

ARCAM

DELTA 90.2 AMPLIFIER SERVICE MANUAL

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Issue 1 August 89 Serial number 4801 -

| | |
|---|---|
| CIRCUIT DESCRIPTION | 2 |
| Disc Stage | 2 |
| Input & Record Selection | 2 |
| Line Amplifier | 2 |
| Tone Control & Direct Switch | 2 |
| Power Amplifier | 3 |
| Speaker Protection & On/Off Mute | 3 |
| Power Supplies | 3 |
| TEST POINTS | 4 |
| CHANGE OF MAINS VOLTAGE | 5 |
| REMOVAL/REPLACEMENT OF TRANSFORMER | 5 |
| CIRCUIT DIAGRAMS | 6 |
| SERVICE NOTE 1 3/7/90 | 6 |

CIRCUIT DESCRIPTION

Disc Stage

The Delta 90.2 disc stage consists of a discrete low noise 21dB flat response amplifier for moving coil cartridges, which is selectable via a rear panel switch, and a moving magnet amplifier which provides RIAA equalisation and amplification for both moving coil and moving magnet cartridges.

IC1 is a low noise, low offset op-amp which provides a 19 dB flat response stage. The voltage gain is set by resistors R11 and R12. R13 and C6 provide a low pass filter to form the passive high frequency part of the RIAA de-emphasis. The negative feedback loop around IC2 formed by R15,16,17,18 and C7 provides the active low frequency correction of the de-emphasis. R14 sets the total voltage gain of IC2 and C8,9 and R19 provides a 12Hz high pass filter.

Input & Record Selection

Line level signals from any one input can be selected for amplification by use of the "listen" switch. Signals to be recorded on either of the tape outputs are independently selected by the "record" switch. The "record" switch is wired to prevent the input and output of Tape 1 being connected to each other to prevent feedback problems. This is NOT so with Tape 2 - feedback can occur if both "listen" and "record" are both set to Tape 2.

CD signals are attenuated by R21 and R22 to match other line inputs.

Line Amplifier

The signal passes via the 'listen' switch and volume control to the line amplifier which provides 18dB of voltage gain. Transistors Q4 and Q5 provide the gain with Q6 and Q7 forming a current source for Q5. DC bias is provided by R27 and R28 via R29 from the emitter of Q5.

Tone Control & Direct Switch

The non-inverting tone control based around IC3 allows a limited range of bass and treble adjustment by varying the frequency dependent feedback around the ic by use of the bass and treble potentiometers. The tone controls can be fully by-passed by use of the 'direct' switch.

Power Amplifier

The power amplifier consists of 2 main parts - a voltage amplifier and a current amplifier. The voltage amplifier consists of Q8,9 and 10. Signal on Q8 modulates the collector current and the resultant voltage variation drives the class A amplifier Q10, via emitter follower Q9. An AC signal equal in amplitude to the output signal appears on the collector of Q10. The class A stage has an active load which is also used to provide thermal feedback for the output and driver stages.

The current amplifier is formed by the complementary emitter follower stages formed by Q15 and 16 and Q18 and 17. The output stage is biased into class AB operation by the voltage across R58, which is set by the active load R11,12 and 13. The bias voltage is set by preset RV1 which consequently sets the output stage quiescent current.

Electronic over voltage or current protection is formed by darlington transistors Q14 and Q19 and their associated circuitry which sense the output current through R68 and R71 and limits the base drive to Q15 and Q18 if it becomes too high. Further protection is afforded by fusible resistors R62 and R82 which will go open circuit if this base current is too great.

Low dc offset at the loudspeaker terminals is maintained by the dc servo, IC4. This has an extremely high dc gain but very little gain at audio frequencies.

Power to the input and class A stages is filtered by use of D211, C203 and D212, C204 to provide isolation from the output stages.

Speaker Protection & On/Off Mute

The amplifier output is connected to the speaker terminals via a relay. On switch on there is a 5 second delay before the relay closes and on switch off it opens immediately to prevent any bangs or thumps reaching the speakers.

The dc level on the speaker outputs is monitored and if this exceeds more than approximately $\pm 0.7V$ the relays open protecting the speakers from dc voltages and currents.

Power Supplies

The main rails are provided by full wave rectification of the secondary winding of the transformer which is smoothed by two 10,000 μF capacitors, C204 and 205, to provide $\pm 45V$. The $\pm 15V$ rails for the line stages, moving magnet stage and servo supplies is derived from the sub rails via regulators formed by Q201,202 and D214 for +15v and Q204,203 and D213 for the -15V and their associated circuitry.

The MC stage is powered from the +15V rail via regulator, IC201 which is configured to provide +8.2V.

TEST POINTS

| TEST POINT | FUNCTION | TYPICAL VOLTAGE |
|----------------|-------------------------|-----------------|
| 1 | MC supply voltage | + 8.2V |
| 2 (L), 3 (R) | Moving coil stage | +0.9V |
| 4 (L), 5 (R) | Disc amp output | < 0.5V |
| 6 (L), 7 (R) | Line amplifier | + 5V |
| 8 (L), 9 (R) | Tone control offset | + 5V |
| 10 (L), 11 (R) | Servo offset | - 1.6V |
| 12 | + 15V rail | +14.5V to +16V |
| 13 | +44V subrail | + 44V |
| 14 | - 15V rail | -16V to -14.5V |
| 15 | -44V subrail | - 44V |
| 16 (L), 17 (R) | Protection circuit bias | - 0.4V |
| 18 (L), 19 (R) | Protection circuit bias | + 0.4V |
| 20 (L), 22 (R) | Quiescent current | 8mV w.r.t TP24 |
| 21 (L), 23 (R) | Quiescent current | 8mV w.r.t TP25 |
| 24 (L), 25 (R) | Speaker output | < 20mV |
| 26 (L), 27 (R) | Switched speaker output | < 20mV |
| 28 (L), 29 (R) | Direct speaker output | < 20mv |
| 30 | Relay turn on voltage | +44V (on) |
| 31 | Positive supply rail | +44V |
| 32 | Negative supply rail | -44V |
| 33 | -ve regulator input | -32V |
| 34 | +ve regulator input | +28V |

CHANGE OF MAINS VOLTAGE

WARNING - The unit must be unplugged from the mains supply when changing wiring or the mains fuse since the fuse is at mains potential even with the unit switched off.

To convert the Delta 90.2 to work on a different mains supply voltage requires changing the position of 2 wires from the primary winding of the transformer for 240v to 120v or 220v to 110v conversion and a change of fuse rating.

To convert to other variations ie 240v to 220v or 220v to 120v requires a replacement transformer.

240/220V WIRING (1.25A ANTI-SURGE FUSE)

| | | |
|--------|-------------|-------|
| 0 | 0 | 0 |
| ORANGE | BROWN & RED | BLACK |
| | 0 | |

120V/110V WIRING (3.15A ANTI-SURGE FUSE)

| | | |
|----------------|--|-------------|
| 0 | | 0 |
| ORANGE & BROWN | | BLACK & RED |
| 0 | | 0 |

From the above diagrams it can be seen that only the red and brown wires need to be moved.

REMOVAL/REPLACEMENT OF TRANSFORMER

If a new transformer is required the top and bottom cover plates should be removed along with the knobs. It is not necessary to remove the buttons from the power or direct/mono/SP2 switches. The front panel must now be removed by undoing the three M4 nuts on the inside of the unit and pulling the front off.

Desolder the primary and secondary transformer windings from the pcb. Remove the 4 screws holding the transformer mounting bar and the bar, complete with transformer, can be removed from the amplifier. Remove the nut on the bottom of the transformer and the transformer will now be free.

Replacement is a reverse of this procedure.

CIRCUIT DIAGRAMS

| No. | Title of Circuit |
|-----|--------------------------------|
| 1 | MM & MC Stage |
| 2 | Input & Record Switching |
| 3 | Line Amplifier & Tone Controls |
| 4 | Power Amplifier |
| 5 | On/Off Mute & Offset Detect |
| 6 | +/- 15v Regulated Supplies |

SERVICE NOTE 1 3/7/90**Background**

There have been some complaints about the level of high frequency noise emitted by the Delta 90.2 even with the volume at minimum. This was caused by noise on the low voltage rails within the amplifiers pre-amp stages and is attributable to 2 factors:

1. noisy 15 volt zener diodes
2. inadequate filtering of the zener.

Solution

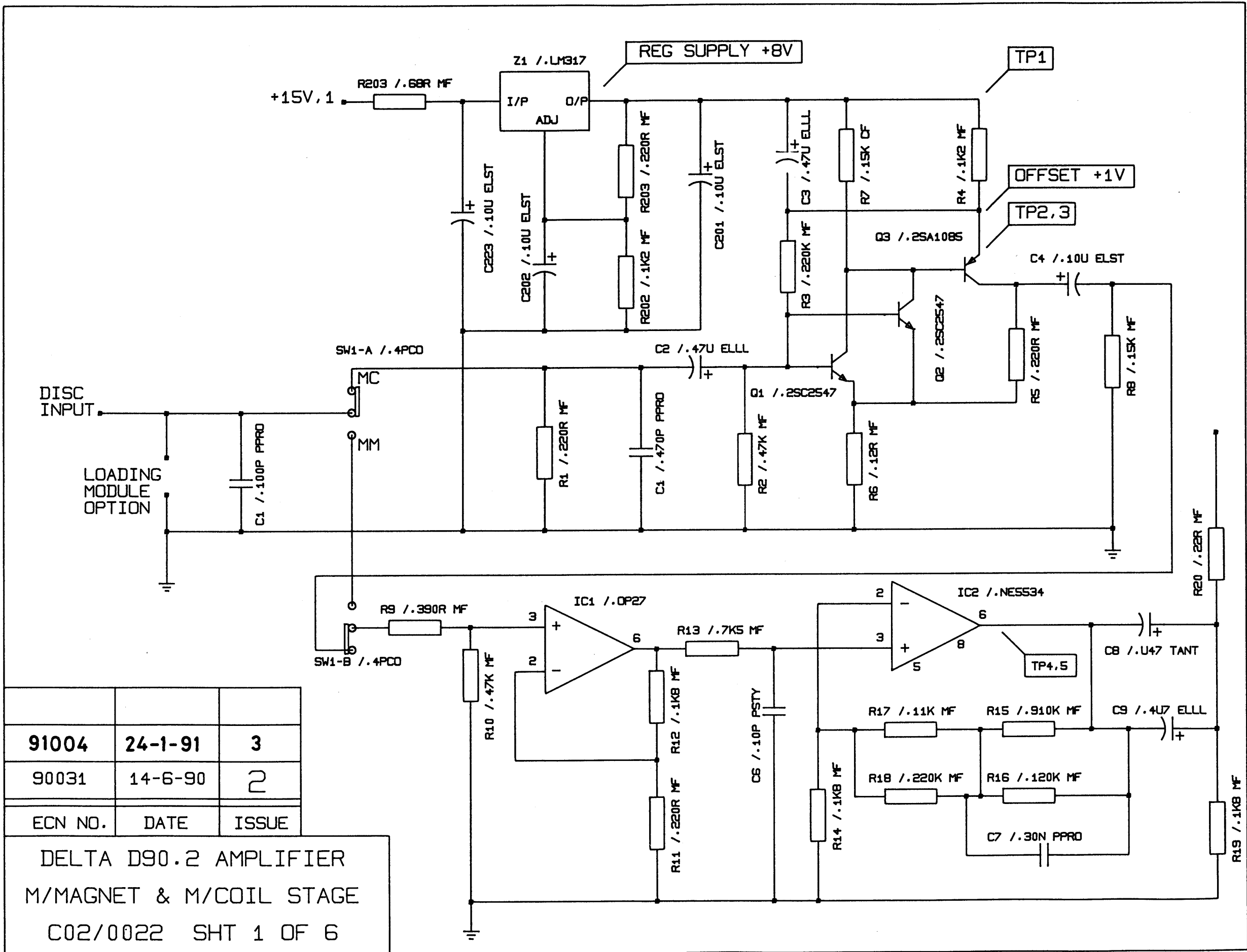
To improve the signal to noise ratio of the Delta 90.2 better quality zener diodes are now used and from serial number 6801 onwards capacitors C208, C215 have been changed from 4u7 to 100uF to improve the filtering.

This improves the CCIR weighted noise by more than 6dB.

This modification can be fitted to all Delta 90.2 amplifiers with serial numbers less than 6801.

BOARD MODIFICATIONS TO 13/11/91

Serial numbers 6801 onwards - C208,215 changed from 4u7 to 100uF to improve power amp noise, (See service note 1).

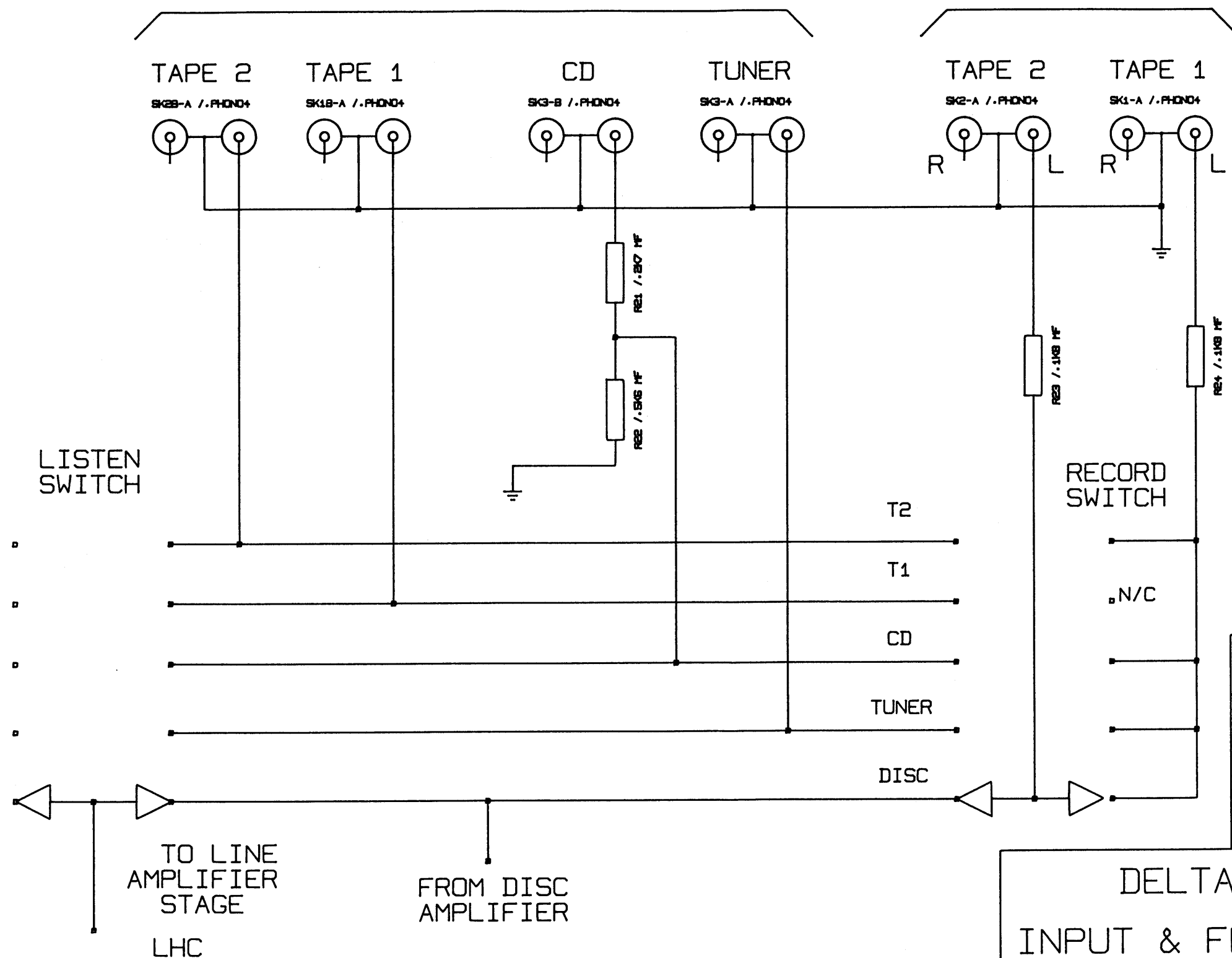


| | | |
|---------|---------|-------|
| 91004 | 24-1-91 | 3 |
| 90031 | 14-6-90 | 2 |
| ECN NO. | DATE | ISSUE |

DELTA D90.2 AMPLIFIER
M/MAGNET & M/COIL STAGE
C02/0022 SHT 1 OF 6

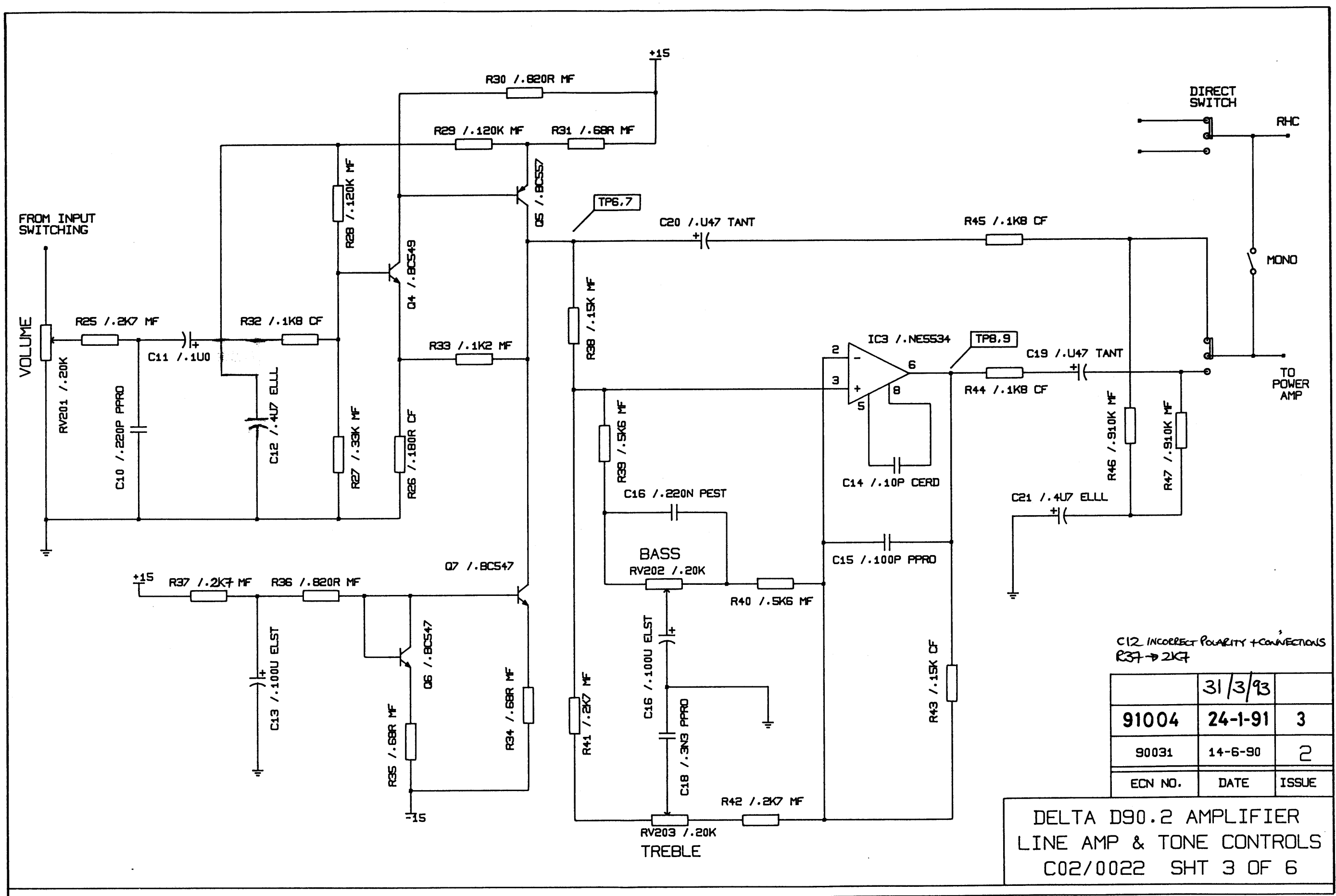
INPUTS

OUTPUTS



| | | |
|---------|---------|-------|
| | | |
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| 90031 | 14-6-90 | 2 |
| ECN NO. | DATE | ISSUE |

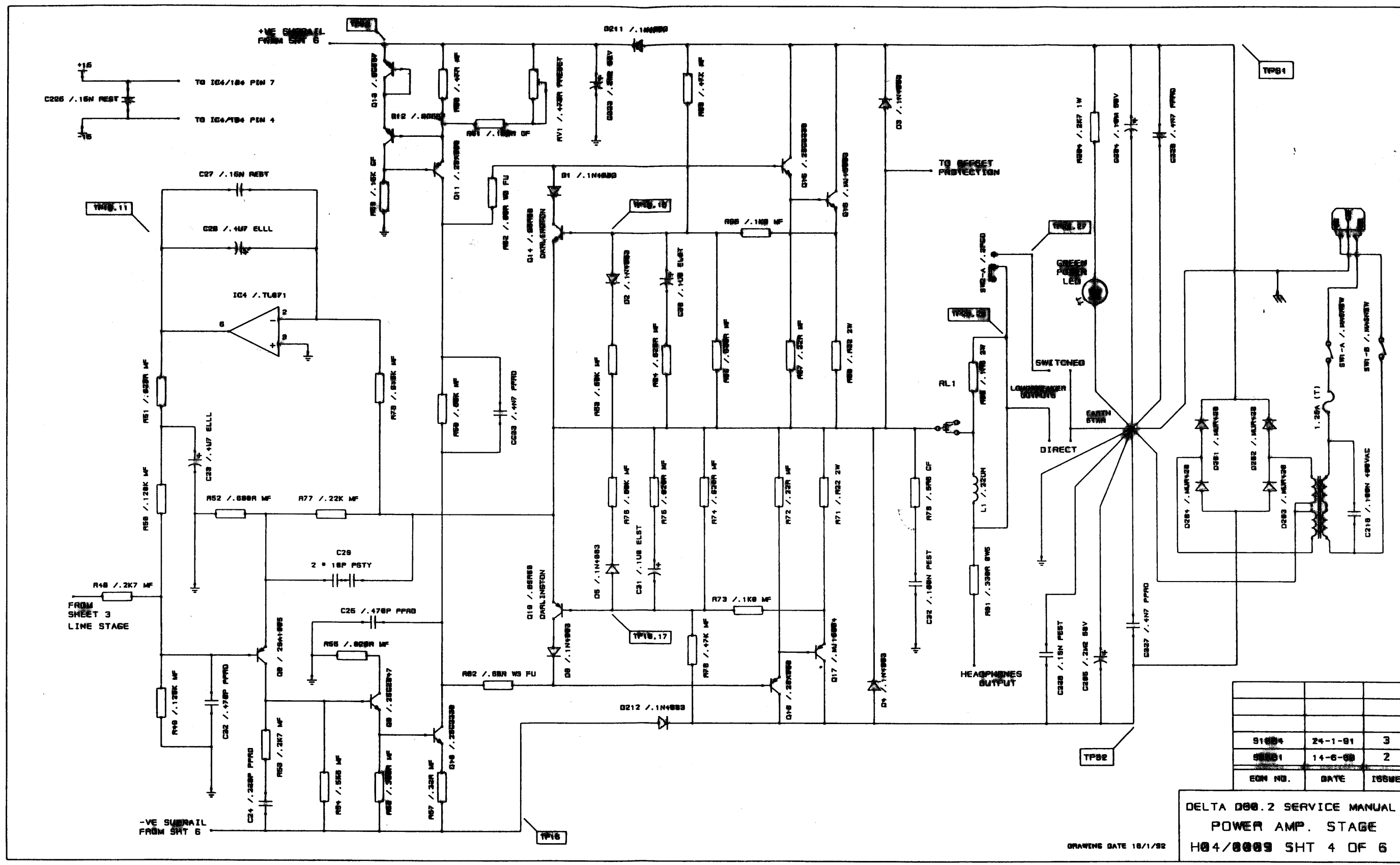
DELTA D90.2 AMP
 INPUT & RECORD SWITCHING
 C02/0022 SHT 2 OF 6



C12 INCORRECT POLARITY + CONNECTIONS
 R37 → 2K7

| | | |
|---------|---------|-------|
| | 31/3/93 | |
| 91004 | 24-1-91 | 3 |
| 90031 | 14-6-90 | 2 |
| ECN NO. | DATE | ISSUE |

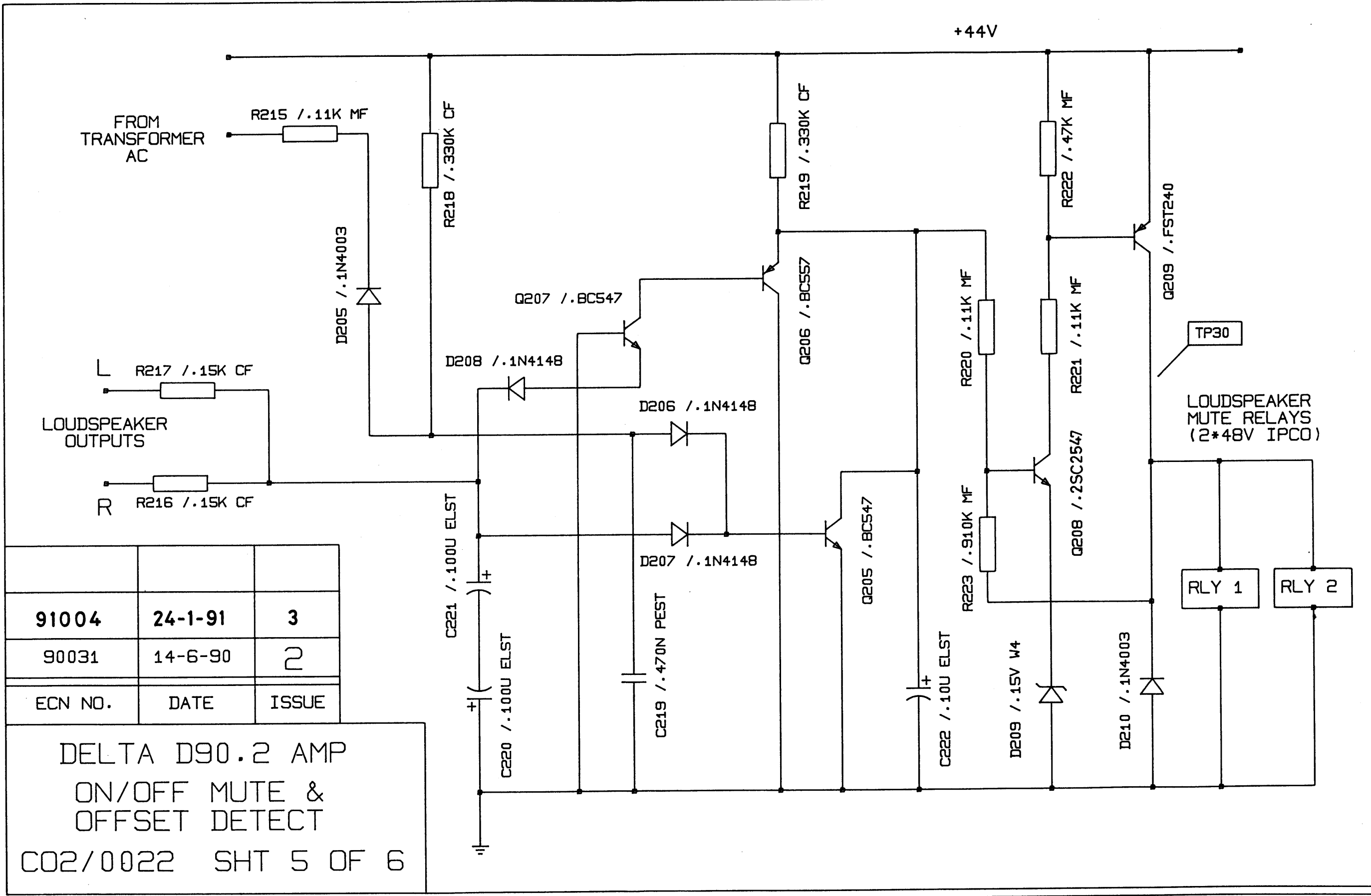
DELTA D90.2 AMPLIFIER
 LINE AMP & TONE CONTROLS
 C02/0022 SHT 3 OF 6



| | | |
|---------|---------|-------|
| 91004 | 24-1-91 | 3 |
| 91001 | 14-6-90 | 2 |
| EON NO. | DATE | ISSUE |

DELTA 060.2 SERVICE MANUAL
 POWER AMP. STAGE
 H04/0000 SHT 4 OF 6

DRAWING DATE 16/1/92



| | | |
|---------|---------|-------|
| | | |
| 91004 | 24-1-91 | 3 |
| 90031 | 14-6-90 | 2 |
| ECN NO. | DATE | ISSUE |

DELTA D90.2 AMP
 ON/OFF MUTE &
 OFFSET DETECT
 C02/0022 SHT 5 OF 6

| | | |
|---------|---------|-------|
| 91004 | 24-1-91 | 3 |
| 90031 | 14-6-90 | 2 |
| ECN NO. | DATE | ISSUE |

DELTA D90.2 AMPLIFIER
POWER SUPPLY STAGE
C02/0022 SHT 6 OF 6

