

**OPERATING & MAINTENANCE  
INSTRUCTION MANUAL  
MODEL 370  
RECORDER ELECTRONICS**



**INOVONICS**  
INCORPORATED

USER'S RECORD

Model 370 - Serial No. \_\_\_\_\_

Date Purchased \_\_\_\_\_

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INSTRUCTION MANUAL

MODEL 370

REPLACEMENT RECORDER ELECTRONICS

December, 1981



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TABLE OF CONTENTS

|      |   |    |
|------|---|----|
| I.   | GENERAL INFORMATION . . . . .   | 2  |
| II.  | SPECIFICATIONS . . . . .  | 2  |
|      | Frequency Response - Signal-to-Noise Ratio -<br>Equalization - Erasure - Head Impedance Range -<br>Line Input - Line Output - Power Requirement -<br>Size and Shipping Weight |    |
| III. | INSTALLATION . . . . .  | 5  |
|      | Unpacking and Inspection - Mounting -<br>Connection - Line In / Out Considerations -<br>Erase Head Tuning - NAB-to-IEC Record Modi-<br>fication - Reproduce Head Matching     |    |
| IV.  | OPERATION AND FUNCTIONAL DESCRIPTION . . . . .  | 9  |
|      | Panel Controls  |    |
| V.   | CALIBRATION . . . . .   | 10 |
|      | Equipment Required - Reproduce Calibration -<br>Input Level and Meter Calibration - Erase /<br>Bias Adjustment - Record Calibration   |    |
| VI.  | CIRCUIT DESCRIPTIONS . . . . .  | 13 |
|      | Reproduce and Line Output Amplifiers -<br>Record Amplifier - Record Logic and Erase /<br>Bias Circuitry - Power Supply  |    |
| VII. | APPENDIX . . . . .  | 16 |
|      | Parts Lists - Schematics - Warranty   |    |

## I. GENERAL INFORMATION

The Inovonics 370 is a basic, two-speed replacement record/reproduce electronics package for updating older professional studio tape recorders. It is directly pin-compatible with earlier Ampex machines (300, 350, 351, AG300, AG350 and AG440), and adaptable to many others.

Features of the 370 include:

Accommodates a wide variety of original-equipment and replacement heads of either high or low impedance.

Wide equalization adjustment range and increased erase, bias and signal headrooms for use with both normal and high-coercivity tapes.

Entire electronics assembly unplugs from front of unit for ease in servicing; all component parts are readily-available, "off-the-shelf" types.

The 370 requires only the proper interconnect cable to interface with nearly any combination of transport and heads. Two units may be interconnected for stereo operation. If no specification is made at time of order, the 370 is supplied with cabling for Ampex 350-series, full-track machines.

## II. SPECIFICATIONS

Performance of any magnetic recording system is limited in great part by the electrical and magnetic efficiency of the heads and the formulation of the magnetic oxide. Recording electronics actually constitute the "easy part" of the system.

As the 370 is intended for routine replacement use, typical full-track, general-replacement heads were used to derive the specifications. Part numbers and pertinent information are listed in the following table.

| HEAD                        | 1kHz Inductance | DC Resistance | Gap Length |
|-----------------------------|-----------------|---------------|------------|
| REPRODUCE<br>Nortronic 9102 | 650mH           | 275-Ohms      | 200μ"      |
| RECORD<br>Nortronic 9103    | 10mH            | 10-Ohms       | 500μ"      |
| ERASE<br>Nortronic 9125     | 1.2mH           | 4-Ohms        | N/A        |

Tape employed in the tests was Ampex 406; Operating Level, 250nW/m; NAB equalization.

Overall Frequency Response (in Hz):

|          |                |
|----------|----------------|
| 15ips    | ±2dB, 25 - 25k |
| 7-1/2ips | ±2dB, 20 - 15k |
| 3-3/4ips | ±2dB, 20 - 8k  |

Signal-to-Noise Ratio (in dB, referred to a "peak" record level 6dB above 250nW/m; 20Hz - 20kHz)

|          | OVERALL |      | STANDBY |      |
|----------|---------|------|---------|------|
|          | u'wtd.  | wtd. | u'wtd.  | wtd. |
| 15ips    | 66      | 74   | 75      | 83   |
| 7-1/2ips | 67      | 74   | 75      | 83   |
| 3-3/4ips | 63      | 70   | 70      | 77   |

Equalization: 15 - 7-1/2ips or 7-1/2 - 3-3/4ips, NAB: may be user-changed to IEC characteristic.

Erase: >75dB erasure of 500Hz signal recorded 12dB above Op Level; erase/bias frequency, 125kHz.

Head Impedance Range:

|         |              |
|---------|--------------|
| Erase:  | 0.2 to 2.0mH |
| Record: | 3 to 15mH    |
| Erase:  | 3mH to 1H    |

Line Input: "Electronically-balanced," bridging; accepts nominal line levels between -10 and +10dBm.

Line Output: Balanced, transformer-isolated. May be adjusted for nominal line levels between +4 and +10dBm. Clipping level, +24dBm into 600-Ohm load.

Power Requirement: 105 - 130VAC (230V available), 50/60Hz; 0.3A (plus transport).

Size and Shipping Weight: 3-1/2" X 19" X 7"; 12 lbs.

### III. INSTALLATION

#### Unpacking and Inspection

Upon receipt, promptly inspect the equipment for shipping damage. Should any be observed, notify the carrier; if not, proceed as outlined below. It is suggested that the original shipping carton and materials be retained for future reshipment if it should become necessary. In the event of return for repair under terms of the Warranty, damage sustained as a result of improper repacking may invalidate the Warranty.

It is essential that the Warranty Registration card found at the front of this manual be completed and returned. This assures coverage of the equipment under terms of the Warranty, and the user will automatically receive specific servicing or modification information when issued.

#### Mounting

The 370 is packaged to mount in a standard 19-inch equipment rack or recorder overbridge with EIA mounting provision. Each channel requires 3-1/2 inches of vertical rack space and about 8 inches of cabinet depth to accommodate back-panel connectors.

#### Connection

The signal, head and transport inter-cabling is pin-compatible with the equipment specified for use with the 370 at time of order. If no specification is made, Ampex 350-series interconnect is assumed and such cabling is provided.

When two units are used in stereo installations, a "daisy-chain style of interconnect cable is supplied which provides erase/bias oscillator "slaving" and common transport logic interface. Normally, input power will be first fed to the bottom-most unit and the cable "daisy-chained" up to the second channel. In such an installation, the lower unit serves as erase/bias oscillator "master," feeding both channels. All electronics are identical, however; it is the cable that dictates the master/slave relationship.

### Line In / Out Considerations

As delivered, the 370 is calibrated to operate at a +4dBm line level corresponding to "zero-VU." Operation at other line levels can be accommodated; see section V, pages 10 through 11 for level setting procedure, and page 11 for adjustment of panel meter calibration.

Input impedance of the 370 is 200k-Ohms, balanced, or 100k-Ohms, unbalanced. Should the equipment which feeds the 370 require a terminating load, a resistor may be connected in parallel with the 370 input. In unbalanced, single-ended installations, either side of the input may be tied to ground, although pin 3 of the input connector is generally considered "hot."

The low source impedance of the 370 Line Output results in only about a 0.5dB shift in level from an unloaded to a 600-Ohm-loaded condition. Although a 600-Ohm termination is not necessary, the 370 should nevertheless be connected to its intended load prior to final calibration.

### Erase Head Tuning

Four sets of terminals on the circuit board select the tuning capacitance to bring the erase head to resonance at the erase frequency of 125kHz. These terminals are located near the connecting fingers and are labeled E, F, G and H.

If the inductance of the erase head is known, the terminals may be strapped according to the following table:

| HEAD INDUCTANCE<br>(mH) | E | F | G | H |
|-------------------------|---|---|---|---|
| 0.2                     | X | X | X | X |
| 0.3                     | X | X |   |   |
| 0.5                     |   | X | X |   |
| 0.75                    | X |   |   | X |
| 1.0                     |   | X |   | X |
| 1.25                    | X |   |   |   |
| 1.5                     |   | X |   |   |
| 1.75                    |   |   | X |   |
| 2.0                     |   |   | X |   |

If inductance of the erase head is not known, the 370 can be put into the RECORD mode and various combinations of the E, F, G and H jumpers tried for maximum voltage across the erase head as monitored with an oscilloscope and low-capacitance probe.



Once optimum tuning is established, the jumpers may be permanently soldered in place.

One note of warning concerning the foregoing:

The 370 erase amplifier has sufficient drive for full erasure of highest coercivity tapes with heads of normal efficiency. Some of the common, "universal replacement" heads can have their modest magnetic structures driven into saturation by the 370. This can overheat and possibly destroy the head, as well as cause noise in the recording process. There is, nevertheless, a self-protection factor which, when taken into account, guarantees that the head will not be overdriven and damaged.

As a head core starts to go into saturation, inductance and "Q" change abruptly. In order to overdrive the head and saturate the core, a tuning capacitance would be required which is different from the value used to resonate the head at low drive levels. Thus if a tuning capacitance is selected for low-level resonance, drive will self-limit when the head inductance starts to change.

If confronted with this possibility, it is best to measure accurately the head inductance with a bridge or consult the manufacturer for the information, and use the table on page 6, rather than experimentally tune for maximum drive.

#### NAB-to-IEC Record Modification

As shipped, the low-frequency record characteristic of the 370 is fixed at the NAB, 3180 $\mu$ s-turnover figure. Should it be desired to change this to the IEC, "flat" characteristic, R51 on the circuit board must be changed from 390k to 620k-Ohms. The selected LF record curve holds true for both speeds.

#### Reproduce Head Matching

The 370 accommodates reproduce heads of either a nominal high impedance, typically 200mH to 1H, or low impedance with values between 3 and 10mH. The reproduce amplifier input characteristic is selected by a set of four terminals near the right-rear of the circuit board. These are labeled A, B, C and D.

Without jumpers the 370 accepts high output, high impedance heads as encountered in Ampex 300- and 350-series, full-track machines. Some heads in the Hi-Z category may require addi-

tional amplifier gain. These heads may be two-track, or have even a narrower track format, or merely have fewer windings. Need for more gain will quickly be determined during the Reproduce Calibration procedure (page 10) when it is found that the REPRO GAIN control cannot be turned up quite far enough. The additional gain required by heads of lower output, but still of nominal high impedance, is obtained by installing a jumper between terminals A and B.

Low impedance reproduce heads require a jumper between terminals A, B and C. Again, should it be found that some additional gain is required, the jumper should be extended to include A, B, C and D.

#### IV. OPERATION AND FUNCTIONAL DESCRIPTION

##### Panel Controls

The INPUT and REPRO GAIN controls adjust the levels of the input signal and the playback gain, respectively. Since these are the only gain controls, each has a wide range corresponding to the combined ranges of a panel control and a "hidden" calibration adjustment. Should it be desired to "set-and-forget" levels, the control knobs can be removed to lessen the risk of inadvertant misadjustment. Of course the unit won't look quite so pretty, though.

The MONITOR button selects between the input signal and playback from the tape, as to which appears at the Line Output and is indicated by the front panel meter.

The SPEED button manually selects the preset record and reproduce equalization in accordance with transport speed. No provision is made for automatic EQ switching, and both channels of a 370 stereo pair must be individually switched.

When the READY button is in, the 370 will enter the RECORD mode when the transport is in PLAY and either the front-panel or a transport RECORD button is pressed. When the button is in the SAFE position, the 370 will not enter the RECORD mode even when a companion channel is put into READY and RECORD. If, however, one channel of a stereo machine is already recording, the other channel will enter the RECORD mode when the READY button is depressed.

The POWER switch controls primary AC power to the 370, and to the tape transport if powered by the electronics.

## V. CALIBRATION

### Equipment Required

Proper alignment of the 370 will require the following test gear:

Head Demagnetizer  
Appropriate Reproduce Alignment Tapes  
Audio Oscillator  
AC Electronic Voltmeter

### Reproduce Calibration

1. Establish the nominal impedance of the reproduce head and jumper the appropriate terminals per instructions on page 7.
2. Switch to INPUT MONITOR and clean and demagnetize all heads, moving very slowly while the demagnetizer is near the heads and withdrawing it about a yard from the head assembly before turning it off.
3. Switch to TAPE MONITOR and thread an alignment tape appropriate for the equalization to which the 370 is switched.
4. Play the Operating Level tone on the alignment tape and adjust the REPRO LEVEL control for the nominal line level (usually +4 or +8dBm) as measured by the AC voltmeter connected to the 370 Line Output. If the adjustment is not within the range of the REPRO LEVEL control, refer to page 7 for restrapping instructions.
5. While reproducing the highest frequency on the test tape, adjust the reproduce head azimuth for maximum output.
6. With high impedance reproduce heads, if the resonance of the head is near the top of the passband (as is usually the case for best signal-to-noise performance), a peak in the response will be noted at the highest frequencies. R1 on the circuit board, a fixed resistor across the reproduce head, determines the "Q" of this fundamental resonance for flattest playback response. As shipped, R1 is 220k, a typical value for most hi-Z heads. To optimize this damping resistor

for best performance, decrease the value of R1 to bring down the top end, or increase R1 to bring the top up. This procedure is best done at the highest speed that will be used, and is relevant to high impedance heads only. When low-Z heads are used, the 220k resistor should be left alone.

7. With the appropriate HS (high speed) or LS (low speed) HF equalization pot, playback response can be set for flattest response from reference frequency to highest frequency.
8. If the alignment tape has the same track width as the reproduce head track, set the appropriate LF equalization pot for smoothest response from reference frequency to the lowest frequency. If this is not the case, as with full-track test tapes and two-track machines, wait until step 4 of Record Calibration, page 12.
9. Repeat steps 3, 4, 7 and (if applicable) 8 for the other speed. It is advisable to make the final repro head azimuth adjustment at the lowest speed to be used.

#### Input Level and Meter Calibration

1. Feed a 1kHz signal from the audio oscillator to the 370 Line Input at nominal line level.
2. Switch to INPUT MONITOR and adjust the INPUT GAIN control for a nominal line level output as measured by the AC voltmeter connected to the 370 Line Output.
3. At this point, adjust the "VU" meter calibration pot, R36 on the circuit board, for a "0 VU" indication. The top cover must be removed from the 370 to reach R36, but once set to a particular Line Output level, the meter should never again require calibration.

#### Erase / Bias Adjustment

Erase head tuning is covered under Section III, INSTALLATION, page 6.

Historically, bias is adjusted for maximum recording sensitivity at a 15-mil-wavelength (1kHz at 15ips). Some tapes with higher coercivity oxides may require a biasing method which differs slightly from the historic. Follow the manufacturers' recommendation for best per-

formance; the 15-mil-wavelength "peak" method is the one used in the following Record Calibration procedure.

### Record Calibration

1. Thread the machine with fresh tape of the type to be used in routine operation.
2. Select HIGH SPEED and INPUT MONITOR. Apply a 1kHz signal to the 370 input which will yield a "0 VU" panel meter indication.
3. Put the tape transport and the 370 into RECORD at the appropriate speed and switch to TAPE MONITOR. Adjust the BIAS pot for a "peak" in the recorded signal, and the FLUX pot for a TAPE MONITOR meter indication of "0 VU."
4. Sweep the oscillator frequency downward from the 1kHz reference. If the reproduce amplifier low frequency equalization was not adjusted in Reproduce Calibration step 8, page 11, the HS-LF pot may be adjusted for flattest response at this time.
5. Sweep the oscillator frequency upward to about 10kHz and adjust record head azimuth for maximum reproduced output.
6. The HS-REQ pot may be adjusted for flattest overall response from the reference frequency to the highest frequency.
7. Repeat steps 4 and 6 for LOW SPEED, adjusting the appropriate LS trim pots for flattest overall response. In the case of 7-1/2 or 3-3/4ips operation, the front-panel INPUT GAIN control should be turned down by 10dB or so, and the REPRO GAIN control turned up by a corresponding amount to make response adjustments at a reduced flux level. This will guard against tape saturation at high frequencies.

## VI. CIRCUIT DESCRIPTIONS

### Reproduce and Line Output Amplifiers

Q1 is a low-noise, matched pair of conventional NPN junction transistors. It is connected in an unequalized, feedback-pair configuration, and is the low level reproduce head preamplifier. Gain of this preamp is established by resistors R7, 8, 9 and 10, which may be jumpered for four gain settings; two for nominal hi-Z heads and two for lo-Z heads.

Output of the Q1 REPRO preamp is routed through the front-panel REPRO LEVEL control to an equalizing amplifier comprised of IC1A and associated circuitry. With C6 in the primary feedback path, IC1A is an integrating amplifier. HF pots R17 and 18 put a "shelf" in the integrating characteristic for control over high frequency equalization. LF pots R15 and 16 shunt C6 to shelve integration at low frequencies per selected equalization.

All equalization switching in the 370 is performed by two quad, CMOS analog switch gates. These gates, referenced on the schematic as A1 and 2, are operated between  $\pm 6V$  logic supply rails in order to pass ground-referenced AC waveforms at levels up to about +10dBmV. Gates "open" with -6V applied to the control lead and "close" to pass the audio signal when +6V is applied. Terminology in this case is switch-contact-oriented.

Either the output of the equalizing amplifier or Line Input signals may be switched to the output line-drive amplifier, IC1B. A second-order, low-pass filter (R24 and 25 with C8 and 9) attenuates erase/bias leakage, etc. The filter is flat to about 25kHz. A2/1-2 is controlled by the "power-on-reset" circuit of Q5 and shunts MONITOR signals to ground for about 5 seconds after the 370 is first turned on. IC1B is buffered by a discrete, complementary emitter-follower pair to deliver the required current to the output load.

IC2, a buffer amplifier and "precision" full-wave rectifier, drives the front-panel "VU" meter. The meter has a DC movement which is optimally damped for program monitoring by R39. Gain of the meter driver is adjusted by R36 to yield a "zero" indication for either a +4, +8 or other Line Output level.

### Record Amplifier

The 370 Line Input is fed directly to the active-balanced, differential input stage, IC3A; the INPUT GAIN control, R44, adjusts for the nominal line level. IC3B, a low-pass filter, is flat to about 25kHz and attenuates out-of-band garbage in the input signal.

IC4B, with input capacitor C22, is an input-differentiating amplifier with an integrating feedback path through C23. The net effect would be flat frequency response were it not for REQ pots R52 and 53. These shelve the integrating characteristic to impart a high-end pre-emphasis with variable turn-over frequency. A mid-high-frequency "dip" is provided by R50, C20 and C21 to better match typical record equalization requirements. R51 bypasses C22 at low frequencies to give the low-frequency boost required by the NAB recording characteristic.

IC4A is the constant-current, record head driver stage. The recording level FLUX trim pot, R59, is in the positive feedback loop of IC4A. Record "relay," FET Q4, is "ramped-on" to give a quiet entry into RECORD. A bias trap (L1 and 2 with C25, and L3/C26) isolates bias, coupled from the erase head by BIAS pot R76 and C42, from IC4A.

### Record Logic and Erase / Bias Circuitry

Q11 is the RECORD "switch." When the 370 is READY, Q11 may be turned on by having the PLAY and RECORD lines from the transport momentarily shorted. This also turns on Q12 which holds Q11 on until the transport is stopped, or S3 is switched to SAFE.

Transport logic is isolated from ground-referenced 370 logic by opto-isolator OC1. When the 370 is in RECORD, OC1 turns on Q13 to light the red meter lamps and give a RECORD command to erase/bias circuitry. With this command, Miller Integrator erase amplifier power controller, Q9 and 10 with R70 and C33 providing integration, begins ramping up. The ramp takes about 100ms to reach the positive supply rail, and erase drive increases in direct proportion.

The erase/bias pilot oscillator consists of inverters IC8B and C and a "ceramic resonator," P1. IC8A and F buffer the pilot signal.

The 500kHz erase/bias pilot signal from either the subject unit's oscillator or from another 370 used as "master" in a



stereo pair, is digitally divided by IC7 to produce a symmetrical square wave at 125kHz. The square wave is amplified by Q6 to switch Q7 on and off at the erase frequency. Q8 is "bootstrapped" to Q7, and the two transistors form a "Class-S" power switching amplifier. The output of this amplifier is a symmetrical square wave with a peak-to-peak amplitude equal to the total supply voltage, about 35V p-p, when the erase DC ramp reaches full value. L4, the erase head and appropriate C38-41 tuning capacitance form a high-"Q," "quasi-half-T-section." This transforms the low impedance square wave drive to a high voltage, low distortion sine wave erase/bias source.

The "power-on-reset" circuit of Q5 holds erase and bias off during turn-on settling.

#### Power Supply

The 370 power supply utilizes variable positive and negative "3-terminal" voltage regulators. These are self-protecting against output or thermal overloads. The output voltage is fixed by the voltage-divider between the output and common terminals. The outputs are  $\pm 18V$  for amplifier, bias and high-level logic. A  $\pm 6V$  logic supply is dropped from the  $\pm 18V$  by zener diodes CR20 and 21.

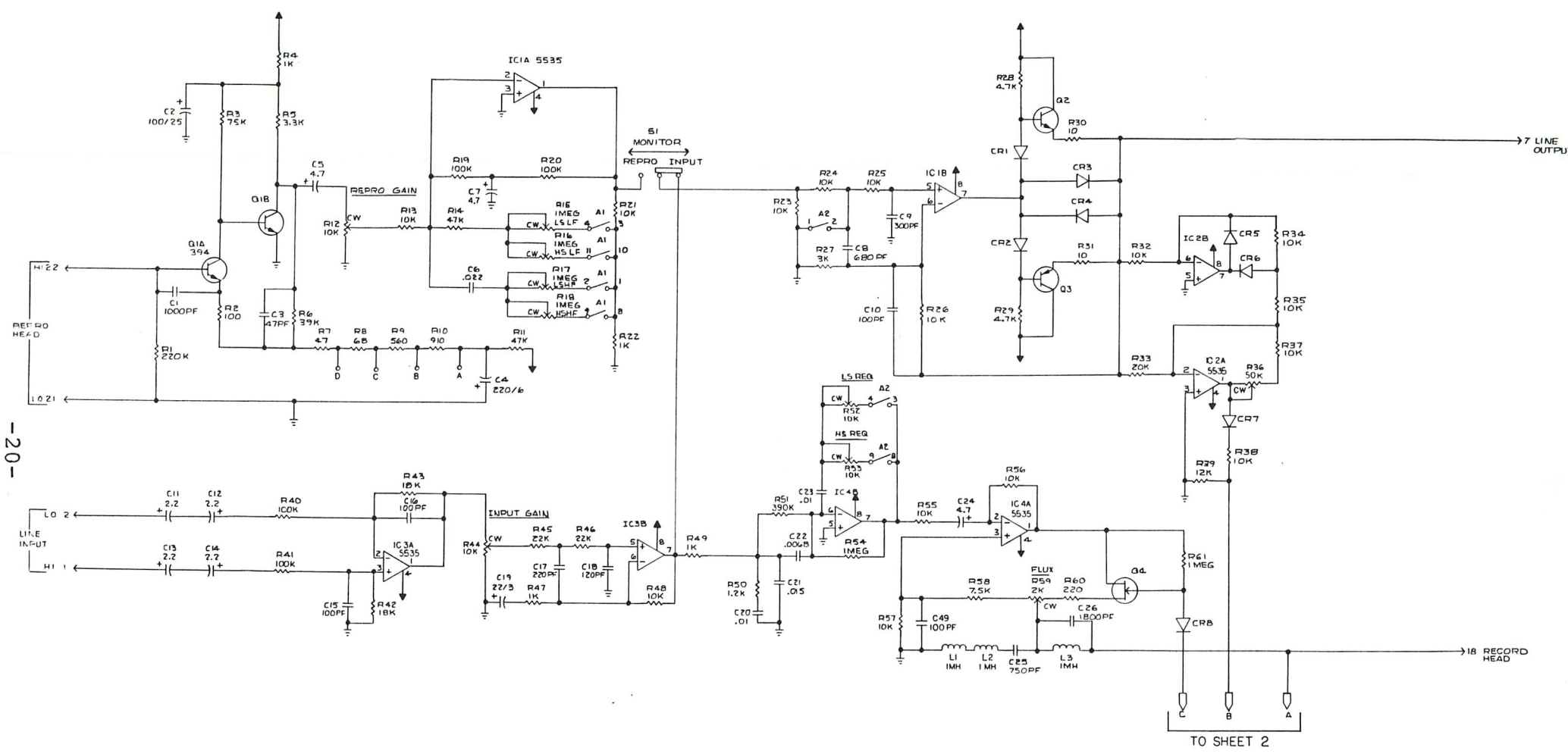
VII. APPENDIX

| SCHEMATIC REFERENCE   | INOVONICS PART NO. | COMPONENT DESCRIPTION            | MANUFACTURER AND MFR'S PART NO. |
|---|--------------------|----------------------------------|---------------------------------|
| <u>PLUG-IN CIRCUIT ASSEMBLY</u> - Assembly 161400, Schematic 161700 |                    |                                  |                                 |
| A1,2  | 1335               | CMOS Analog Switch Gate          | RCA CD4066 BE                   |
| C1  | 0822               | Capacitor, Mica 1000pF           | Arco DM19-102J                  |
| C2  | 0920               | " Electrolytic 100 $\mu$ F, 25V  | Elna type RL - 100/25           |
| C3  | 0806               | " Mica 47pF                      | Arco DM15-470J                  |
| C4  | 1069               | " Electrolytic 220 $\mu$ F, 6.3V | Elna type RL - 220/6.3          |
| C5,7,24,29,43   | 1054               | " Tantalum 4.7 $\mu$ F, 25V      | NEC NDD475M25C                  |
| C6  | 0863               | " Mylar .022 $\mu$ F, 100V       | Sprague 225P 22391              |
| C34   | 1067               | " Tantalum 1.0 $\mu$ F, 35V      | NEC NDA105M35C                  |
| C8  | 0820               | " Mica 680pF                     | Arco DM19-681J                  |
| C9,42   | 0827               | " " 300pF                        | " DM15-301J                     |
| C10,15,16,28,30,31,49   | 0810               | " " 100pF                        | " DM15-101J                     |
| C11-14,32,36,44,47,48   | 1053               | " Tantalum 2.2 $\mu$ F, 25V      | NEC NDB225M25C                  |
| C17   | 0814               | " Mica 220pF                     | Arco DM15-221J                  |
| C18   | 0811               | " " 120pF                        | " DM15-121J                     |
| C19   | 1068               | " Tantalum 22 $\mu$ F, 3V        | NEC NDC226M03C                  |
| C20,23  | 0862               | " Mylar .01 $\mu$ F, 100V        | Sprague 225P 10491              |
| C21   | 0873               | " " .015 $\mu$ F, 100V           | " 225P 15491                    |
| C22   | 0860               | " " .0068 $\mu$ F, 100V          | " 225P 68391                    |
| C25   | 0828               | " Mica 750pF                     | Arco DM19-751J                  |
| C26   | 0825               | " " 1800pF                       | " DM19-182J                     |
| C33,35,37   | 0867               | " Mylar .1 $\mu$ F, 100V         | Sprague 225P10591               |
| C38   | 0829               | " Mica 3000pF                    | Arco DM19-302J                  |
| C39   | 0834               | " " 2700pF                       | " DM19-272J                     |
| C40   | 0833               | " " 2400pF                       | " DM19-242J                     |
| C41   | 0831               | " " 510pF                        | " DM19-511J                     |
| C45,46  | 0910               | " Electrolytic 470 $\mu$ F, 50V  | Elna type TE - 470/50           |

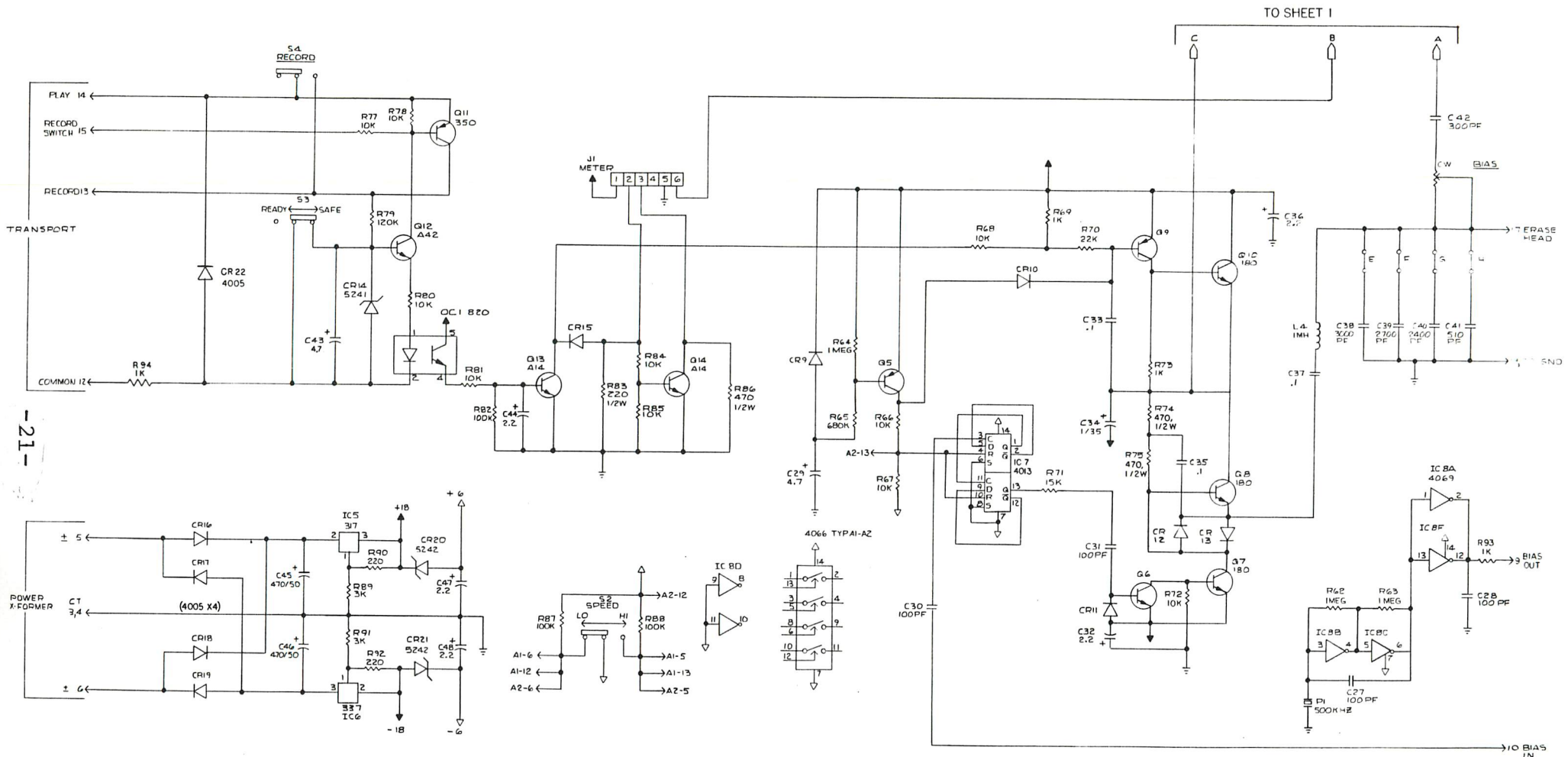
| SCHEMATIC REFERENCE   | INOVONICS PART NO. | COMPONENT DESCRIPTION     | MANUFACTURER AND MFR'S PART NO. |
|---|--------------------|---------------------------|---------------------------------|
| CR1-13,15   | 1100               | Diode, silicon signal     | GI 1N4151                       |
| CR14,20,21  | 1105               | " zener                   | Motorola 1N5242                 |
| CR16-19,22  | 1125               | " rectifier               | " 1N4005                        |
| IC1-4   | 1314               | Integrated Circuit        | Signetics NE5535N               |
| IC5   | 1373               | " "                       | National LM317                  |
| IC6   | 1374               | " "                       | " LM337                         |
| IC7   | 1322               | " "                       | RCA CD4013AE                    |
| IC8   | 1336               | " "                       | " CD4069BE                      |
| J1  | 1717               | Connector, 6-pin Male     | Molex 09-60-1061                |
| L1-3  | 1403               | Inductor, 1mH             | Delevan 2500-28                 |
| L4  | 1415               | " "                       | Caddell-Burns 6470-14           |
| OC1   | 1307               | Optical Coupler           | Fairchild FCD 820               |
| P1  | 1410               | Ceramic Resonator, 500kHz | RMC CR30-FA / 500K              |
| Q1  | 1237               | Transistor, Dual NPN      | National LM394                  |
| Q2,6  | 1204               | " NPN                     | " 2N3567                        |
| Q3,5,9  | 1205               | " PNP                     | " 2N3645                        |
| Q4  | 1230               | " FET                     | Siliconix J111                  |
| Q7,8,10   | 1236               | " NPN                     | Motorola MJE180                 |
| Q11   | 1225               | " PNP                     | " MJE350                        |
| Q12   | 1226               | " NPN                     | " MPSA42                        |
| Q13,14  | 1232               | " " Darlington            | " MPSA14                        |
| <p><u>NOTE:</u> Unless otherwise specified, all fixed resistors are carbon film type, value and wattage per schematic. Variable resistors are multi-turn (Spectrol 43P, Beckman 89PR, etc.), value per schematic.</p> |                    |                           |                                 |

| SCHEMATIC REFERENCE                          | INOVONICS PART NO. | COMPONENT DESCRIPTION   | MANUFACTURER AND MFR'S PART NO.    |
|--|--------------------|---|------------------------------------|
| R12,44                                       | 0622               | Resistor, variable 10K  | Allen Bradley 73M1N040S103A        |
| -  | 2505               | Knob for above  | Raytheon 70-2WD-2G                 |
| R36  | 0562               | Resistor, variable 50k  | Beckman Helitrim 91AR 50K          |
| S1-3   | 1841               | Switch, pushbutton, DPDT-alternate actn.                          | Schadow FG-EE-FG/WHT               |
| S4   | 1842               | " " DPDT-momentary  | " FG-RED-2U-0A                     |
| <u>CHASSIS COMPONENTS - Schematic 161800</u> |                    |   |                                    |
| C1,2   | 0872               | Capacitor, mylar .01 $\mu$ F, 600V                                | Sprague 6PS-S10                    |
| F1   | 2706               | Fuse, 3AG-3A  | Buss or Littlefuse                 |
| J1   | 1644               | Connector, 6-pin "Jones" Female                                   | Cinch S306-AB                      |
| J2   | 1640               | " 10-pin " Male   | Cinch P310-AB                      |
| J3,4   | 1717               | " 6-pin Male  | Molex 09-60-1061                   |
| J5   | 1609               | " 3-pin "XLR" Male  | Switchcraft D3M                    |
| J6   | 1610               | " " " Female  | " D3F                              |
| J7   | 1601               | " 1-pin "MS" Male   | Amphenol 3102A10S-2P               |
| J8   | 1602               | " 2-pin " "   | " 3102A10S-4P                      |
| J9   | 1603               | " 3-pin " "   | " 3102A10S-3P                      |
| J10  | 1715               | " 22-pin P.C.   | Edac 356-o22-250-01                |
| M1   | 2808               | Meter, "Simulated VU" (DC movement)<br>(Meter lamps are type 387) | Dixson 301-K / 200uA w/ "VU" scale |
| R1   | 0064               | Resistor, 1/4W, 5% carbon film 1.5K                               |                                    |
| S1   | 1830               | Switch, SPDT "Rocker"   | Arrow-Hart 1604-21E                |
| T1   | 159700             | Transformer, Power  | Inovonics O.E.M. part              |
| T2   | 109000             | " Output  | " " "                              |

-20-



|   |                     |   |
|---|---------------------|---|
| 370   | DRAWN FAK 7-20-81   | <br><small>802-B Woodland Way, Chino, CA 91708 Phone 714-999-1111</small> |
|   | CHECKED JWB 7-24-81 |   |
|   | APPROVED            | TITLE   |
| TOLERANCES<br>R1 - R1<br>R1 - R99<br>ANGLES 45° |                     | <b>SCHEMATIC,<br/>PLUG-IN</b>   |
| MATERIAL / FINISH                               |                     | PAGE 1 OF 2<br>DWG NO 161700<br>REV D                                     |



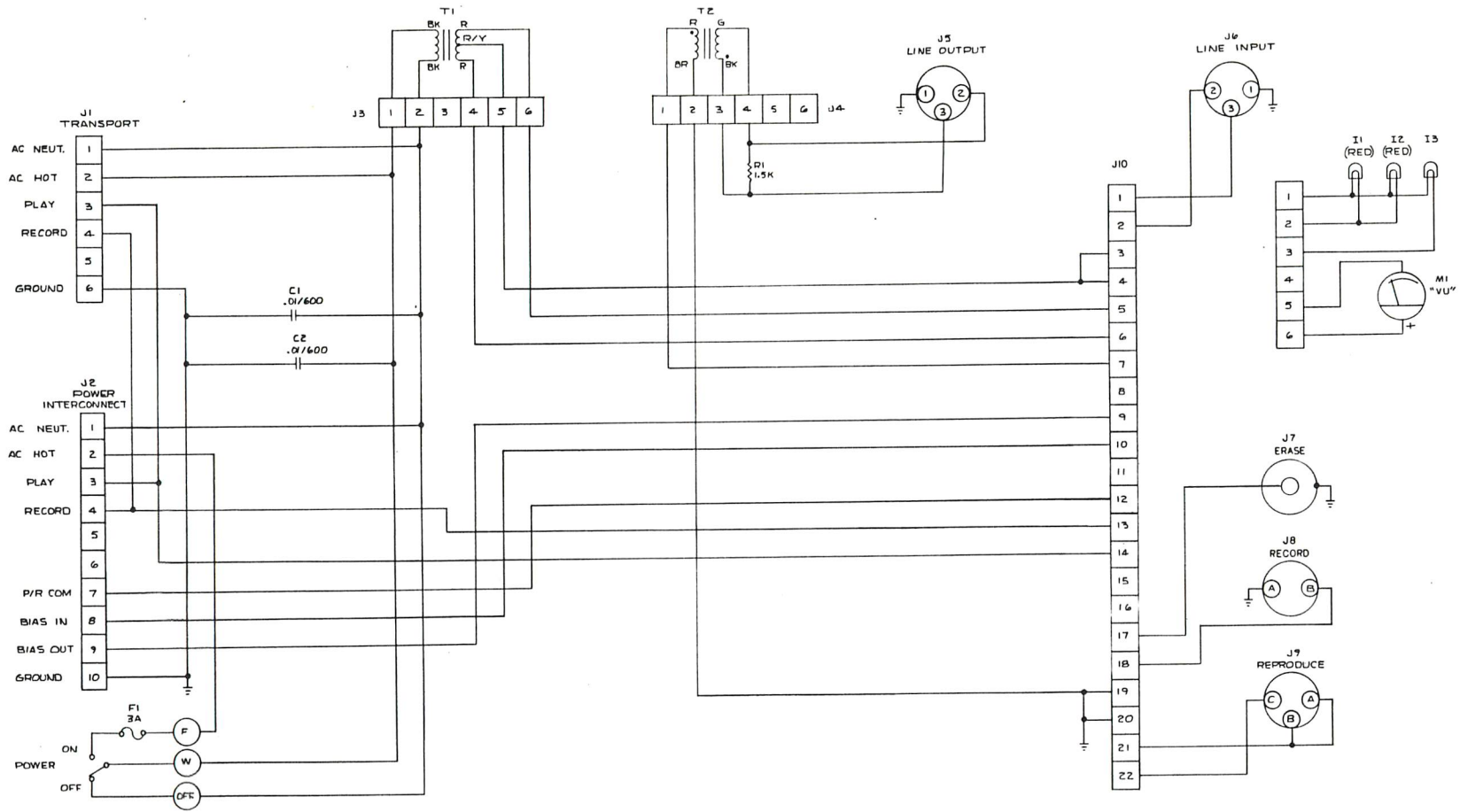
-21-

**NOTES:**

- UNLESS OTHERWISE SPECIFIED . . . .
1. RESISTORS ARE 1/4W, 5%, VALUE IN OHMS.
  2. CAPACITORS ARE 20V OR BETTER, VALUE IN  $\mu$ F.
  3. NPN TRANSISTORS ARE P/N 1204 (2N3567 EQUIV).
  4. PNP " " P/N 1205 (2N3645 " ).
  5. FET " " P/N 1211 (MPF 111 " ).
  6. DIODES ARE P/N 1100 (1N4151 EQUIV).

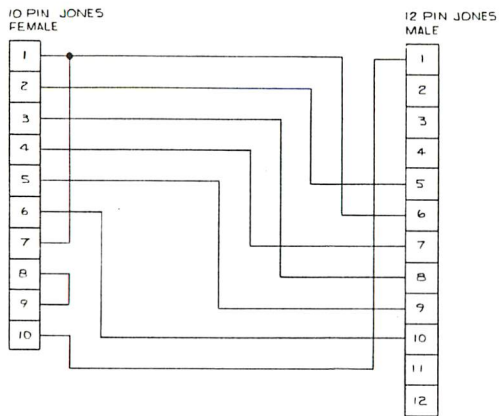
|            |                   |             |   |
|------------|-------------------|-------------|---|
| 370        | DRAWN             | FAK 7-20-81 | <br>301 S. Van Ness Blvd. - Campbell, CA 95008 - Phone 214-8300 |
|            | CHECKED           | JBW 7-24-81 |   |
| TOLERANCES | MATERIAL / FINISH |             | <b>SCHEMATIC PLUG-IN</b>  |
| PL - 01    |                   |             |   |
| 91 - 006   |                   |             | PAGE 2 of 2<br>DWG NO 161700<br>TITLE D                         |

-22-

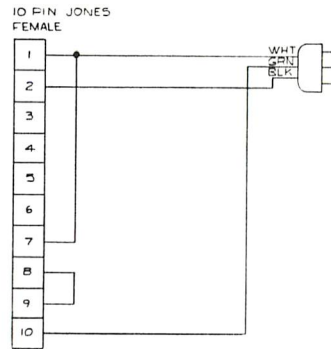


|   |         |                                |         |   |
|---|---------|--------------------------------|---------|---|
| 370   | DRAWN   | FAK                            | 7-15-81 | <br>833 S Van Ness St. San Francisco, CA 94108 Phone 314-8300 |
|   | CHECKED | JBW                            | 7-24-81 |   |
| TOLERANCES                                    |         | MATERIAL FINISH                |         | TITLE   |
| .015 ± .001<br>.030 ± .002<br>ANGLES 45° ± 1° |         | APPROVED: _____<br>DATE: _____ |         | SCHEMATIC, CHASSIS<br>PAGE 1 OF 1<br>DWG NO 161800 REV A      |

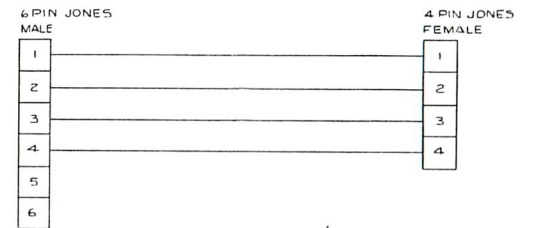




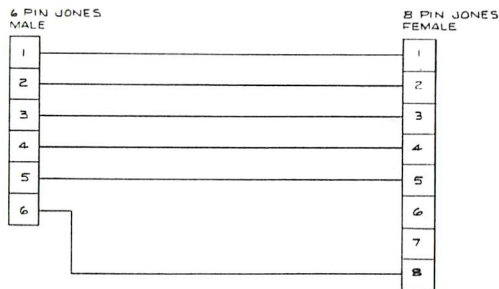
AMPEX 300



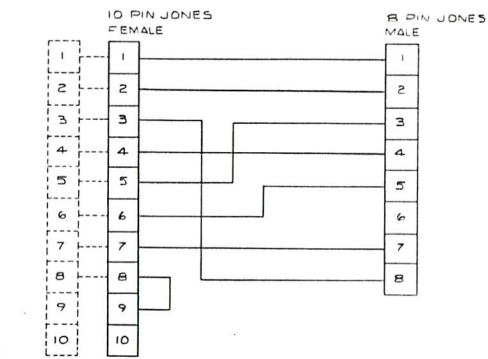
AMPEX 351



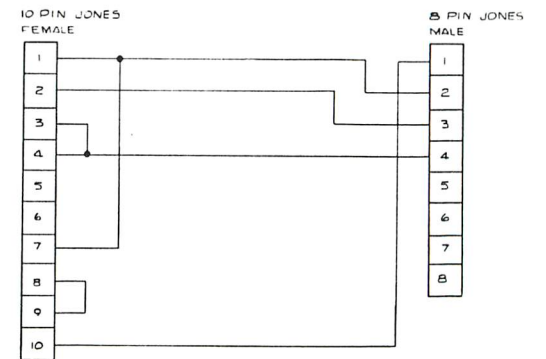
AMPEX 350 ADAPTER



AMPEX AG-350 ADAPTER



TYPICAL STEREO INTERCONNECT  
AMPEX AG-440



AMPEX FR-1100

|                                       |         |                 |          |  |
|---------------------------------------|---------|-----------------|----------|--|
| 370<br>380                            | DRAWN   | FAK             | 4-20-81  | <br>INOVONICS<br>803 S. Vander Ave., Campbell, CA 95008 Phone 374-8300 |
|                                       | CHECKED | JBW             | 4-23-81  |  |
| TOLERANCES                            |         | MATERIAL FINISH |          | TITLE  |
| .01 - .015<br>.01 - .005<br>ANGLES .1 |         |                 |          | INTERCONNECT<br>CABLES   |
|                                       |         | PAGE            | DRG. NO. | REV.   |
|                                       |         | 1 of 1          | 161200   | A  |