channel audio to either main or sub stereo generator inputs. Crosstalk representing distortion components (non-linear crosstalk) typically better than -80dB as measured on a baseband spectrum analyzer.
38kHz Subcarrier Suppression: Greater than 40dB below 100% modulation; 60dB typical.
Suppression of 76kHz and its Sidebands: Greater than 70dB below 100% modulation.
Pilot Frequency: 19.000kHz ±2Hz.
Pilot Injection Adjustment Range: Less than 8% to greater than 10% modulation.

Composite (Baseband) Output

Source Impedance: 470 ohms, independent of OUTPUT ATTEN setting, unbalanced.
Level: variable 0 to greater than 4V p-p by means of 15-turn OUTPUT ATTEN control.
Connector: Type BNC held floating over chassis ground to permit interface to various exciters without need for wideband transformer for ground loop suppression. RF suppressed.
Recommended Maximum Cable Length: 6ft (1.8m) RG-58A/U.

Auxiliary Input/Output (for Test use only)

Provides L and R lowpass filter output or L and R stereo generator input depending upon setting of rear-apron NORMAL/TEST switch. Connectors are RCA phono-type, unbalanced. Stereo generator requires approx. 3V RMS for 100% modulation, unbalanced, with source impedance of test generator less than 50 ohms.

Operating Controls

VU Meter Selector switches ASA-standard VU meter to read:

L or R Input Level
L or R Compressor Output
L or R Filter Out
L-R Level
19kHz Oscillator Level
38kHz PLL Control Voltage
38kHz AGC Control Voltage
±15 V Power Supply Voltages

Stereo/Mono Mode Switch: Momentary front panel switch may be conveniently strapped for either left or right mono by means of a plug-in internal jumper. Mode may be remote-controlled by application of 6-24 V AC or DC pulses to appropriate rear terminals. Terminals are optically isolated, and may be floated ±50 V above ground. Three pairs of remote terminals will select either left or right audio inputs in mono mode, or stereo. Another internal jumper selects which of the three modes will be entered on powerup.

Setup Controls (front-panel, behind lockable swing-down door -- see Fig. 4-5)

Compressor:
- Left and Right Input Attenuators
- "Master" Band Release Time
- Gate Threshold
- Bass Coupling
- Clipping
- High-Frequency Limiter Threshold

Stereo Generator:
- Pilot Injection
- Pilot Phase
- L-R Gain (Separation)
- Pilot ON/OFF Switch
- NORMAL/MAIN-TO-SUB/SUB-TO-MAIN Crosstalk Test Switch (see text)

General:
- Output Attenuator
- PROOF/OPERATE Switches
  (to defeat gain reduction, hf limiting, clipping, and gating)
- Power ON/OFF
- 115V/230V Selector Switch

Power Requirements

115/230VAC, ±15%, 50-60Hz, approx. 19VA.
IEC mains connector with detachable 3-wire "U-Ground" power cord supplied.
Leakage to chassis less than 0.5uA. AC is RF-suppressed.

Dimensions

19" (48.3cm) W x 7" (17.8cm) H x 12.5" (31.2cm) D -- 4 rack units.

Environmental

Operating Temperature Range: 0-50° C (32-122° F).
Humidity: 0-95% R.H., non-condensing.

Warranty

One year, parts and labor. Subject to limitations set forth in our Standard Warranty.

All specifications subject to change without notice.

APPENDIX M:

Functions of Jumpers on PC Cards

Several cards used in OPTIMOD-FM Model 8100A/1 are also used in other Orban products. These cards have jumpers which determine their mode of operation. This appendix provides a card-by-card quick reference to jumper functions and normal 8100A/1 jumper positions. See assembly drawings in **Appendix J** for jumper locations and diagrams.

Card #3/4: The jumpers on these cards determine the gains of the 20dB pads ahead of the input differential amplifiers. They should be set according to the nominal levels of the lines driving the OPTIMOD-FM. (Shipped with pads IN.)

Card #5: Jumper A converts the Master Release Time module from its normal timing mode to a slow averaging mode for use with the Model 8100A/XT Six-Band Limiter Accessory Chassis. Unless the 8100A/XT is installed, jumper A should be set to NORMAL mode (as shipped).

Jumper B determines the threshold of compression of the Master band control circuitry. Unless the 8100A/XT is installed, both links should be set to NORMAL mode (as shipped).

Jumper C determines the attack time of the Master band. Unless the 8100A/XT is installed, both links should be set to NORMAL mode (as shipped).

Card #6: Jumper A should always be in the 8100A,8180A position.

Jumper positions B and C are used to route the outputs of Card #6. When the two links are mounted in the NORMAL B position, the outputs are sent to the 8100A/XT through Accessory Port #2. When the links are mounted in the NORMAL C position (as shipped), the outputs are sent to 8100A/1 Cards #8 and #9. Note that NORMAL B orientation is not the same as NORMAL C orientation. The REVERSE B and C positions reverse the left and right channel outputs of Card #6, which may be useful for fault diagnosis.

Card #7: The Powerup Mode jumper determines whether the stereo generator comes up in STEREO (as shipped), MONO LEFT, or MONO RIGHT mode when AC power is applied.

The Mono Mode jumper selects whether MONO LEFT (as shipped) or MONO RIGHT mode is entered when the front-panel STEREO/MONO switch is set to MONO.