

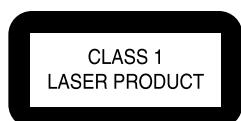
Service

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Service Manual



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1. Technical Specifications and Connection Facilities

1.1 VAD8041 functionality:

- Loading of 8 cm and 12 cm discs by a motorized tray
- Disc type recognition and in case of a DVD+RW disc laser power calibration
- Servo control for disc rotation, sledge movements, tilt, focus and actuator position
- EFM+ encoding / decoding for DVD, and EFM decoding for CD
- Writes and read DVD+RW discs and reads DVD, CD and CD-R/RW discs
- Linking control, header insertion and sector number updating at record
- Interfacing to the MPEG back-end for control and for data
- The back-end has to provide MPEG data processing, data buffering, construction of logical format for Lead-in, Data area and Lead-out part of the DVD+RW disc

1.2 Connections

The following interfaces are provided for connecting the drive to the MPEG back-end Application:

- Power Connector: 4-pin supply interface
- IDE Connector: 40-pin command and data transfer interface
- IDE Bus selection:
- Jumper Selection: 6-pin IDE Bus selector

1.3 Read and Write Speeds

Type of Disc (Function)	Disc Rotation Speed
Read Speed CD	CAV 7x
Read Speed DVD	CAV 4x
Write Speed DVD+RW	ZCAV 2.4x
Write Speed DVD+R	ZCAV 2.4x

2. Safety Instructions, Warnings and Notes

2.1 Safety Instructions

2.1.1 General Safety

Safety regulations require that during a repair:

- Connect the unit to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol **▲**, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that after a repair, you must return the unit in its original condition. Pay, in particular, attention to the following points:

- Route the wires/cables correctly, and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the electrical DC resistance between the mains plug and the secondary side:
 1. Unplug the mains cord, and connect a wire between the two pins of the mains plug.
 2. Set the mains switch to the 'on' position (keep the mains cord unplugged!).
 3. Measure the resistance value between the mains plug and the front panel, controls, and chassis bottom.
 4. Repair or correct unit when the resistance measurement is less than 1Ω .
 5. Verify this, before you return the unit to the customer/user (ref. UL-standard no. 1492).
 6. Switch the unit 'off', and remove the wire between the two pins of the mains plug.

2.1.2 Laser Safety

This unit employs a laser. Only qualified service personnel may remove the cover, or attempt to service this device (due to possible eye injury).

Laser Device Unit

Type	: Semiconductor laser GaAlAs
Wavelength	: 650 nm (DVD) : 780 nm (VCD/CD)
Output Power	: 20 mW (DVD+RW writing) : 0.8 mW (DVD reading) : 0.3 mW (VCD/CD reading)
Beam divergence	: 60 degree

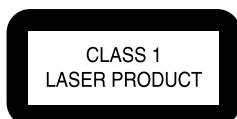


Figure 2-1 Class 1 Laser Product

Note: Use of controls or adjustments or performance of procedure other than those specified herein, may result in hazardous radiation exposure. Avoid direct exposure to beam.

2.2 Warnings

2.2.1 General

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, symbol **▲**). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are at the same potential as the mass of the set by a wristband with resistance. Keep components and tools at this same potential. Available ESD protection equipment:
 - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Be careful during measurements in the live voltage section. The primary side of the power supply (pos. 1005), including the heatsink, carries live mains voltage when you connect the player to the mains (even when the player is 'off!'). It is possible to touch copper tracks and/or components in this unshielded primary area, when you service the player. Service personnel must take precautions to prevent touching this area or components in this area. A 'lightning stroke' and a stripe-marked printing on the printed wiring board, indicate the primary side of the power supply.
- Never replace modules, or components, while the unit is 'on'.

2.2.2 Laser

- The use of optical instruments with this product, will increase eye hazard.
- Only qualified service personnel may remove the cover or attempt to service this device, due to possible eye injury.
- Repair handling should take place as much as possible with a disc loaded inside the player.
- Text below is placed inside the unit, on the laser cover shield:

CAUTION VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING VED ÅBNING UNDGÅ UDSETTELSE FOR STRÅLING ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING NÄR DENNA DEL ÄR ÖPPNAD BETRAKTA EJ STRÅLEN VARO! AVATTÄÄESSÄ OLET ALTTINA NÄKYVÄLLE JA NÄKYMÄT ÖMÄLLÉ LASER SÄTEILYLLE. ÄÄLA KATSO SÄTEESEN VORSICHT SICHTBARE UND UNSICHTBARE LASERSTRÄHLUNG WENN ABDECKUNG GEÖFFNET NICHT DEM STRAHL AUSSETZEN DANGER VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM ATTENTION RAYONNEMENT LASER VISIBLE ET INVISIBLE EN CAS D'OVERTURE EXPOSITION DANGEREUSE AU FAISCEAU

Figure 2-2 Warning text

3. Directions For Use

Not applicable

4. Mechanical Instructions

Note that exploded views can be found in chapter 10

4.1 General

Follow the dismantling instructions in described order.
Never touch the lens of the OPU.
Take sufficient ESD measures during handling.

4.2 Dismantling

You can divide the Basic Engine into the following parts:

1. Loader (frame and tray)
2. PWB
3. DVD-Mechanism (OPU, traverse with turntable motor and sledge-motor assy)
4. Encasing

4.3 Cabinet

- Remove the encasing by releasing the four screws at the underside of the drive, see figure 4-1
- Make sure that you do not lose the 5 heat paths (gray rubber pieces that conduct the heat from the ICs to the case)!
- If you need to measure on the PCB while a disc is inserted, the top case should be applied again onto the drive. In this way the clamping mechanism is established.

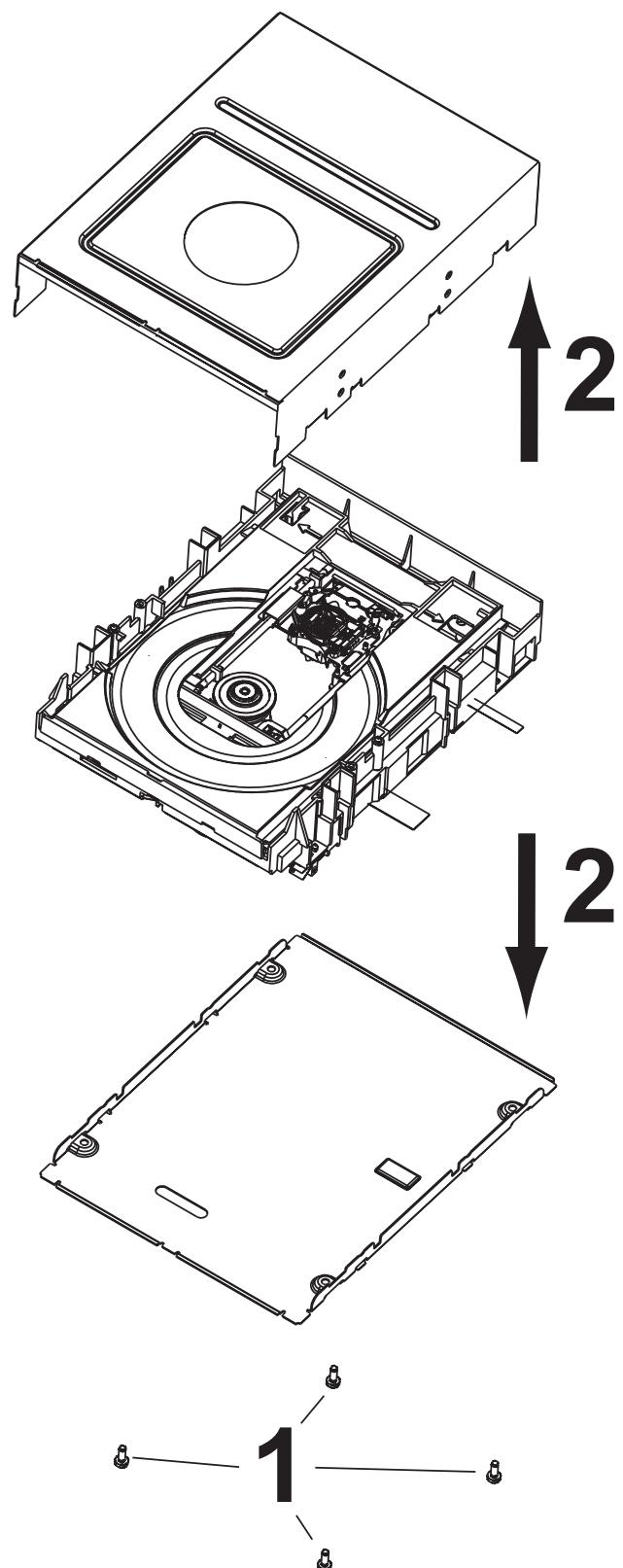


Figure 4-1 Basic Engine dismantling (part1)

4.4 Tray

- Remove encasing as described in 4.3
- Disengage the two holders that fix the tray [1], see figure 4-2, and pull out the tray [2]

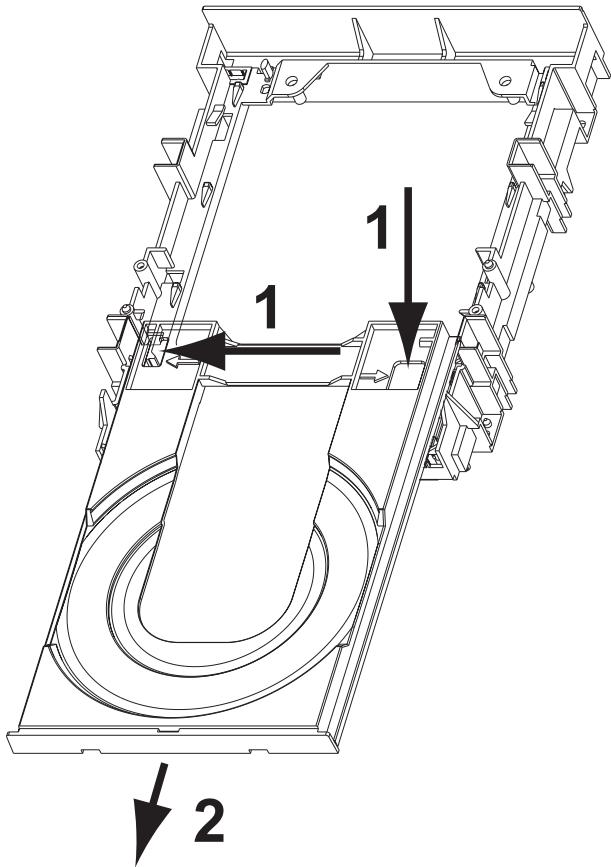


Figure 4-2 Remove Tray

4.5 Printed Board

Note: After exchanging the PWB (or the DVD-M) the complete drive has to be adjusted! Run command 931 of DSW (AdjustLaserControl). Refer to chapter 8 for adjustment instructions!

- Remove encasing as described in 4.3
- Disconnect the 2 flex foils from the PWB connectors and the OPU flex
- Remove the 2 screws that hold the PWB, see figure 4-3
- Remove the PCB
- Remove the yellow plate if needed by releasing the 2 snap hooks

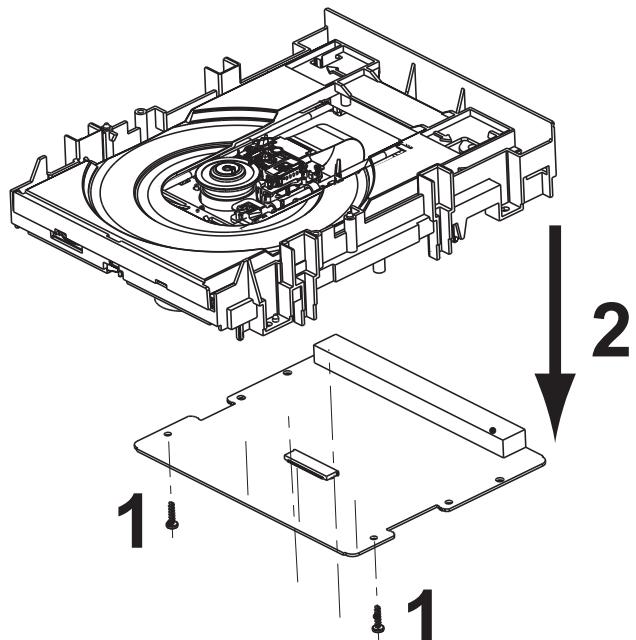


Figure 4-3 Remove PWB

4.6 DVD-M

Caution: Never try to align or repair the DVD-Module itself! Only the factory can do this properly. Service engineers are only allowed to exchange the sledge motor assy. After Exchanging the DVD-M (or the PWB) the complete drive has to be adjusted! Run command 931 of DSW (AdjustLaserControl). Refer to chapter 8 for adjustment instructions!

- Remove PCB as described in 4.5
- Remove the four screws [1], see figure 4-4.
- Now you can remove the DVDM

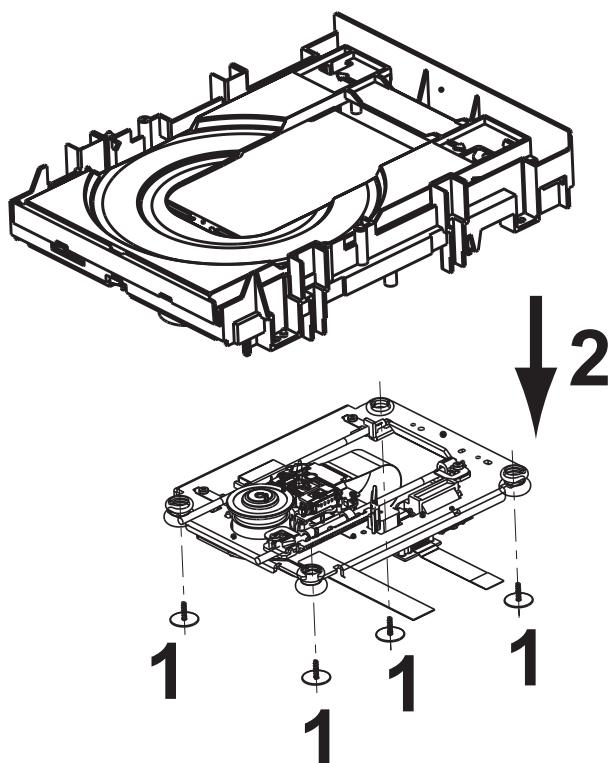


Figure 4-4 Remove DVDM

4.7 Sledge Motor Assembly

Caution: Never try to align or repair the DVD-Module itself!
Only the factory can do this properly. Service engineers are only allowed to exchange the sledge motor assy.

- Eject the tray.
- Remove the 2 screws that hold the sledge motor, see figure 4-5
- Remove the sledge motor

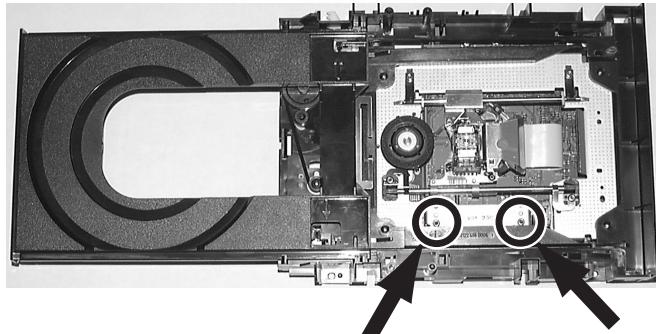


Figure 4-5 Remove Sledge Motor Assy

4.8 Re-assembly

To re-assemble the module, do all processes in reverse order.
Take care of the following:

- **Complete module:** Place all wires/cables in their original position
- **Heat Paths:** Put the 5 heat paths (gray rubber pieces) back to their position on the ICs, see figure 4-6.
- **Emergency opening slot:** Be sure that the slot for the emergency tray opener is covered by adhesive tape!
- **Jumper selection:** Jumper has to be in position "Master"!

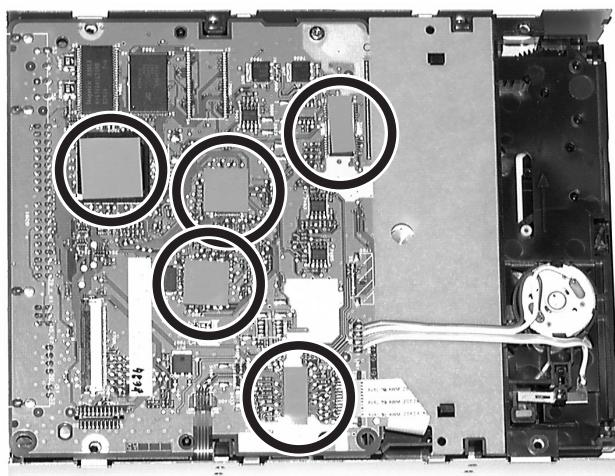


Figure 4-6 Heat Path

5. Service Modes, Error Codes and Fault Finding

5.1 General

Please refer to the service manual of the recorder for a description of the complete Diagnostics Software. In this manual only drive specific error codes are explained.

5.2 Self test

A power on self-test is incorporated in the software of this drive. With DSW command 902 (Chrysalis Mpeg Codec) the set software can retrieve the result of the self-test.

```
DS:> 902
090207:
Self-test result byte : 00000000
Self-test result byte : 00000001
Self-test result byte : 00001000
Test OK @

DS:>
```

Figure 5-1 Example, nucleus 902 showing no communication with the OPU

Following table gives the output format of this nucleus.

Byte	Bit 7	6	5	4	3	2	1	0
0	Reserved				tray*	ttm*	pcs*	laser forward sense
1	Reserved			real dsp*	hdr80	cheetah	laconic	elantec
2	Reserved				eeprom	eeprom checksum*	eeprom empty*	iic

*error code not detected in VAD8031/VAD8041

Forward Sense Tests if the forward sense value measured during drive startup is within normal range
 HDR80 Performs a read/write test on a register (HDR 80 is an internal module of Centaurus)
 Cheetah Performs a read/write test on a register
 Laconic Read the IC version (fixed) and checks if it's ok
 Elantec Performs a read/write test on a register
 Eeprom Performs a read/write test on an address
 I2C Tries addressing all I2C devices in the system - if one fails, this test fails

Please note that if the I2C test fails, most other IC tests will fail as well.

Figure 5-2 Self test Results

5.3 Error Codes

With DSW command 910 (Digital Board Chrysalis) the set software can retrieve an overview of all occurred engine errors.

```
D&S - HyperTerminal
File Edit View Call Transfer Help
D S C M W T
DS:> 910
Momentary errors (0-9): 0x21 0x00 0x00 0x20 0x00 0x00 0x00 0x00 0x00 0x00
Cumulative errors (1-9): 0x00 0x80 0x20 0x00 0x00 0x00 0x00 0x00 0x00
Software fatal assert : 256 cpowermanager.cpp
091000:
Test OK @
DS:>-
```

5.3.1 Momentary Errors

Byte 0: latest error:

Overview of the BE error codes.

error code	error	meaning
0x00	no_error	No error has occurred
0x01	illegal_command_error	Command not allowed in this state or unknown command
0x02	illegal_parameter_error	Parameter(s) not valid for this command
0x03	command_timeout_error	The maximum execution time for the command has exceeded
0x04	sledge_home_error	The sledge could not be moved home
0x05	sledge_calibration_error	An error occurred during calibration of the sledge
0x06	sledge_unstable_error	The sledge detected unstable control
0x07	speed_timeout_error	Spindle motor could not reach its target speed within timeout
0x08	speed_window_error	Measured spinning speed is not within expected window
0x09	focus_timeout_error	Focus could not be achieved within the timeout
0x0A	focus_retries_error	The amount of focus retries expired
0x0B	focus_agc_error	The focus agc results are out of range
0x0C	radial_timeout_error	Servo didn't get on track within the timeout
0x0D	radial_retries_error	Servo didn't get on track after several retries
0x0E	radial_agc_error	The radial agc results are out of range
0x0F	radial_init_error	Unreliable signal scaling after the radial initialisation
0x10	hf_pll_error	HF-decoder pll could not lock to HF signal
0x11	wobble_pll_error	Wobble pll could not lock to wobble signal
0x12	subcode_timeout_error	Subcode information could not be read
0x13	subcode_notfound_error	Requested subcode item could not be found
0x14	header_timeout_error	Header information could not be read
0x15	adip_timeout_error	Adip information could not be read
0x16	adip_window_error	Adip address was not within expected window
0x17	adip_sync_error	No adip sync was detected

error code	error	meaning
0x18	atip_timeout_error	Atip information could not be read
0x19	atip_notfound_error	Requested atip item could not be found
0x1A	atip_window_error	Atip address was not within expected window
0x1B	atip_sync_error	No atip sync was detected
0x1C	tray_error	Tray could not be closed or opened within the timeout
0x1D	seek_error	The requested seek couldn't be performed within the timeout
0x1E	no_hf_present_error	Attempt to read from a blank area
0x1F	record_error	An error occurred during the recording
0x20	illegal_stopaddress_error	The requested stopaddress with modify-stop-address is not valid
0x21	no_disc_error	No disc is detected
0x22	not_initialised_error	The system is not initialised (e.g. seek on unknown disc type)
0x23	illegal_medium_error	BE detected an unsupported medium during disc recognition
0x24	cd_frequency_error	Measured HF frequency is not within CD frequency range
0x25	dvd_frequency_error	Measured HF frequency is not within DVD frequency range
0x26	re-served(non_existing_bca_error)	Attempt to read non-existing bca information
0x27	reserved(bca_read_error)	An error occurred during reading of bca information
0x28	selftest_error	An error occurred during the self-test of the BE
0x29	i2c_error	The I2C interface does not operate
0x2A	laser_pll_error	Laser control pll did not lock or lost lock on write clock
0x2B	laser_forward_sense_error	Forward sense value didn't change with changing laser power
0x2C	jitter_optimisation_error	An error occurred during optimisation of the jitter
0x2D	tilt_calibration_error	An error occurred during calibration of the tilt frame
0x2E	reserved	
0x2F	frontend_offset_calib_error	The offset in the frontend couldn't be calibrated
0x30	reserved	
0x31	wsg_calculation_error	An error occurred in the calculation of the write strategy
0x32	buffer_overrun_error	The buffer input stream overran the buffer output stream
0x33	return_value_invalid_error	The requested information is not available for this inquiry
0x34	illegal_recording_speed_error	The selected speed is not allowed for a recording on this medium
0x35	opc_media_parameter_error	The media parameters (info in ATIP/ADIP) are invalid or not read
0x36	opc_record_power_error	The final optimum power was not reached
0x37	opc_start_power_low_error	OPC start power too low (optimum power is higher)
0x38	opc_start_power_high_error	OPC start power too high (optimum power is lower)

error code	error	meaning
0x39	opc_power_calculation_error	Error during OPC power calculation (samples are wrong)
0x3A	opc_test_zone_full_error	OPC can't be performed because test zone is full
0x3B	opc_bad_jitter_measurement_error	The jitter measurement during OPC samples readback failed
0x3C	opc_read_samples_error	An error occurred during OPC readback sampling
0x3D	ropc_alpha_overflow_error	The determined value for the optimum power is too high
0x3E	ropc_alpha_ref_current_error	The alpha measurement reference current is wrong (IAN)
0x3F	ropc_alpha_gain_error	The alpha measurement alpha gain is wrong
0x40	beta_over_under_flow_error	During the walking OPC a beta over-/under-flow was detected
0x41	not_enough_calib_points_error	Not enough valid calibration points available for re-calibration
0x42	not_enough_power_error	The calculated power during re-calibration exceeds max power
0x43	illegal_reading_speed_error	The selected speed is not allowed for the requested command
0x44	servo_fatal_error	The actuator dissipation became too high during a servo recovery

This error is overwritten by the next player / inquiry command.

Byte 1 - 9: cumulative errors of previous error occurrences.
 Every individual error has its own bit in the 9-byte structure as described in the drawing below:

Format of the BE error bytes.

byte 1

b7	b6	b5	b4	b3	b2	b1	b0
reserved	FOCUS AGC ERROR	FOCUS RETRIES ERROR	FOCUS TIMEOUT ERROR	RADIAL AGC ERROR	RADIAL RETRIES ERROR	RADIAL TIMEOUT ERROR	RADIAL INIT ERROR

byte 2

TRAY ERROR	reserved	JITTER OPTIMIZATION ERROR	SLEDGE HOME ERROR	SLEDGE UNSTABLE ERROR	SLEDGE CALIBRATION ERROR	TILT SENSOR OFFSET CALIBRATION ERROR	TILT CALIBRATION ERROR
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byte 3

RECORD ERROR	SEEK ERROR	NO DISC ERROR	NOT INITIALISED ERROR	ILLEGAL STOPADDRESS ERROR	ILLEGAL PARAMETER ERROR	ILLEGAL COMMAND ERROR	COMMAND TIMEOUT ERROR
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byte 4

SERVO FATAL ERROR	reserved	reserved	HF PLL ERROR	NO HF PRESENT ERROR	HEADER TIMEOUT ERROR	SUBCODE NOTFOUND ERROR	SUBCODE TIMEOUT ERROR
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byte5

WOBBLE PLL ERROR	ADIP SYNC ERROR	ADIP WINDOW ERROR	ADIP TIMEOUT ERROR	ATIP NOTFOUND ERROR	ATIP SYNC ERROR	ATIP WINDOW ERROR	ATIP TIMEOUT ERROR
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byte6

WSG CALCULATION ERROR	DVD FREQUENCY ERROR	CD FREQUENCY ERROR	ILLEGAL RECORDING SPEED ERROR	SPEED WINDOW ERROR	SPEED TIMEOUT ERROR	NON EXISTING BCA ERROR	BCA READ ERROR
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byte7

LASER FORWARD SENSE ERROR	NVRAM CHECKSUM UPDATE ERROR	FRONTEND OFFSET CALIBRATION ERROR	LASER PLL ERROR	ILLEGAL READING SPEED ERROR	ILLEGAL MEDIUM ERROR	SELFTEST ERROR	I ² C ERROR
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byte8

OPC READ SAMPLES ERROR	OPC BAD JITTER MEASUREMENT ERROR	OPC TEST ZONE FULL ERROR	OPC POWER CALCULATION ERROR	OPC START POWER HIGH ERROR	OPC START POWER LOW ERROR	OPC RECORD POWER ERROR	OPC MEDIA PARAMETER ERROR
------------------------	----------------------------------	--------------------------	-----------------------------	----------------------------	---------------------------	------------------------	---------------------------

byte9

RETURN VALUE INVALID ERROR	BUFFER OVERRUN ERROR	BETA OVER/UNDER FLOW ERROR	NOT ENOUGH CALIB POINTS ERROR	NOT ENOUGH POWER ERROR	ROPC ALPHA GAIN ERROR	ROPC ALPHA REF CURRENT ERROR	ROPC ALPHA OVERFLOW ERROR
----------------------------	----------------------	----------------------------	-------------------------------	------------------------	-----------------------	------------------------------	---------------------------

These errors are kept in memory until a power down of the drive (e.g. when recorder goes to standby) or reset of the drive.

5.3.2 Cumulative errors

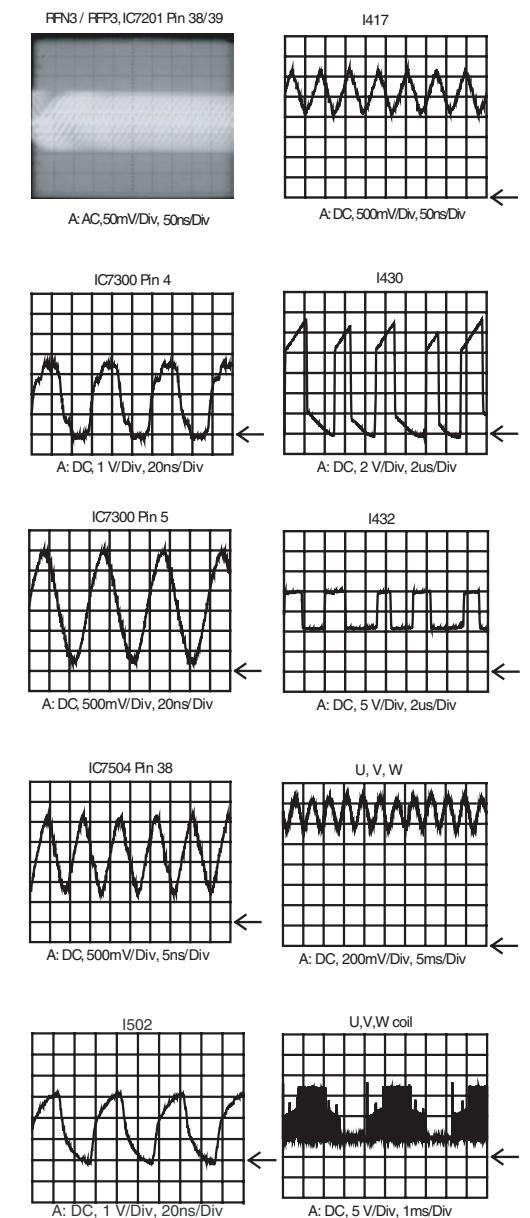
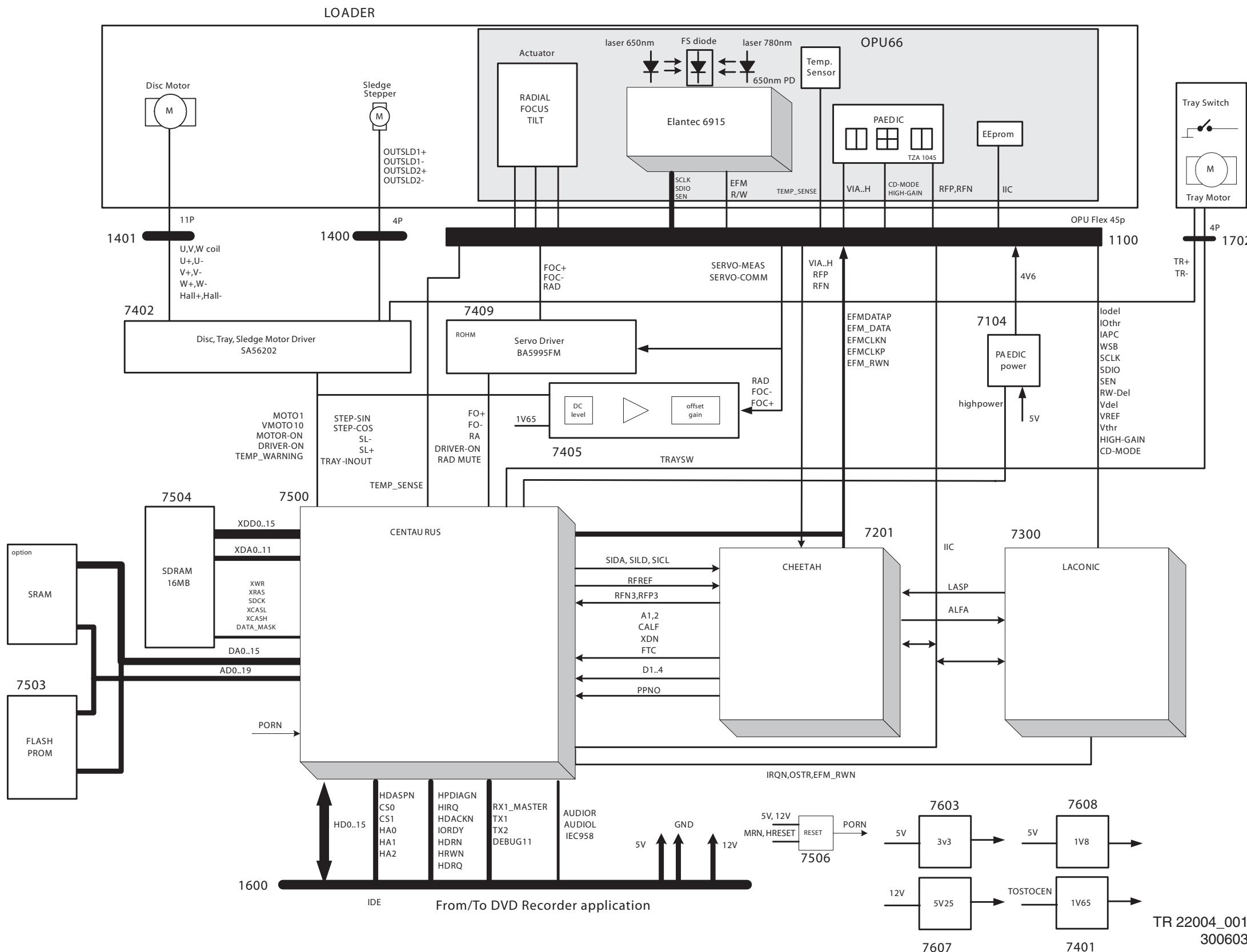
These errors are stored in EEPROM and are thus non-volatile showing the complete error history of the drive.
Byte 1 - 9: cumulative errors of previous player / inquiry error occurrences. These bytes are the same as the nine bytes (1-9) of the Momentary errors

5.3.3 Software fatal assert

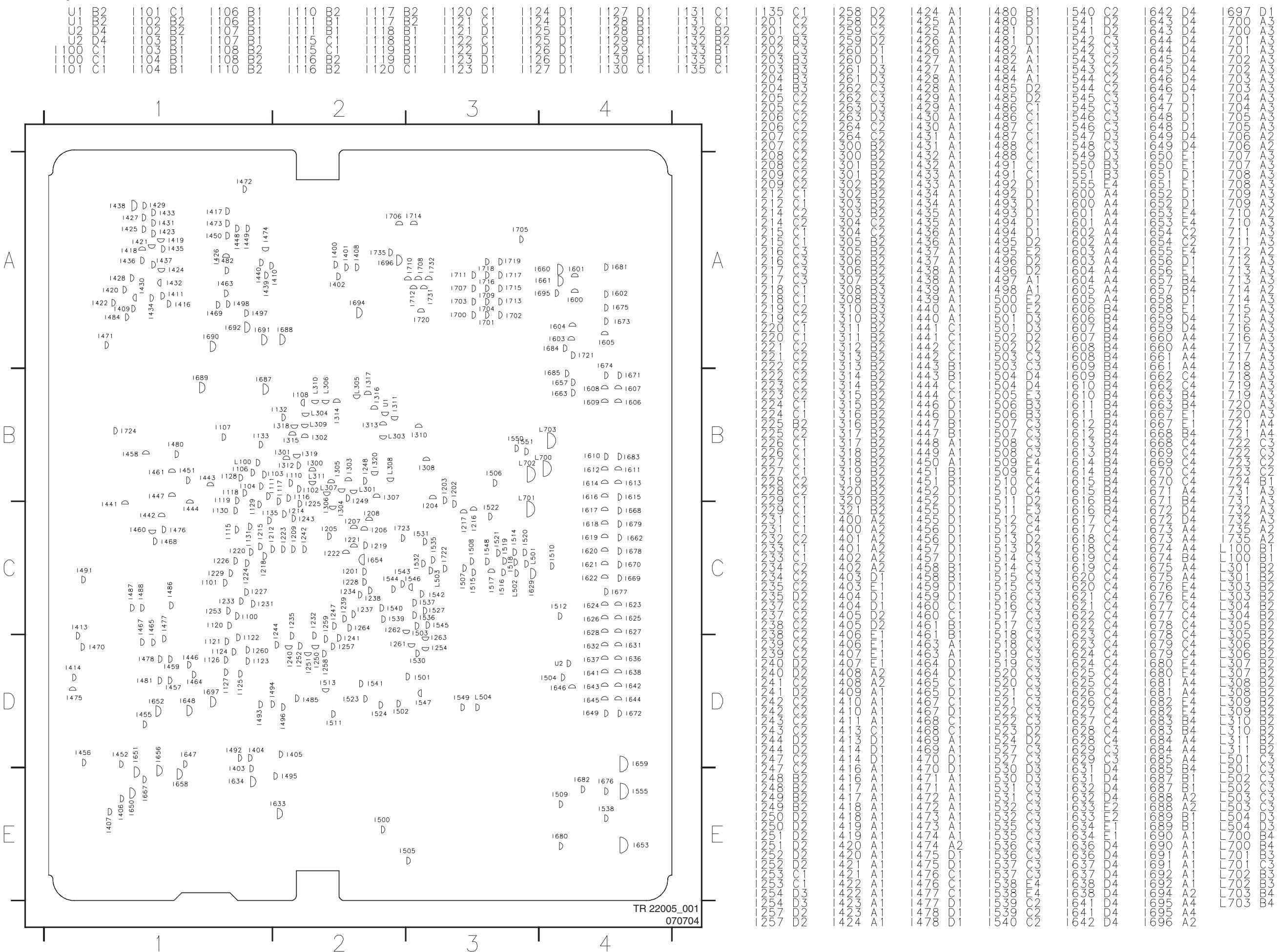
Gives row number and file name in the source code of the firmware of the data path of the AV3

6. Block Diagrams, Waveforms, Wiring Diagram.

Block Diagram

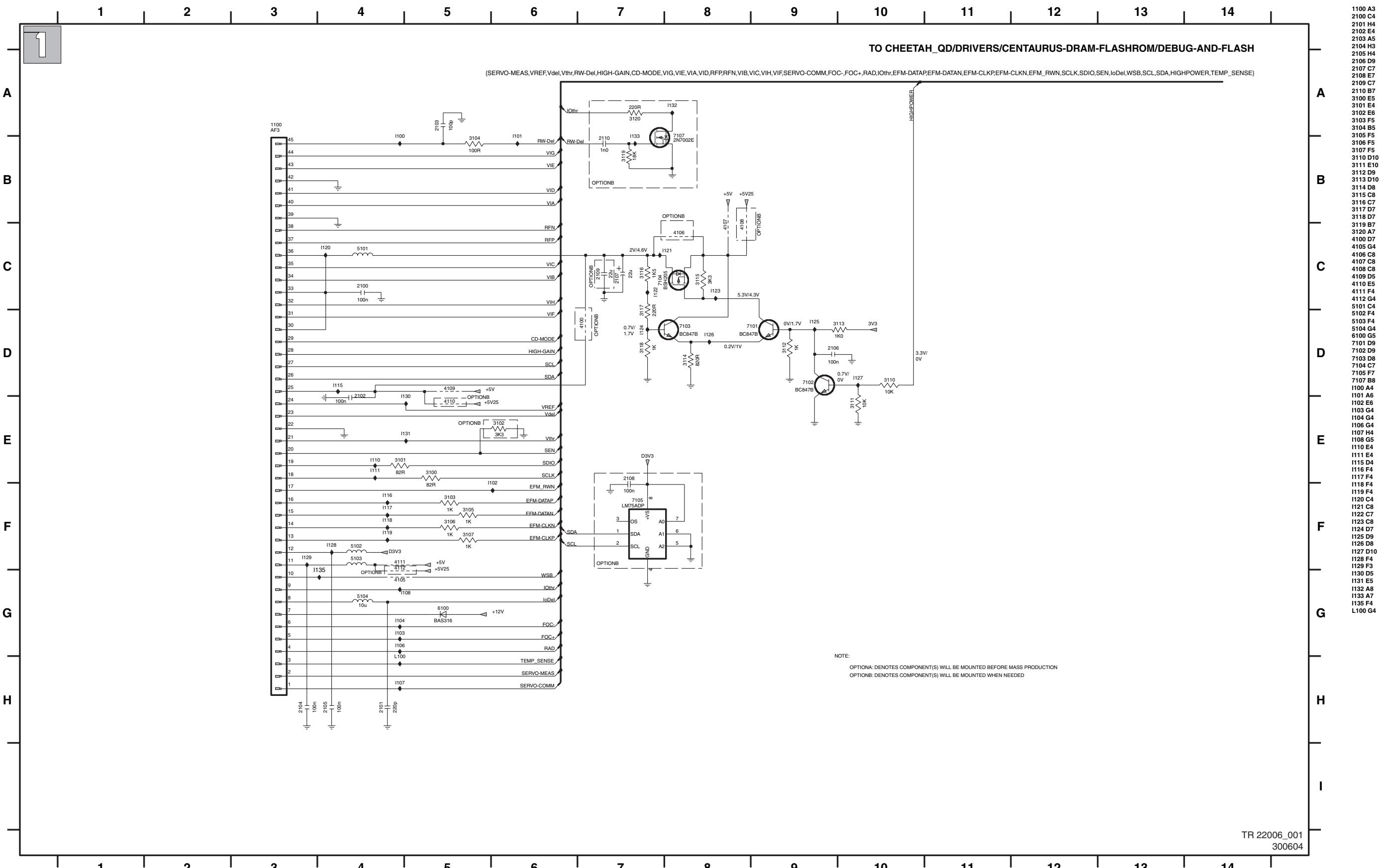


TR 22004_001
300603

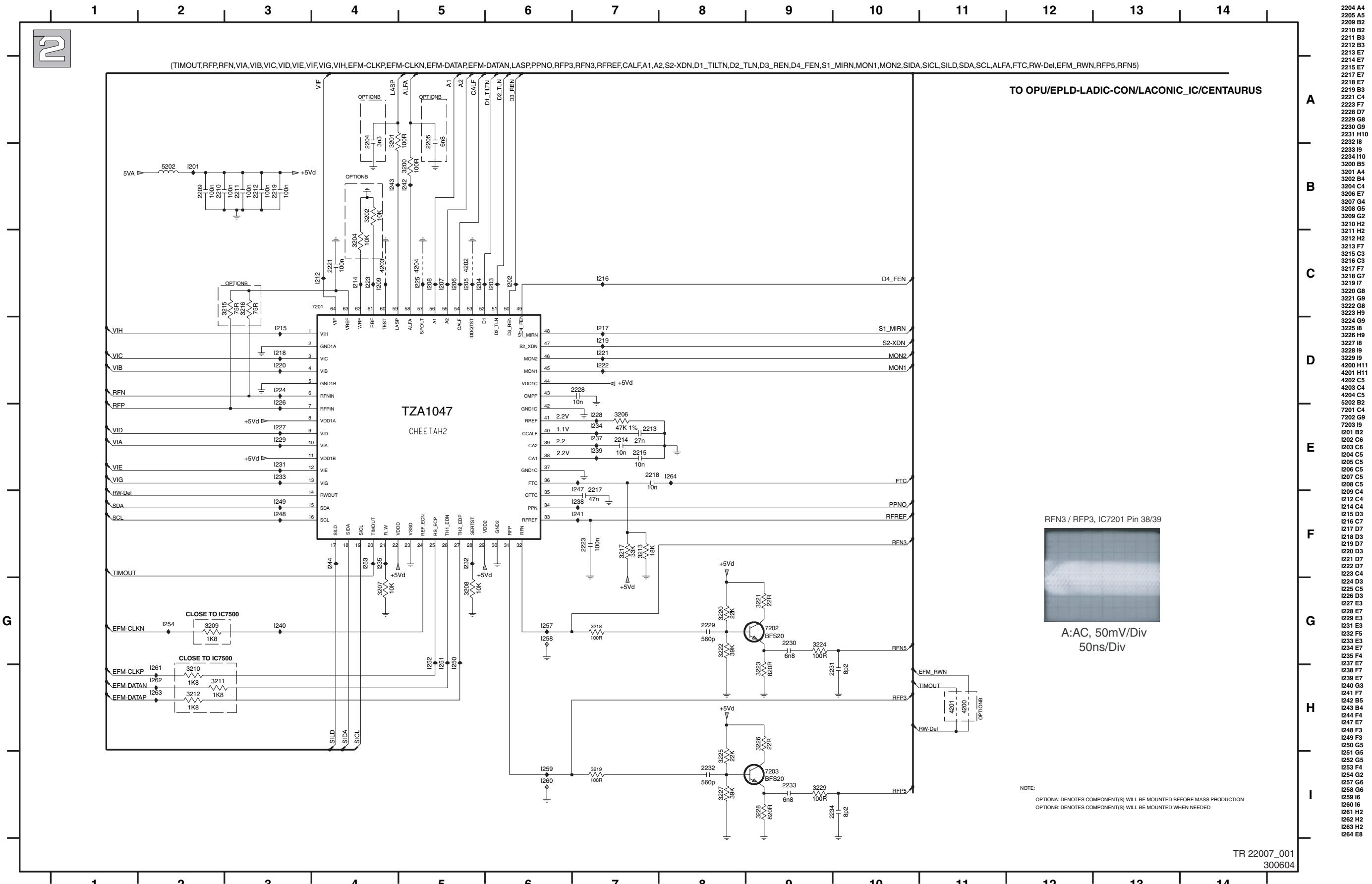
Testpoints Overview

7. Electrical Diagrams and Print-Layouts

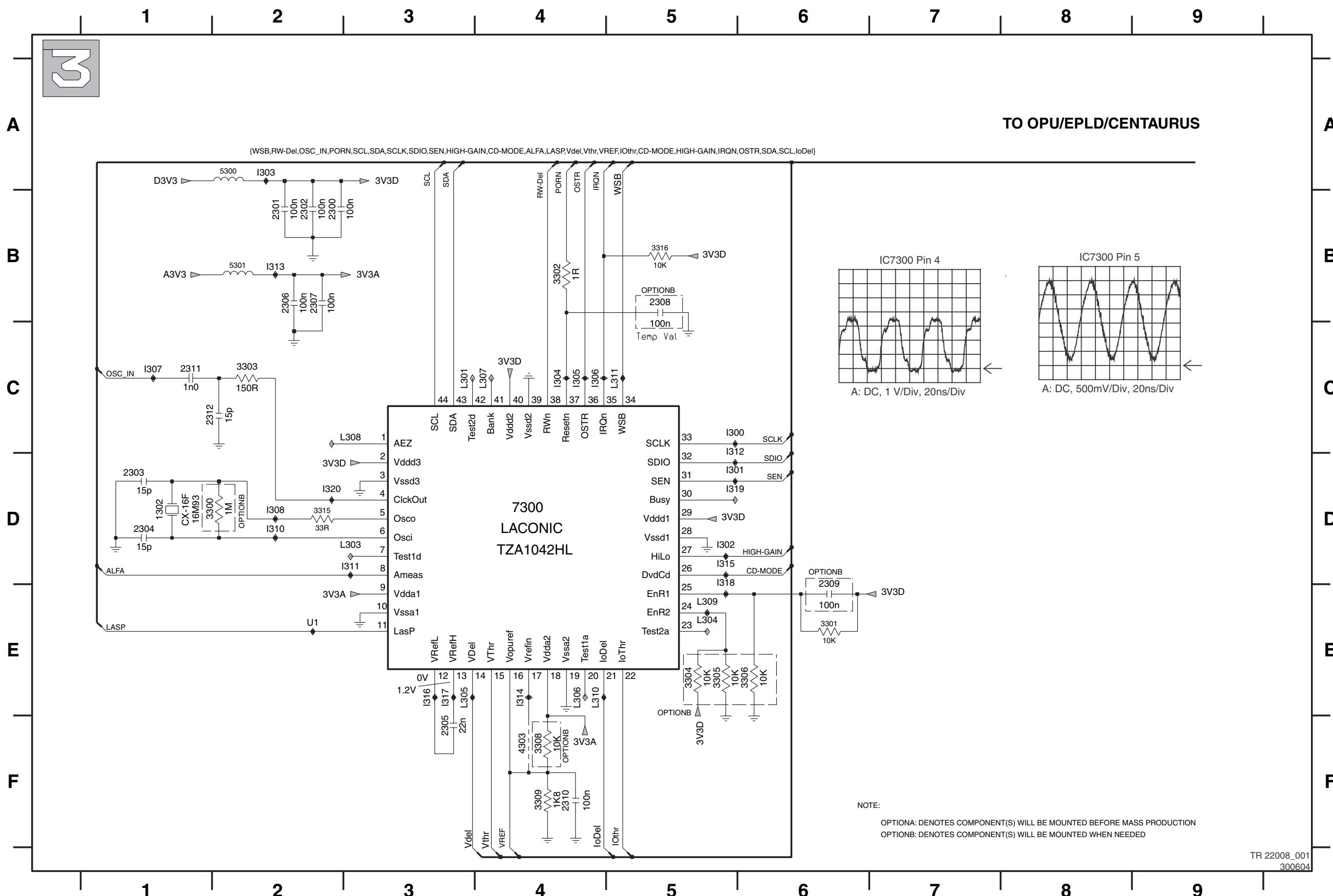
Servo Board: OPU Interface



Servo Board: Cheetah

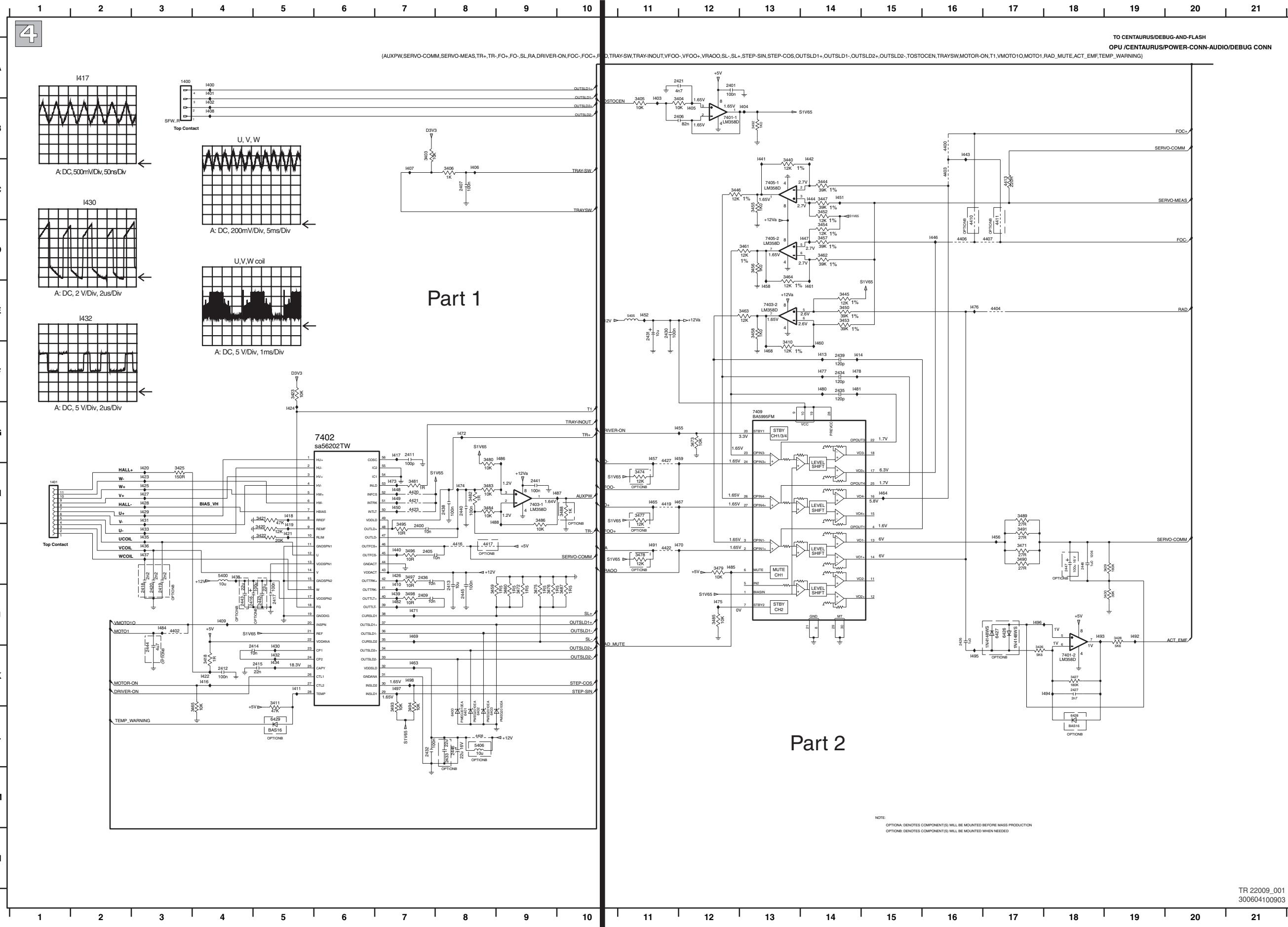


2204 A4
 2205 A5
 2206 B2
 2210 B2
 2211 B3
 2212 B3
 2213 ET
 2216 E7
 2215 ET
 2217 ET
 2218 B3
 2221 C4
 2222 F7
 2228 D7
 2229 G8
 2231 H10
 2232 I8
 2234 I10
 3200 B5
 3201 A4
 3202 B4
 3204 C4
 3206 E7
 3207 G4
 3208 G5
 3209 G2
 3210 H2
 3211 H2
 3212 H2
 3213 F7
 3215 C3
 3217 F7
 3218 G7
 3219 I7
 3220 G8
 3221 G9
 3222 G8
 3223 H9
 3224 G9
 3225 I8
 3226 H9
 3227 I8
 3228 I9
 3229 I9
 4200 H11
 4201 H11
 4202 C5
 4203 C4
 4204 C5
 5202 B2
 7201 C4
 7202 G9
 7203 I9
 7204 H2
 7205 C6
 7206 C5
 7207 C5
 7208 C5
 7209 C4
 7210 C4
 7211 D3
 7212 D3
 7213 D7
 7214 D7
 7215 C4
 7216 C4
 7217 D3
 7218 D3
 7219 D7
 7220 D7
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 7222 D3
 7223 C4
 7224 D3
 7225 C5
 7226 D3
 7227 E3
 7228 E7
 7229 E3
 7230 F5
 7231 E3
 7232 E3
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 7243 B4
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 7254 E7
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 7264 E8

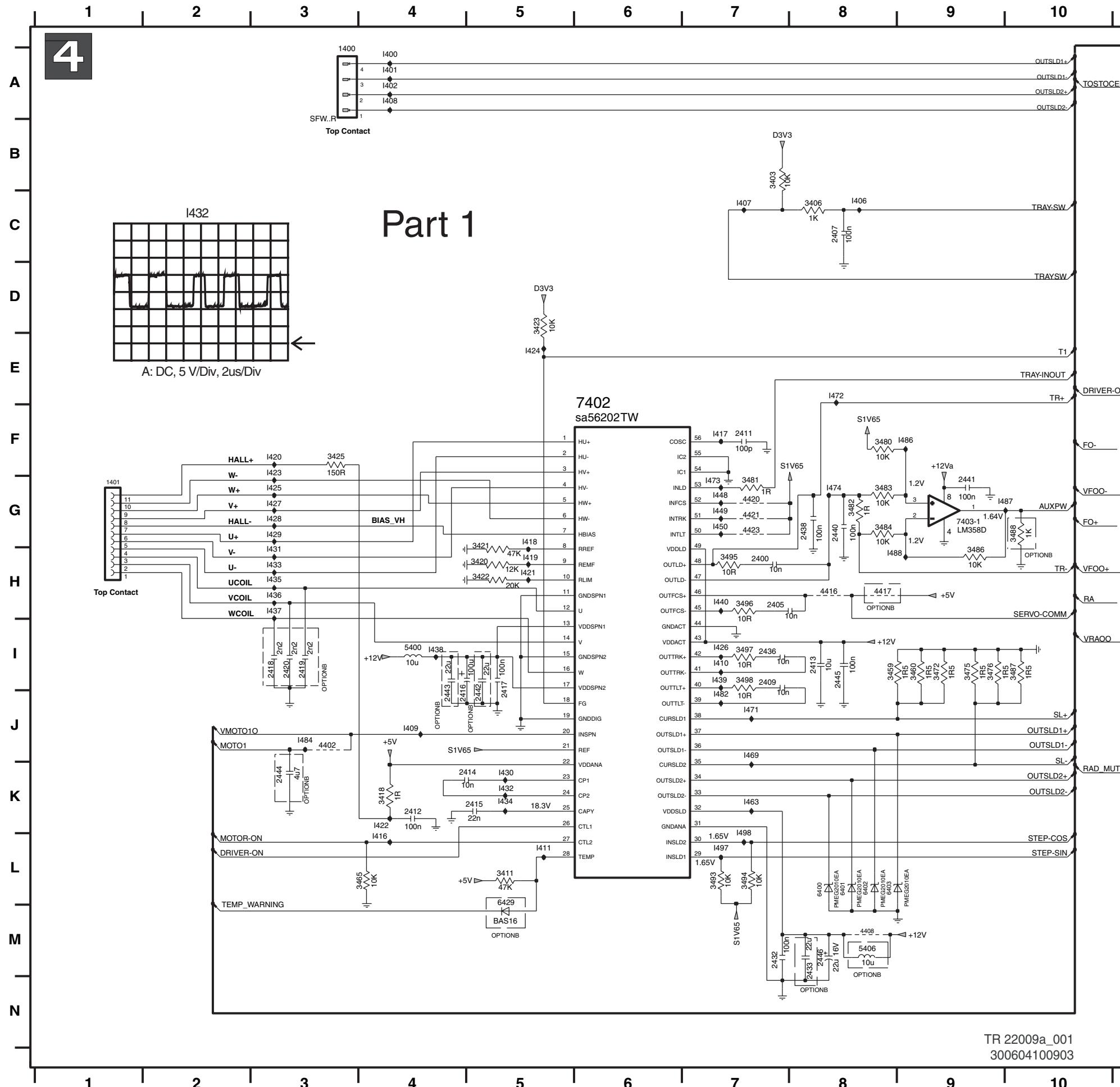
Servo Board: Laconic

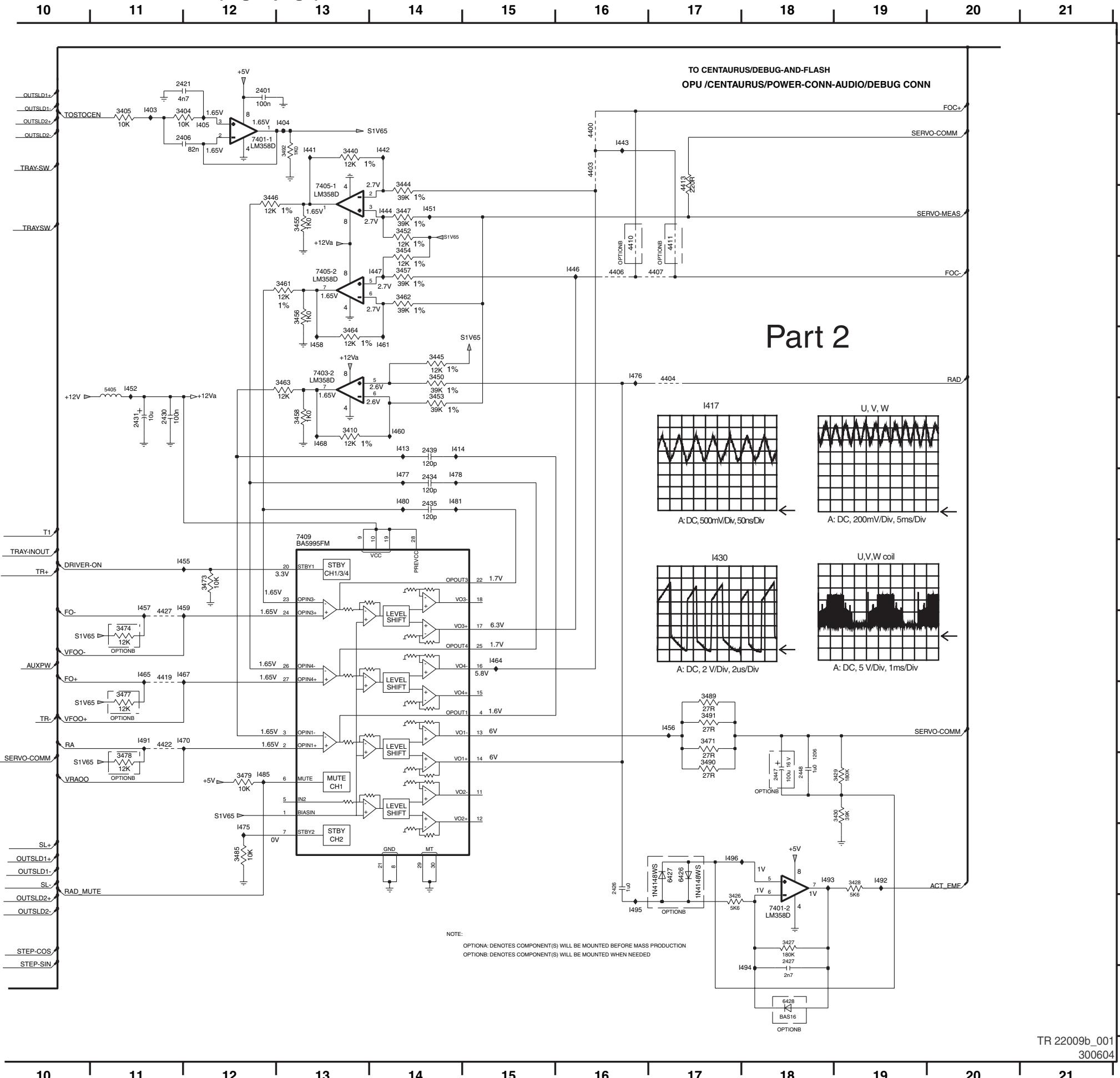
U1 E2
1302 D1
2300 B2
2301 B2
2302 B2
2303 D1
2304 D1
2305 F3
2306 B2
2307 B2
2308 B5
2309 E6
2310 F4
2311 C1
2312 C2
3300 D2
3301 E6
3302 B4
3303 C2
3304 E5
3305 E5
3306 E6
3308 F4
3309 F4
3315 D2
3316 B5
4303 F4
5300 A2
5301 B2
7300 D4
I300 C5
I301 D5
I302 D5
I303 A2
I304 C4
I305 C4
I306 C4
I307 C1
I308 D2
I310 D2
I311 D3
I312 C5
I313 B2
I314 E4
I315 D5
I316 E3
I317 E3
I318 D5
I319 D5
I320 D2
L301 C3
L303 D3
L304 E5
L305 E3
L306 E4
L307 C4
L308 C3
L309 E5
L310 E4
L311 C5

Servo Board: Drivers (Overview)

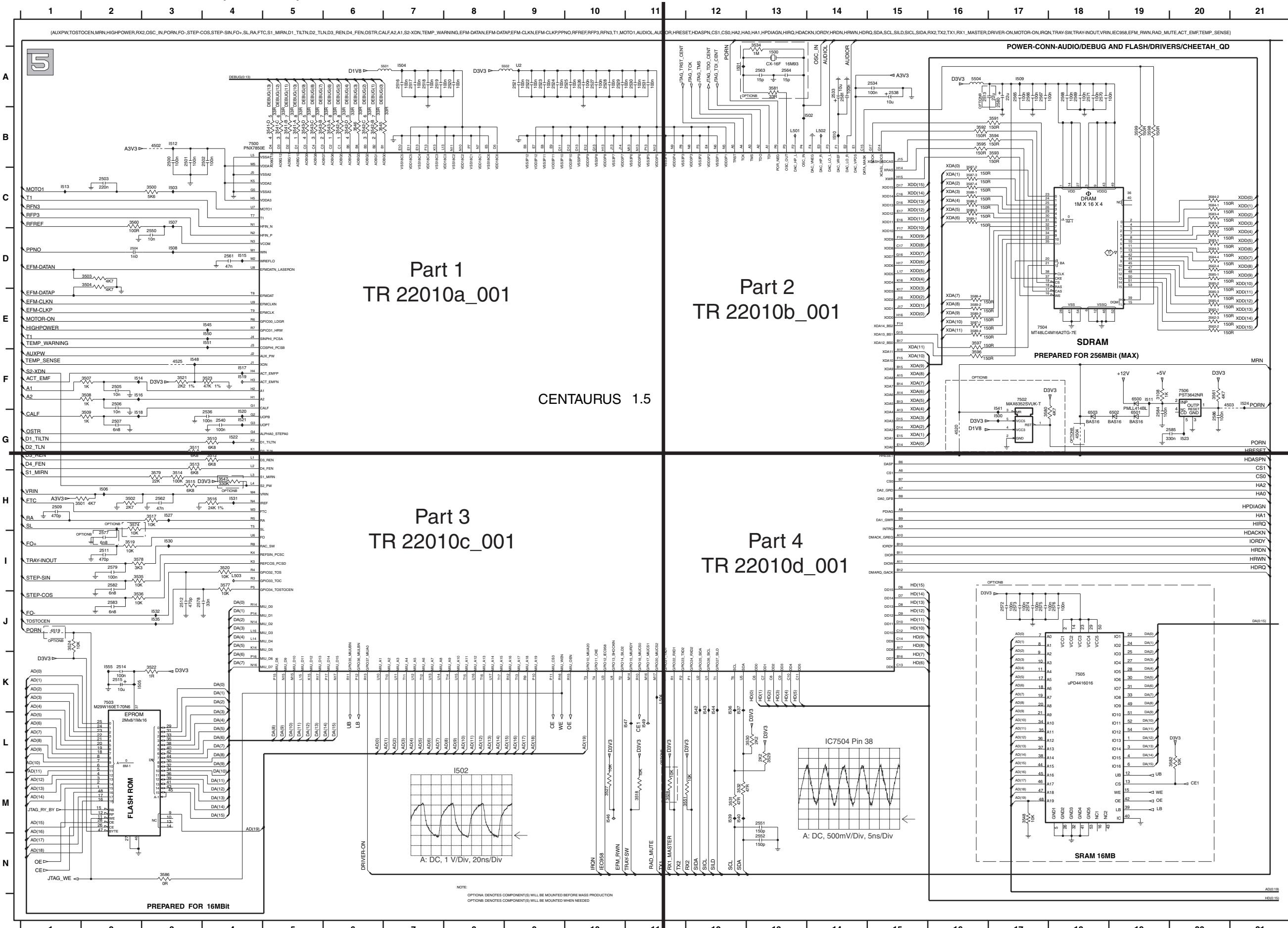


	I434 K5
1	I401 H1
2	I435 I3
3	I400 I7
4	I436 I3
5	I401 A12
6	I437 I3
7	I401 J4
8	I438 I4
9	I400 G6
10	I439 J7
11	I401 G7
12	I440 I7
13	I441 I7
14	I442 I7
15	I443 I7
16	I444 I7
17	I445 I7
18	I446 I7
19	I447 I7
20	I448 I7
21	I449 I7
A	I450 I7
B	I451 I7
C	I452 I7
D	I453 I7
E	I454 I7
F	I455 I7
G	I456 I7
H	I457 I7
I	I458 I7
J	I459 I7
K	I460 I7
L	I461 I7
M	I462 I7
N	I463 I7

Servo Board: Drivers (Left page)

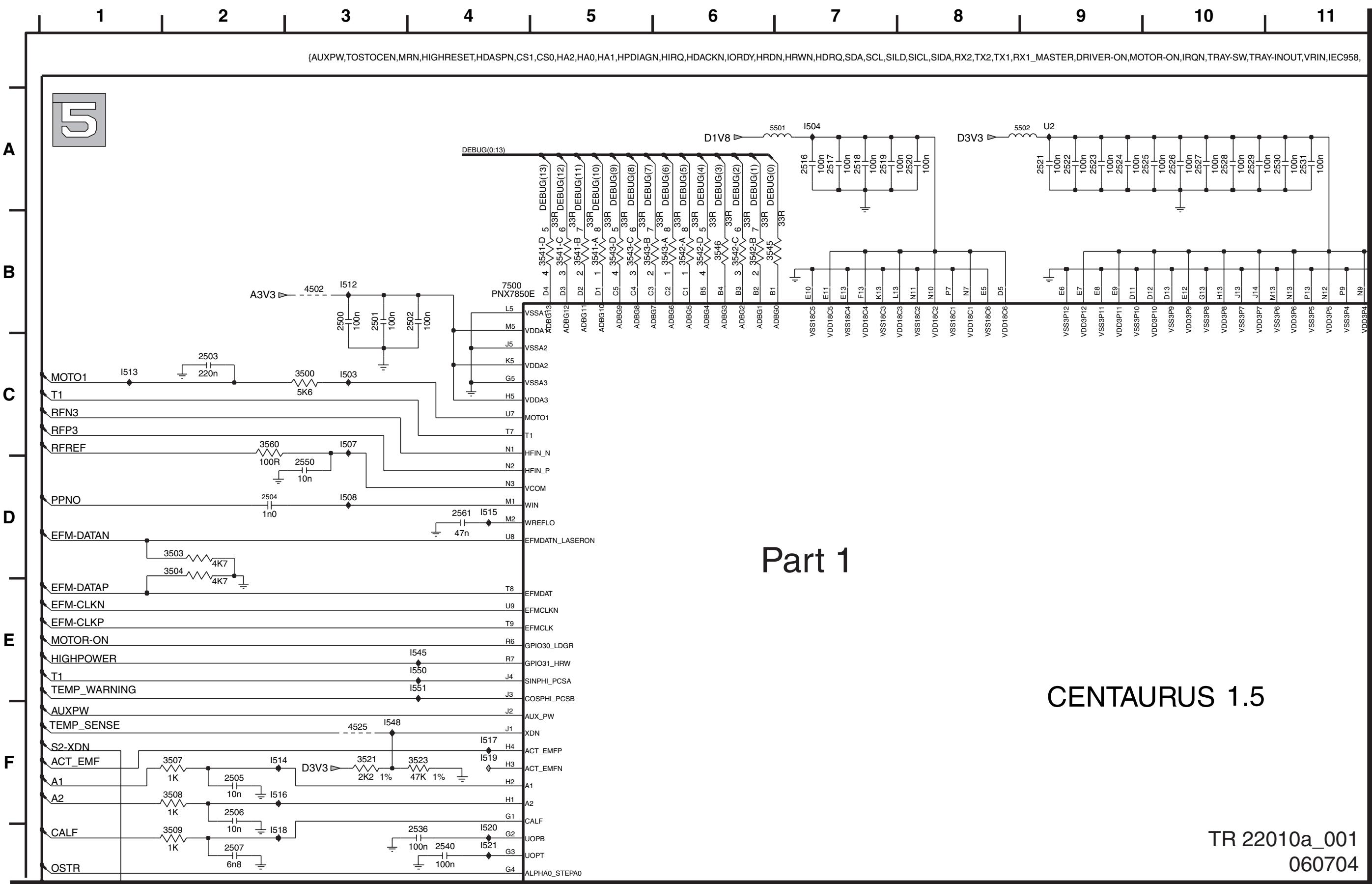
Servo Board: Drivers (Right page)

Servo Board: Centaurus (Overview)

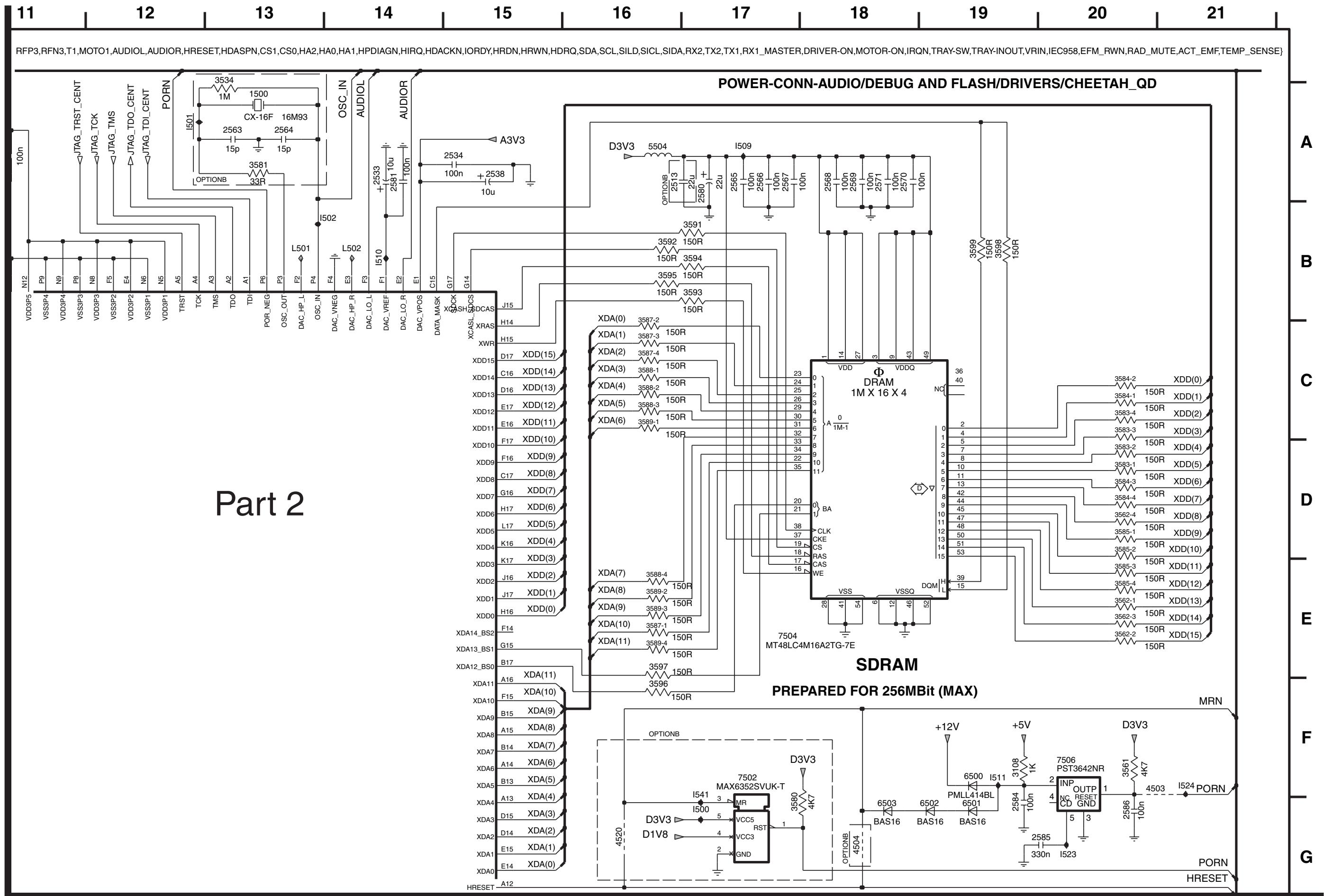


U2 A9 7600 B4
1500 A13 7502 F17
2500 B3 7504 E17
2501 G3 7506 F20
2502 C2 7508 F14
2503 C2 7509 F20
2504 G17 7509 G17
2505 A12 7509 G17
2506 F2 7509 G17
2507 G2 7509 G17
2508 C3 7509 G17
2509 K2 7509 G17
2510 H2 7509 G17
2511 J3 7509 G17
2512 J3 7509 G17
2513 A16 7509 G17
2514 A3 7509 G17
2515 K2 7509 G17
2516 A7 7509 G17
2517 A7 7509 G17
2518 A7 7509 G17
2519 A7 7509 G17
2520 A9 7509 G17
2521 A9 7509 G17
2522 A9 7509 G17
2523 A9 7509 G17
2524 A9 7509 G17
2525 A10 7509 G17
2526 A10 7509 G17
2527 A10 7509 G17
2528 A10 7509 G17
2529 A10 7509 G17
2530 A20 7509 G17
2531 A12 7509 G17
2532 A14 7509 G17
2533 A14 7509 G17
2534 A15 7509 G17
2535 A15 7509 G17
2536 A15 7509 G17
2537 A15 7509 G17
2538 A15 7509 G17
2539 A15 7509 G17
2540 A15 7509 G17
2541 A15 7509 G17
2551 M13 7509 G17
2552 M13 7509 G17
2553 D4 7509 G17
2554 K12 7509 G17
2555 A13 7509 G17
2556 A13 7509 G17
2557 A17 7509 G17
2558 A17 7509 G17
2559 A17 7509 G17
2560 A17 7509 G17
2561 D4 7509 G17
2562 D4 7509 G17
2563 K12 7509 G17
2564 A13 7509 G17
2565 A13 7509 G17
2566 A17 7509 G17
2567 A17 7509 G17
2568 A17 7509 G17
2569 A17 7509 G17
2570 A18 7509 G17
2571 A18 7509 G17
2572 A18 7509 G17
2573 A17 7509 G17
2574 A17 7509 G17
2575 A17 7509 G17
2576 A18 7509 G17
2577 A18 7509 G17
2578 A18 7509 G17
2579 A2 7509 G17
2580 A17 7509 G17
2581 A14 7509 G17
2582 A20 7509 G17
2583 J2 7509 G17
2584 G19 7509 G17
2585 G20 7509 G17
3108 F19 7509 G17
3501 G3 7509 G17
3501 H1 7509 G17
3502 H2 7509 G17
3503 D2 7509 G17
3507 F2 7509 G17
3508 F2 7509 G17
3510 G4 7509 G17
3511 G3 7509 G17
3512 G4 7509 G17
3513 G3 7509 G17
3514 H3 7509 G17
3515 H3 7509 G17
3516 H4 7509 G17
3517 H3 7509 G17
3518 M11 7509 G17
3519 M12 7509 G17
3520 I4 7509 G17
3521 F3 7509 G17
3522 G3 7509 G17
3523 F4 7509 G17
3524 J1 7509 G17
3527 A10 7509 G17
3528 A11 7509 G17
3529 L13 7509 G17
3530 L13 7509 G17
3531 D12 7509 G17
3532 M12 7509 G17
3534 A13 7509 G17
3535 E2 7509 G17
3541 B5 7509 G17
3542 B5 7509 G17
3543 C5 7509 G17
3544 C5 7509 G17
3545 E5 7509 G17
3546 B6 7509 G17
3547 H4 7509 G17
3548 C17 7509 G17
3551 M2 7509 G17
3560 C2 7509 G17
3561 G20 7509 G17
3562 E5 7509 G17
3563 E5 7509 G17
3564 C20 7509 G17
3565 C20 7509 G17
3566 D20 7509 G17
3567 D20 7509 G17
3568 E20 7509 G17
3569 E20 7509 G17
3570 E16 7509 G17
3571 E16 7509 G17
3572 E16 7509 G17
3573 E16 7509 G17
3574 H2 7509 G17
3575 H2 7509 G17
3576 H3 7509 G17
3577 G17 7509 G17
3578 H3 7509 G17
3579 H3 7509 G17
3580 G17 7509 G17
3581 G17 7509 G17
3582 L20 7509 G17
3583 E20 7509 G17
3584 E20 7509 G17
3585 E20 7509 G17
3586 E20 7509 G17
3587 E16 7509 G17
3588 E16 7509 G17
3589 E16 7509 G17
3590 E16 7509 G17
3591 B16 7509 G17
3592 B16 7509 G17
3593 B17 7509 G17
3594 B17 7509 G17
3595 B16 7509 G17
3596 F16 7509 G17
3597 E16 7509 G17
3598 E16 7509 G17
3599 B19 7509 G17
4502 B3 7509 G17
4503 B20 7509 G17
4504 G16 7509 G17
4519 J1 7509 G17
4520 G16 7509 G17
5501 G3 7509 G17
5502 A9 7509 G17
5503 G18 7509 G17

Servo Board: Centaurus Part1

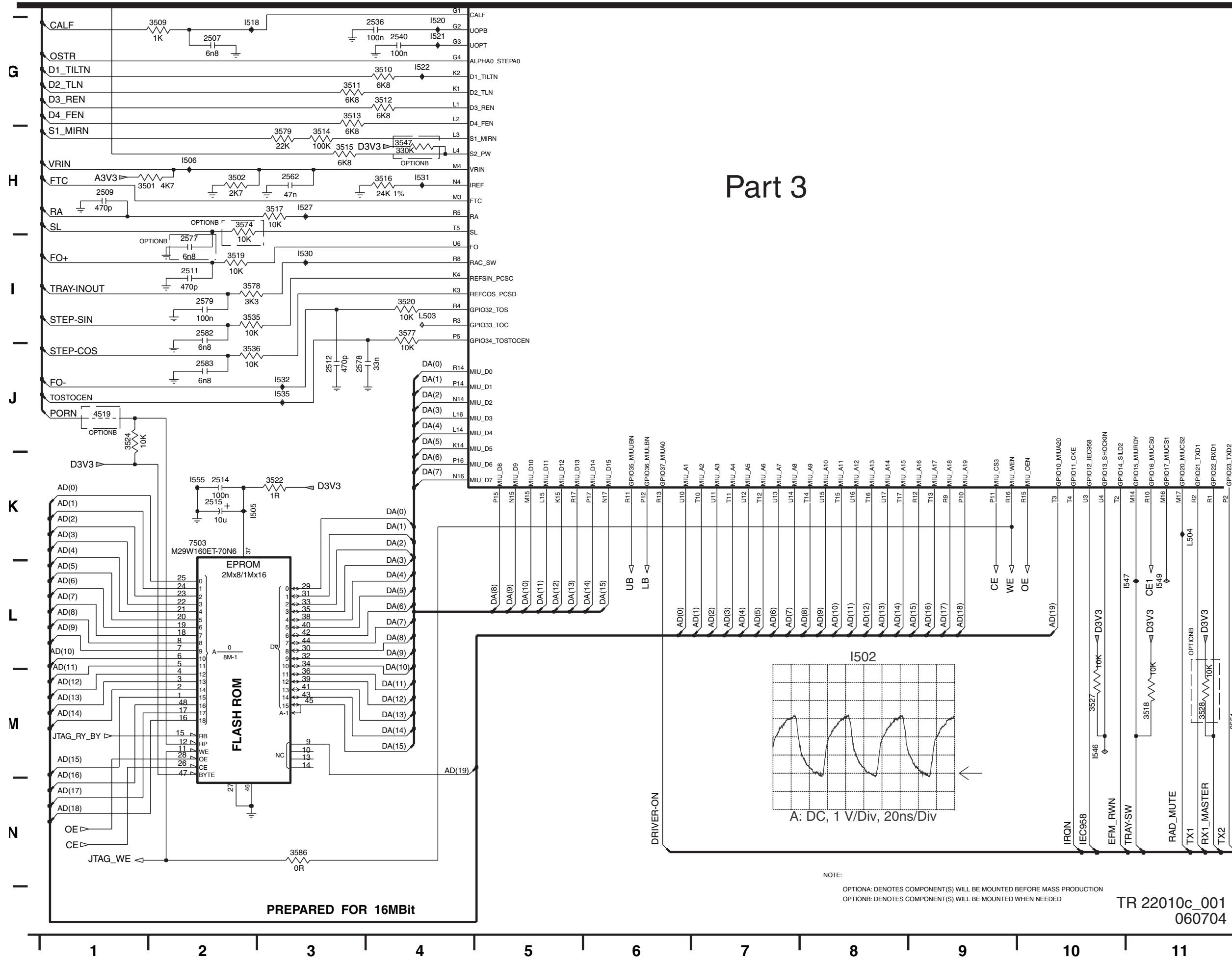


Servo Board: Centaurus Part 2



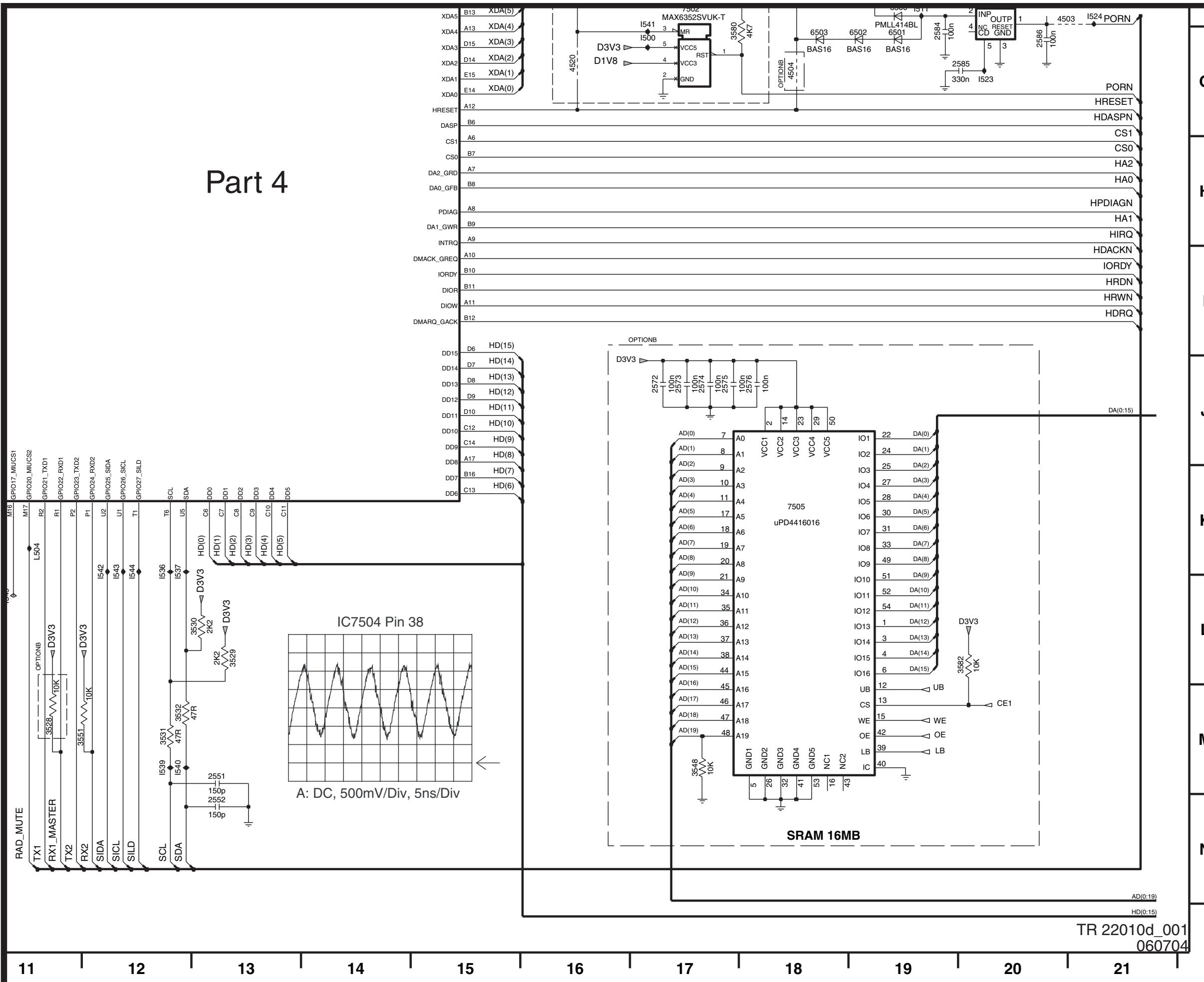
Servo Board: Centaurus Part 3

Part 3

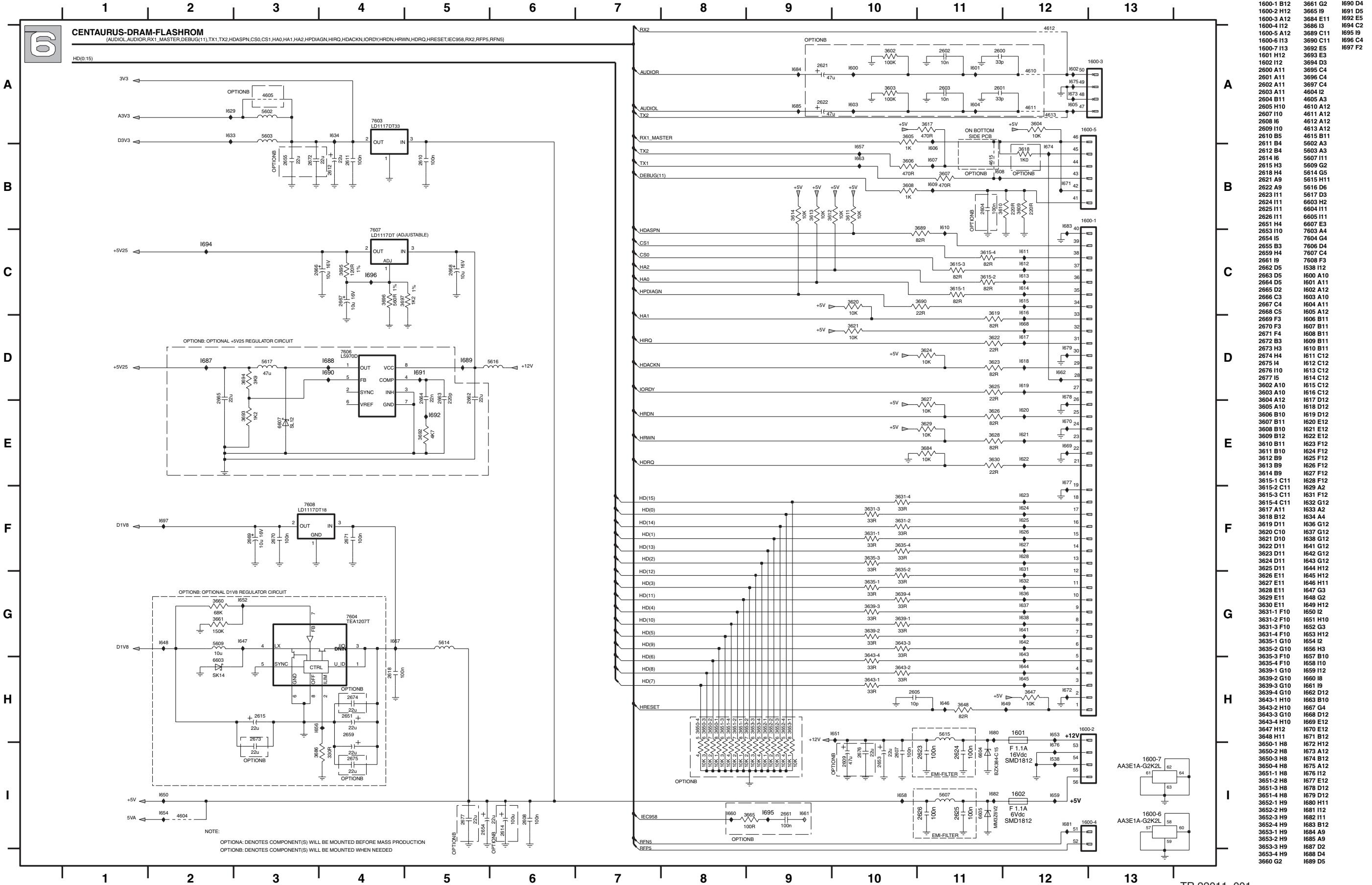


Servo Board: Centaurus Part 4

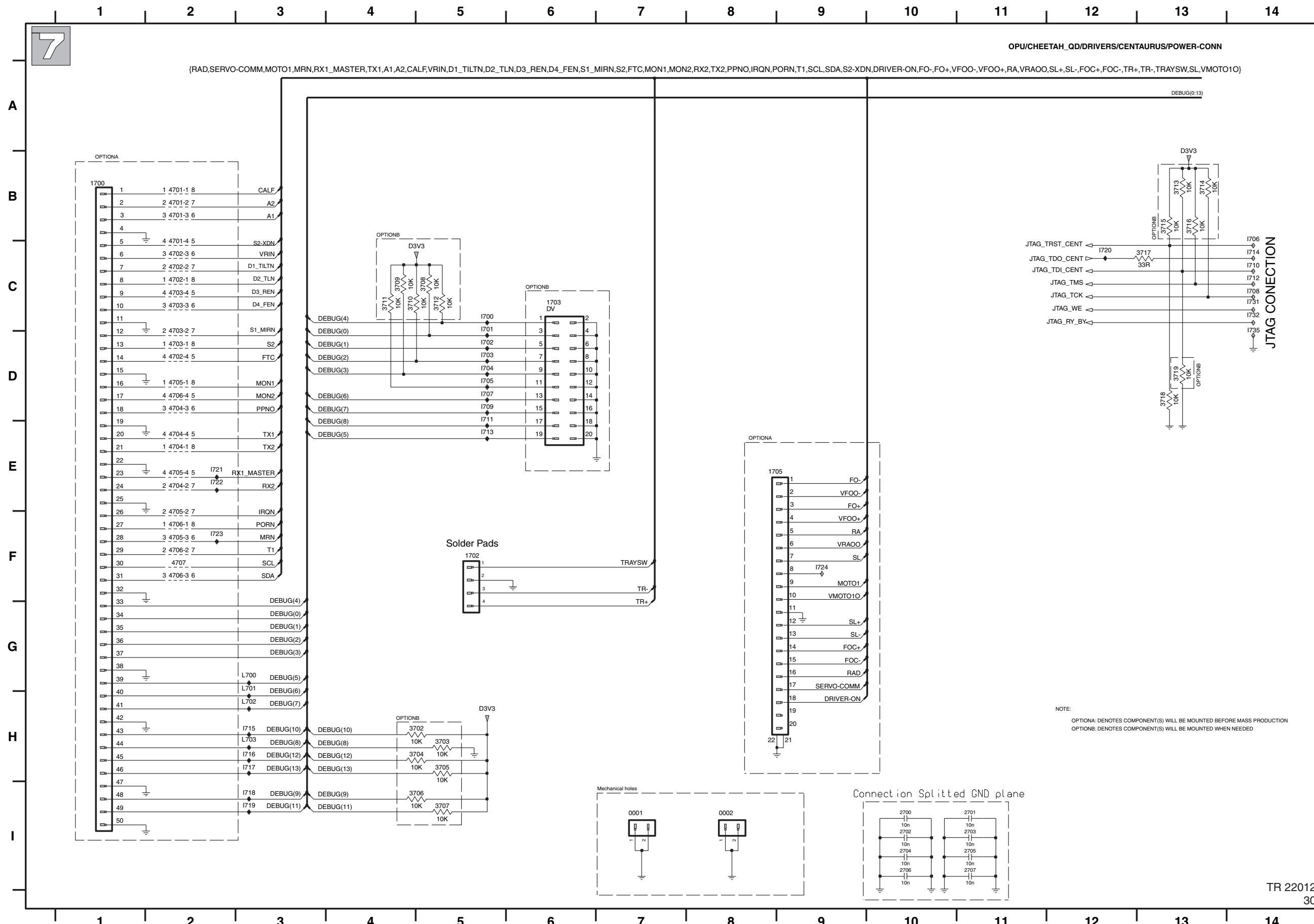
Part 4



Servo Board: Power, Connectors

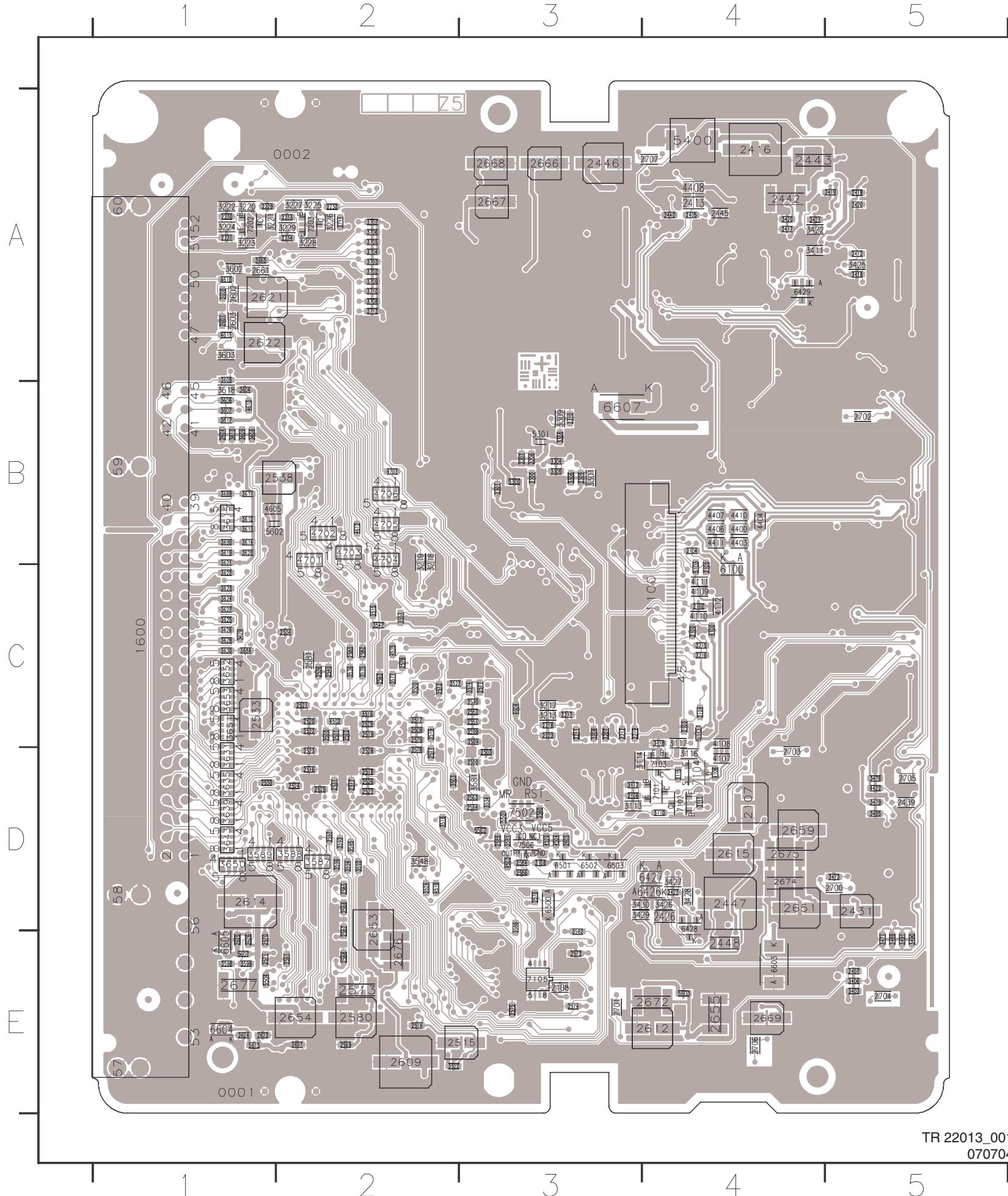


Servo Board: Tray Motor Connections



0001 I7
0002 I8
1702 F5
1703 C6
1705 E9
2700 I10
2701 I11
2702 I10
2703 I11
2704 I10
2705 I11
2706 I10
2707 I11
3702 H5
3703 H5
3704 H5
3705 H5
3706 H5
3707 I5
3708 C5
3709 C4
3710 C4
3711 C4
3712 C5
3713 B13
3714 B13
3715 B13
3716 B13
3717 C13
3718 D13
3719 D13
4701-1 B2
4701-2 B2
4701-3 B2
4701-4 C2
4702-1 C2
4702-2 C2
4702-3 C2
4702-4 D2
4703-1 D2
4703-2 D2
4703-3 C2
4703-4 C2
4704-1 E2
4704-2 E2
4704-3 D2
4704-4 E2
4705-1 D2
4705-2 F2
4705-3 F2
4705-4 E2
4706-1 F2
4706-2 F2
4706-3 F2
4706-4 D2
4707 F2
I700 C5
I701 C5
I702 D5
I703 D5
I704 D5
I705 D5
I706 B14
I707 D5
I708 C14
I709 D5
I710 C14
I711 D5
I712 C14
I713 E5
I714 C14
I715 H3
I716 H3
I717 H3
I718 H3
I719 H3
I720 C12
I721 E2
I722 E2
I723 F2
I724 F9
I731 C14
I732 C14
I735 C14
L700 G3
L701 G3
L702 H3
L703 H3

Layout Servo Board (Top Side)



1100 C4	2527 D2	2701 E3	3518 02	3653 C1	6500 D3
1600 C1	2528 D2	2702 B5	3519 C2	3665 A1	6501 D3
2100 C4	2529 C2	2703 D4	3520 C2	3684 C1	6502 D3
2102 C4	2530 D1	2704 E5	3522 E2	3689 B1	6503 D3
2103 C4	2531 D2	2705 D5	3524 02	3690 B1	6603 E4
2104 B4	2533 C1	2706 E4	3527 C2	3702 A2	6604 E1
2105 C4	2534 C2	2707 A4	3529 C3	3703 A2	6605 E1
2106 D3	2536 C2	3104 C4	3530 C3	3704 A2	6607 B3
2107 D4	2538 B2	3108 D3	3534 03	3705 A2	7101 D4
2108 E3	2540 C2	3110 D4	3535 C2	3706 A2	7102 D4
2211 C3	2551 C3	3111 D4	3536 C2	3707 A2	7103 D4
2212 C3	2552 C3	3112 D3	3547 C2	3708 A2	7104 D4
2217 C3	2562 C2	3113 D3	3548 02	3709 A2	7105 E3
2218 C3	2563 D3	3114 D3	3551 C2	3710 A2	7202 A1
2219 C3	2564 D3	3115 D4	3561 03	3711 A2	7203 A2
2223 C3	2565 D2	3116 D4	3574 C3	3712 A2	7502 D3
2229 A1	2566 D2	3117 C4	3577 C2	4100 C4	7506 D3
2230 A1	2567 E2	3118 C4	3578 02	4106 04	
2231 A1	2568 E2	3207 C3	3580 03	4107 D4	
2232 A2	2569 E2	3208 C3	3581 03	4108 C4	
2233 A2	2570 E1	3213 C3	3582 E3	4109 C4	
2234 A2	2571 E1	3215 C4	3586 03	4110 C4	
2300 B3	2573 E3	3216 C4	3587 02	4111 C4	
2301 B3	2574 E3	3217 C3	3588 02	4112 C4	
2306 B3	2575 E3	3218 B2	3589 01	4400 B4	
2307 B3	2576 D3	3219 B2	3591 E2	4403 B4	
2309 B3	2577 C3	3220 A1	3592 02	4404 B4	
2310 B3	2578 C2	3221 A1	3593 02	4406 B4	
2405 A4	2579 C2	3222 A1	3594 02	4407 B4	
2407 E5	2580 E2	3223 A1	3595 02	4408 A4	
2412 A5	2581 C2	3224 A1	3596 02	4410 B4	
2413 A4	2582 C2	3225 A2	3597 02	4411 B4	
2416 A4	2583 C2	3226 A2	3598 E1	4422 D5	
2417 A4	2584 D3	3227 A2	3599 E1	4502 C2	
2418 A5	2585 D3	3228 A2	3602 A1	4503 03	
2419 A5	2586 D3	3229 A2	3603 A1	4504 D3	
2420 A5	2600 A1	3301 B3	3604 B1	4519 D2	
2426 D4	2601 A1	3304 B3	3605 A1	4520 D3	
2427 D4	2602 A1	3305 B3	3606 B1	4525 C2	
2431 D5	2603 A1	3306 B3	3607 B1	4604 C3	
2439 D5	2604 B1	3308 B3	3608 B1	4605 B1	
2440 A4	2605 D3	3309 B3	3609 B1	4610 A1	
2442 A4	2607 E2	3403 E5	3610 B1	4611 A1	
2443 A4	2609 E2	3406 E5	3611 B1	4612 B2	
2445 A4	2612 E4	3411 A4	3612 B1	4613 B1	
2446 A3	2614 D1	3418 A5	3613 B1	4701 B2	
2447 D4	2615 D4	3420 A4	3614 B1	4702 B2	
2448 E4	2621 A1	3421 A4	3615 B1	4703 B2	
2500 C2	2622 A1	3422 A4	3617 B1	4704 B2	
2501 C2	2623 E1	3425 A5	3618 B1	4705 B2	
2502 C2	2624 E1	3426 04	3619 B1	4706 B2	
2503 D3	2625 E1	3427 04	3620 B1	4707 B2	
2509 C2	2626 E1	3428 04	3621 B1	5101 C4	
2511 D2	2651 D4	3429 03	3622 C1	5103 C4	
2512 C2	2653 D2	3430 03	3623 C1	5300 B3	
2513 E2	2654 E2	3471 E5	3624 C1	5301 B3	
2514 E2	2655 E4	3473 05	3625 C1	5400 A4	
2515 E3	2659 D4	3478 05	3626 C1	5501 D3	
2516 D2	2661 A1	3479 05	3627 C1	5502 03	
2517 D2	2666 A3	3485 05	3628 C1	5504 E1	
2518 D2	2667 A3	3489 E5	3629 C1	5602 B1	
2519 C2	2668 A3	3490 E5	3630 C1	5603 E4	
2520 C2	2669 E4	3491 E5	3631 01	5607 E1	
2521 C2	2672 E4	3500 03	3635 D1	5615 E1	
2522 C2	2674 D4	3503 02	3639 D1	6100 C4	
2523 D2	2675 D4	3504 C3	3643 D1	6426 04	
2524 D2	2676 E2	3515 C2	3650 D1	6427 D4	
2525 D2	2677 E1	3516 C2	3651 C1	6428 D4	
2526 D2	2700 D5	3517 C2	3652 C1	6429 A4	

8. Alignments, Test Procedures

8.1 Adjust Laser Control

In case of exchanging DVD-M or PWB an adjustment to align OPU and PWB to each other is necessary.

8.1.1 Adjustment Procedure

- Connect the Digital Board to a PC via serial cable (3122 785 90017)
- Start up Hyperterminal or any other terminal program with the correct settings (19200 8-N-1)
- Power on the set
- Call up nucleus 931 of the DSW. The adjustment takes about 30 seconds

Example:

DS:> 931

93100

Test OK @

- Now data within the OPU EEPROM and the FLASH of the PWB are aligned.

8.2 Drive Test

8.2.1 Short Term Test Procedure

Test 1: Disc LVP 12.01 (7104 099 91731) test layer change on track 28 ->31

Duration: 1 minute

When the LVP12.01 disc is loaded and accepted the next steps are:

- Skip to track 29.
- Press next to chapter 30.
- Fast forward to halfway track 30
- Play track 30 till track 31 halfway
- When this part of the disc is played without any still pictures or freeze frames the beamlanding of the OPU is good (the track transition at the beginning of track 31 gives a short still picture but this is normal.)
- Stop the disc.

Test 2: DVD+R blank disc type Ricoh 4X (7104 099 94261)

Duration: 4 minutes

- Record 1 minute
- Press stop
- Open / close
- Play back recorded track

Remark: When this disc is used for 30 recordings the disc appears to be full. But physically the disc is not full and to use also the remaining space on the disc you can do this by deleting the index pictures.

Test 3: CD-RW low reflection audio disc. (7104 099 96581)

Duration: 1 minute

- Play a few seconds from track 1
- Skip to the last track
- Play a few seconds of the last track.
- Stop the disc

8.2.2 Long Term Test Procedure

Following the steps to be taken for all DVD recorders coming in for service to the workshop related to a DVDM failure and which have "No Defect Found", NDF after a Short Term Test.

In case no defect is found during the "Short Term Test Procedure" the test has to be extended with a burn in test - "Long Term Test Procedure".

The burn in test described herein should be done with a DVD+RW disc.

Make a recording of 1 to 2 hours on M1/HQ and M2/SP mode.

Remark:

Attention! To prevent scratches the discs should be treated very carefully!

Heavily scratched discs have a bad influence on the test performance and should be replaced.

The technician has to decide by visual inspection the reliability of his test material.

The pictures below show a bad example of discs used too long.



Figure 8-1

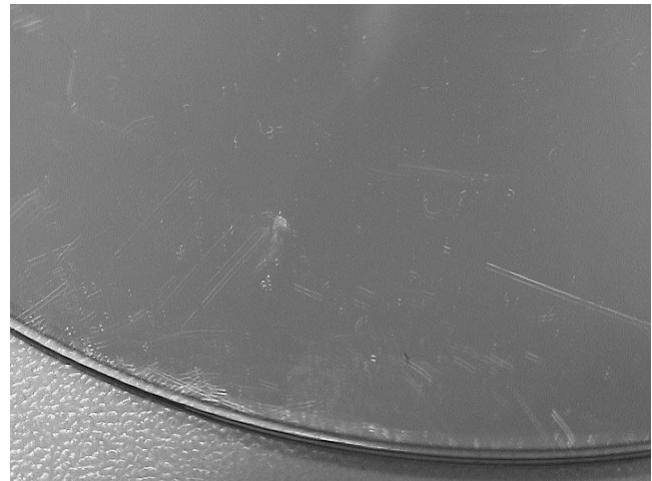
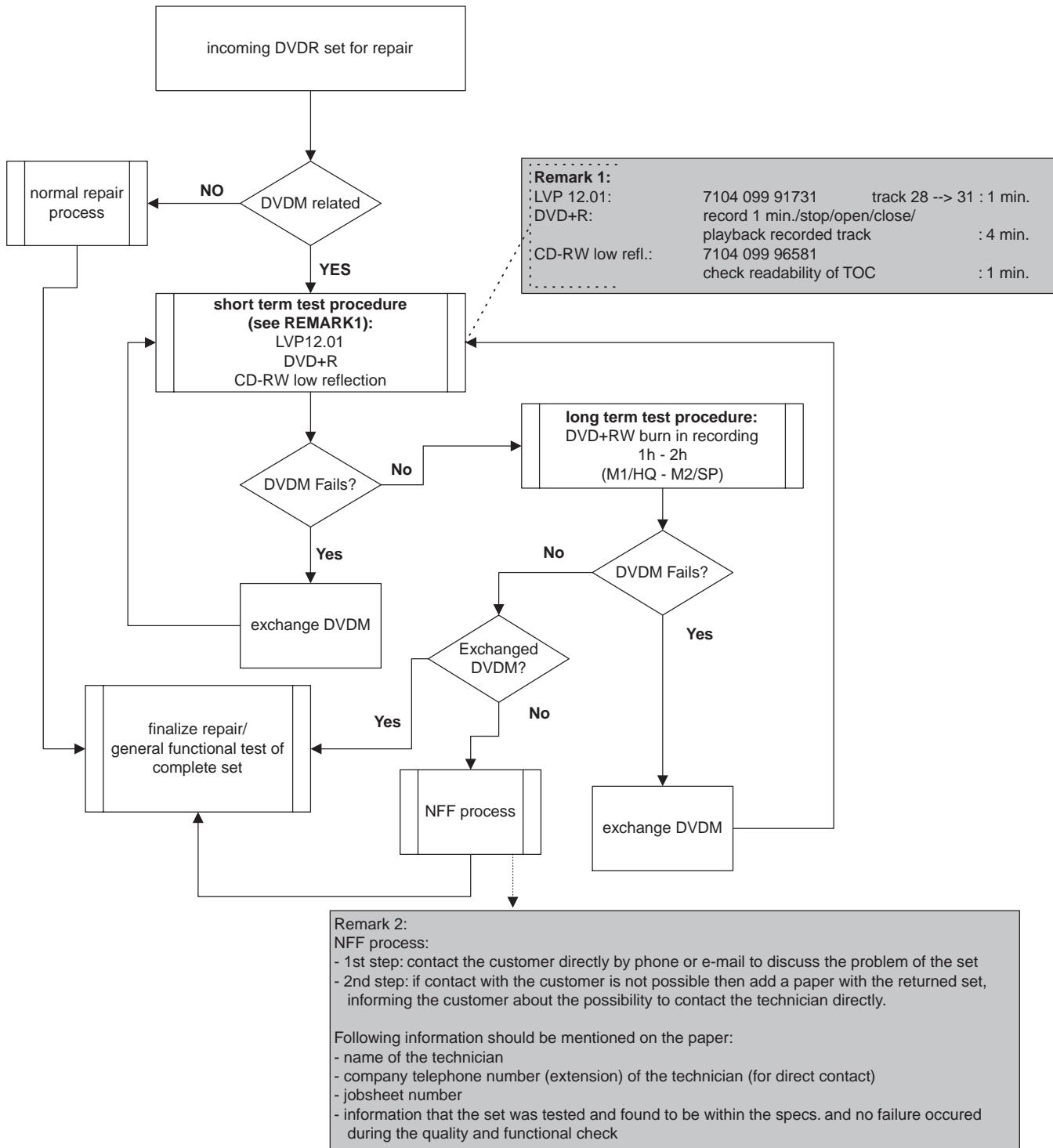


Figure 8-2

Flowchart for test instruction

In the flowchart below it is described how and when the burn in test has to be carried out.

**Figure 8-3**

9. Circuit Descriptions, Abbreviation List, and Data Sheets

9.1 General

The VAD8041 module, also known as "AV3.5", is a Video Recorder Drive with an IDE interface intended for use in a consumer DVD+RW/+R video recorder.

The video recorder engine performs all basic servo tasks. It reads data from and writes data to the disc and controls all functions like tray control, start/stop the disc, tracking, jumping and communicating to the host.

Mechanically, the module consists of a motorized tray loader that contains the dual laser optical pickup unit and a PCBA that contains all the electronics needed to control the drive and interfacing to the MPEG encoder/decoder back-end application.

There is a temperature sensor included in the drive that prevents malfunction or destruction of the drive in case the temperature inside the drive gets too high.

9.2 Overall Block Diagram DVDM & Frontend

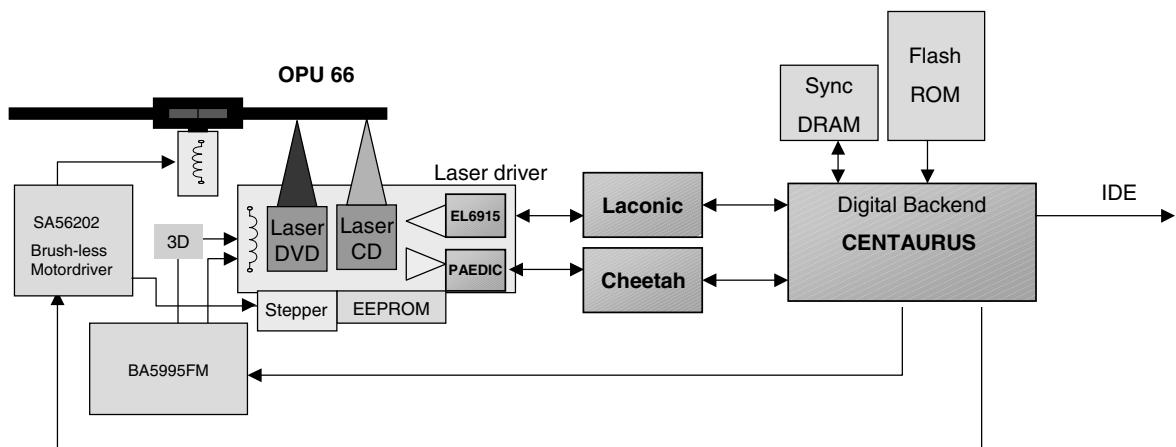


Figure 9-1

9.3 Centaurus

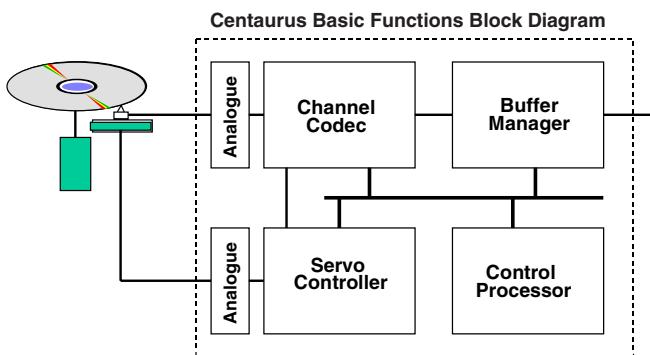


Figure 9-2

The Centaurus, IC7500 is a highly integrated IC that controls all the functions of the drive. It interfaces via the IDE to the MPEG back-end and incorporates the following functions:

- CD/DVD channel decoder/encoder
- CD/DVD data block decoder/encoder
- Buffer Manager
- Digital Servo processor using digital signal processor.
- Drive System microprocessor based on MIPS core.

The MIPS microcontroller uses Flash ROM for the firmware and SRAM to execute the program. SDRAM is provided for the encoding/decoding function block of centaurus. 2 MBytes of data buffer size is available inside the IC for data storage.

9.4 Cheetah

The Cheetah, IC7201 is an analogue pre-processing for the diode signals coming from the OPU. It contains an amplifier with programmable gain that amplifies the RF signal to adapt the output for the different reflectivity of the various discs. The tracking signals are filtered and normalized. In addition the IC contains a timing circuit for the sample and hold circuits and for switching the various blocks between read and write. Supporting functions such as laser control and offset control are incorporated. Communication to and from the IC is based on a fast two-wire serial bus that works according to the I²C interface protocol.

9.5 Laconic

The main function of the LACONIC, IC7300 is to control the laser power. The IC forms a closed control loop in combination with the Elantec located on the OPU. It compensates aging and temperature of the laser. Furthermore it forms a fingerprint correction loop. It also acts as bridge between I²C and serial bus of the Elantec laser driver on the OPU.

9.6 Optical Pick-up Unit

The OPU66 is a dual laser Optical Pick-up Unit for DVD+RW/+R. It consists of a 3-D actuator for focusing, radial tracking and tilt correction.

- 650nm laser for DVD
- 780nm laser for CD

On the interconnecting flex several electrical components are mounted.

- Elantec programmable laser diode power driver

- Paedic integrated photo detector with programmable gain pre-amplifier
- Eeprom containing a number of values representing adjustments belonging to the OPU.

The laser control and diode signal processor ICs together with an EEPROM are mounted on the OPU flex.

The laser control IC generates the DVD laser read and writing signals needed for reading DVD discs and writing DVD+RW / +R discs (write strategies of DVD+RW / +R discs).

The diode signal processor is an analogue pre-processor adapted for the CD and CD-R / RW read function.

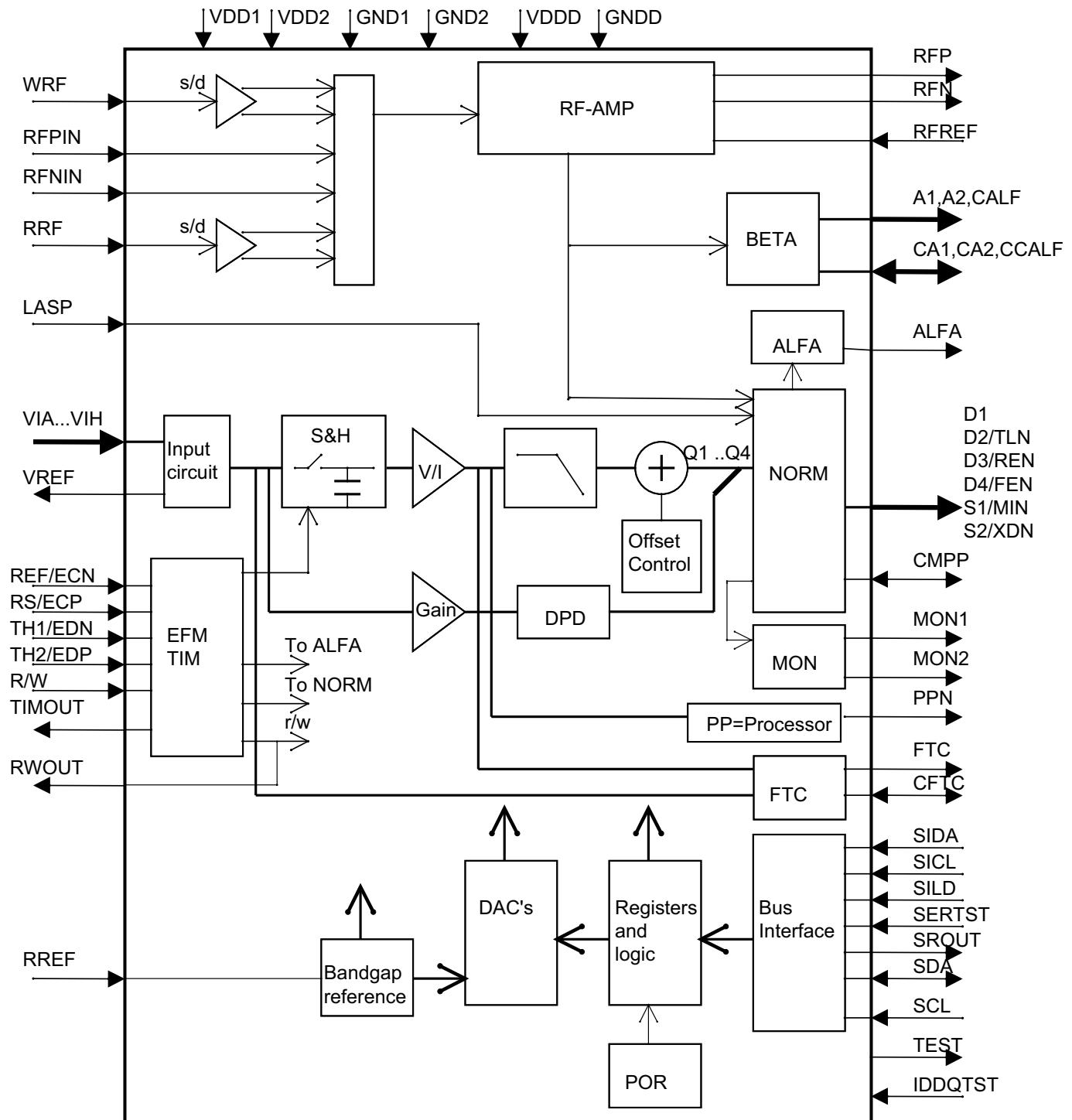
The EEPROM contains information about writing current, writing strategies and other parameters belonging to the OPU.

9.7 Motor and Servo drivers

The SA56202 is a one-chip motor driver IC that is capable to drive all motors of CD or DVD systems: spindle, sled and loading motors. The driver for the 3-phase, brushless, hall-commutated spindle motor uses True-Silent PWMTM. This proprietary technology ensures that all 3-phase motor currents are sinusoidal resulting in an optimally silent and power-efficient driver. Internal compensation of the spindle motor's back-EMF enables the driver to operate in current-steering mode without using external power-dissipating sense resistors. The driver for the 2-phase sled stepper motor operates in current-steering PWM mode. In addition the IC contains four full-bridge linear channels that are used to drive the loading motor. The 3D actuators (focus, tracking and tilt) are driven by IC 7409, BA5995FM.

9.8 IC Servo Board

IC7201, TZA1047: Servo Board, Analogue Preprocessor



Symbol	Pin	Description
VIH	1	Satellite segment H input
GND1	2	Ground
VIC	3	Central segment C input
VIB	4	Central segment B input
GND1	5	Ground
RFNIN	6	Inverse differential RF input / Single-ended RF read input
RFPIN	7	Differential RF input/ Single-ended RF write input
VDD1	8	Positive supply
VID	9	Central segment D input
VIA	10	Central segment A input
VDD1	11	Positive supply
VIE	12	Satellite segment E input
VIG	13	Satellite segment G input
RWOUT	14	R/W signal output
SDA	15	Data input/output I ² C
SCL	16	Clock input I ² C
SILD	17	Strobe line of serial bus interface
SIDA	18	Data line of serial bus interface
SICL	19	Clock line of serial bus interface
TIMOUT	20	EFMTIM test output
R/W	21	External Read/Write signal input
VDDD	22	Positive supply digital part
VSSD	23	digital ground
REF/ECN	24	Reference input for timing signals in EFMTIM bypass mode ^[1] / Inverse EFM clock input ^[2]
RS/ECP	25	RF sampling signal ^[1] / EFM clock input ^[2]
TH1/EDN	26	Segment sampling timing signal ^[1] / Inverse EFM data input ^[2]
TH2/EDP	27	Segment sampling timing signal ^[1] / EFM data input ^[2]
SERTST	28	Enable test mode (Tie to GND or leave open for normal operation)
VDD2	29	Positive supply voltage

Symbol	Pin	Description
GND2	30	Supply ground
RFP	31	RF output voltage, positive
RFN	32	RF output voltage, negative
RFREF	33	Reference voltage for differential RF output common mode level
PPN	34	Output PP voltage
CFTC	35	FTC high pass filter capacitor
FTC	36	FTC output
GND1	37	Supply ground
CA1	38	Beta circuit external capacitor
CA2	39	Beta circuit external capacitor
CCALF	40	Beta circuit external capacitor
RREF	41	Reference resistor to ground
GND1	42	Supply ground
CMPP	43	MPP external capacitor
VDD1	44	Positive supply
MON1	45	Monitor output voltage
MON2	46	Monitor output voltage
S2/XDN	47	Servo output current
S1/MIRN	48	Servo output current
D4/FEN	49	Servo output current
D3/REN	50	Servo output current
D2/TLN	51	Servo output current
D1	52	Servo output current
IDDQTST	53	Select zero dissipation mode (tie to GND for normal operation)
CALF	54	RF average level signal
A2	55	RF bottom level signal
A1	56	RF top level signal
SROUT	57	shift register output for register test mode
ALFA	58	alfa output current
LASP	59	laser power setpoint signal
TEST	60	Test output
RRF	61	Single ended RF read input voltage

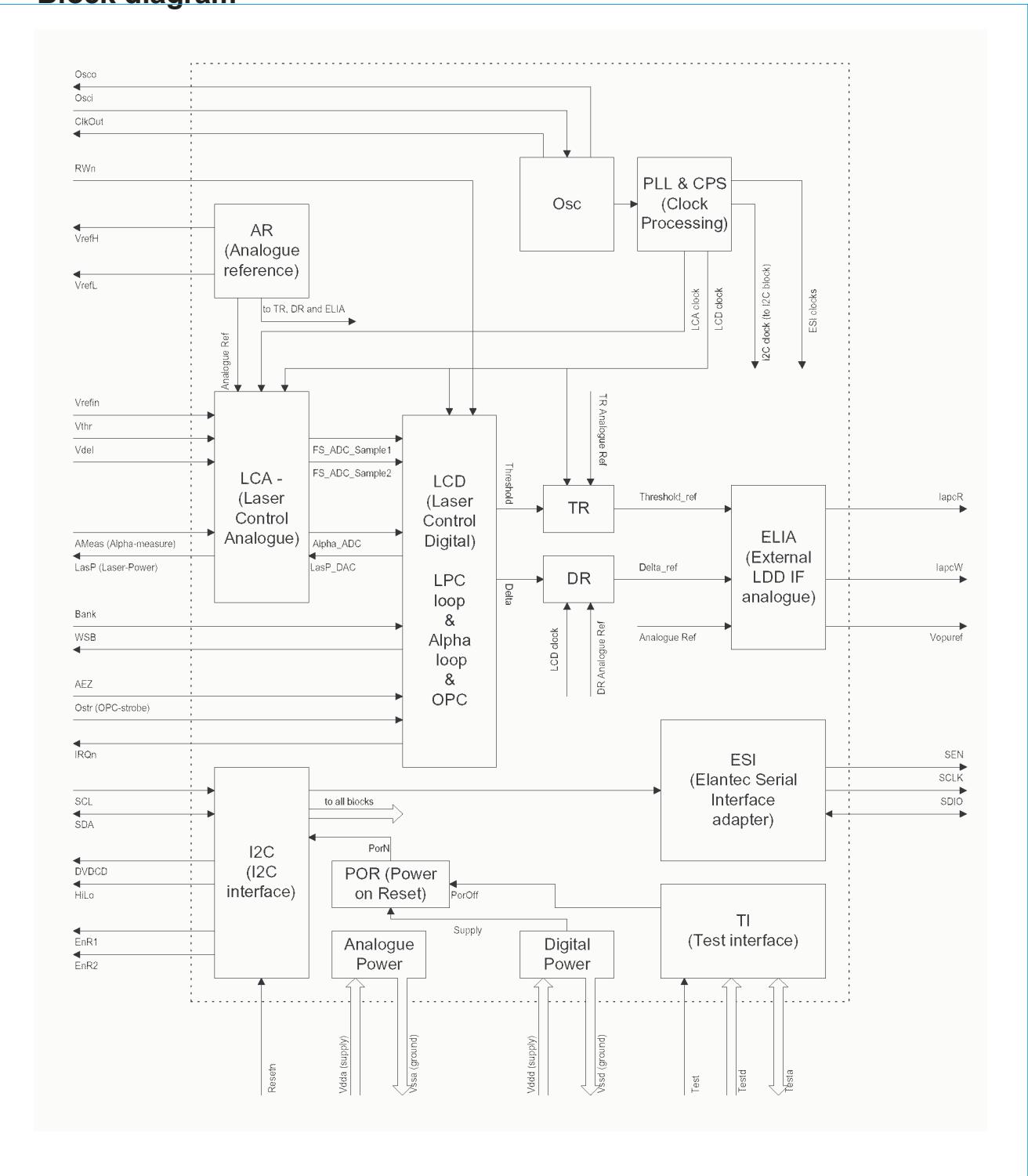
Symbol	Pin	Description
WRF	62	Single ended RF write input voltage
VREF	63	PDIC reference voltage output
VIF	64	Satellite segment F input

[1] Only in EFM bypass mode

[2] EFM clock and data when not in EFM bypass mode.

IC7300, TZA1042: Servo Baord, Laser Power Controller

Block diagram



Pin description

Symbol	Pin	Type	Drive	Description /Thr.
AEZ	1	I hy pd	T	Alpha Error Zero/Alpha Set Zero
V _{DDD3}	2	P	-	Digital Pad Supply
V _{SSD3}	3	P	-	Digital Pad Supply
CLOCKOUT	4	T	M	Buffered Oscillator Output
OSCO	5	AO	A	Output of inverting Amplifier that forms oscillator
OSCI	6	AI	A	Input of inverting Amplifier that forms oscillator
TEST1D	7	I pd	T	Test pin
AMEAS	8	AI	A	Alpha Measure – value of measured disk writing quality
V _{DDA1}	9	P	-	Analogue Supply
V _{SSA1}	10	P	-	Analogue Supply
LASP	11	AO	A	Laser Power – indicates power level
VREFL	12	AO	A	Bandgap Voltage Reference ground connection
VREFH	13	AO	A	Bandgap Voltage Reference output
VDEL	14	AI	A	Voltage input for Delta "laser power"
VTHR	15	AI	A	Voltage input for Threshold "laser power"
VOPUREF	16	AO	A	Reference Voltage for OPU
VREFIN	17	AI	A	Input Reference Voltage for Vthr and Vdel
V _{DDA2}	18	P	-	Analogue Supply
V _{SSA2}	19	P	-	Analogue Supply
TEST1A	20	AB	A	Test pin
IAPCW	21	AO	A	Current Output of Delta Reference
IAPCR	22	AO	A	Current Output of Threshold Reference
TEST2A	23	AB	A	Test pin
ENR2	24	T	M	Programmable Output Flag
ENR1	25	B pd	M/T	Device Initialisation/Programmable Output Flag (must be driven to VDD during reset)
DVDCCD	26	T	M	Programmable Output Flag for indicating DVD/CD mode
HILO	27	T	M	Programmable Output Flag for indicating High/Low reflectivity
V _{SSD1}	28	P	-	Digital Pad Supply
V _{DDD1}	29	P	-	Digital Pad Supply
BUSY	30	B	M/T	Busy Enable input from Elantec / Board test IO
SEN	31	B	M/T	Serial Enable output to Elantec / Board test IO
SDIO	32	B	M/T	Serial data input output from/to Elantec / Board test IO
SCLK	33	B	M/T	Busy Enable input from Elantec / Board test IO
WSB	34	B	M/T	Write Strategy Bank – output controls OPU write switching / Board test IO

Pin description...continued

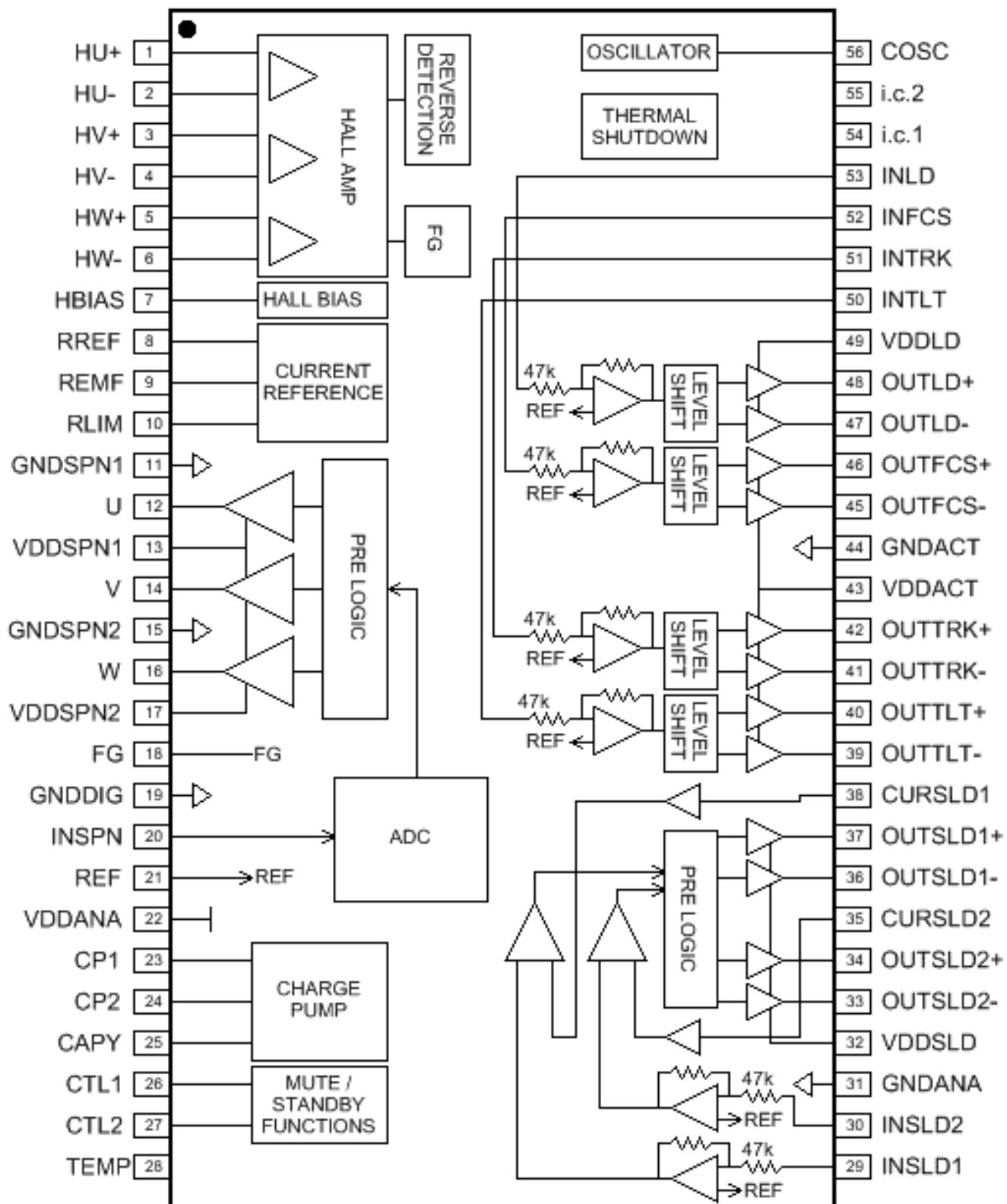
Symbol	Pin	Type	Drive	Description <i>/Thr.</i>
IRQN	35	OD	M	Interrupt Request Not – active low interrupt request
OSTR	36	I hy pd	T	OPC Strobe – request step in alpha setpoint / Board test input
RESETN	37	I hy pd	T	Reset Not – active low reset input
RWN	38	B	M/T	Read/Write not – indicates power setpoints/Board test IO
VSSD2	39	P	-	Digital Core Supply
VDDD2	40	P	-	Digital Core Supply
BANK	41	I hy pd	T	CAV setpoint switching input signal / Board test IO
TEST2D	42	I pd	T	Test pin
SDA	43	BOD	M/T	I ² C Serial Data
SCL	44	I	T	I ² C Serial Clock

- [1] All supply pins must be connected to the same external power supply voltage
- [2] All inputs are 5V tolerant – i.e. they will drive the supply voltage (3.0-3.6V), but will work correctly when interface to a 5V drive device
- [3] The pin type definition is given below:

PinType Definition Table

Type	Definition
I	input
O	output
OD	open drain
B	bi-directional
BOD	bi-directional open drain
T	tri-state output
AI	analog input
AO	analog output
AB	analog bi-directional
P	power connection
hy	hysteresis on input
pd	hysteresis on output

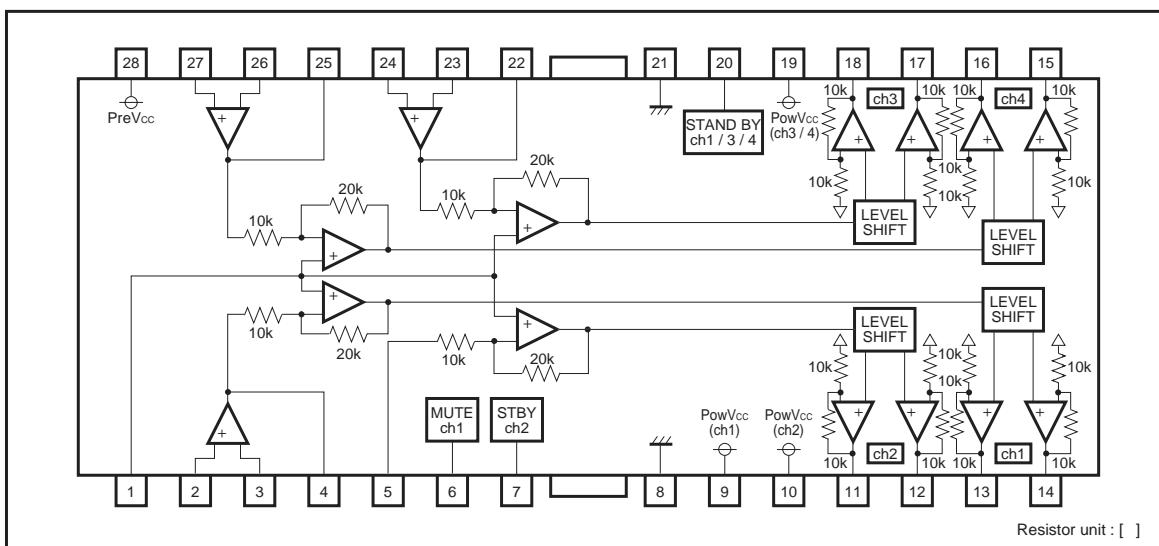
IC7402, SSA56202: Servo Board, Motor Driver



PIN DESCRIPTION

PIN	SYMBOL	DESCRIPTION	PIN	SYMBOL	DESCRIPTION
1	HU+	positive Hall input U	56	COSC	ext. capacitor for int. oscillator
2	HU-	negative Hall input U	55	i.c.2	internally connected
3	HV+	positive Hall input V	54	i.c.1	internally connected
4	HV-	negative Hall input V	53	INLD	loading driver input
5	HW+	positive Hall input W	52	INFCS	focus driver input
6	HW-	negative Hall input W	51	INTRK	tracking driver input
7	HBIAS	Hall element bias	50	INTLT	tilting driver input
8	RREF	ext. res. for current reference	49	VDDLD	loading driver power supply
9	REMFI	ext. res. for EMF regeneration	48	OUTLD+	loading driver positive output
10	RLIM	ext. res. for current limit	47	OUTLD-	loading driver negative output
11	GNDSPN1	spindle driver power ground 1	46	OUTFCS+	focus driver positive output
12	U	spindle driver output U	45	OUTFCS-	focus driver negative output
13	VDDSPN1	spindle driver power supply 1	44	GNDACT	actuator drivers power ground
14	V	spindle driver output V	43	VDDACT	actuator drivers power supply
15	GNDSPN2	spindle driver power ground 2	42	OUTTRK+	tracking driver pos. output
16	W	spindle driver output W	41	OUTTRK-	tracking driver neg. output
17	VDDSPN2	spindle driver power supply 2	40	OUTTLT+	tilting driver pos. output
18	FG	frequency generator output	39	OUTTLT-	tilting driver neg. output
19	GNDDIG	ground supply	38	CURSLD1	sled driver 1 current sense
20	INSPN	spindle driver input	37	OUTSLD1+	sled driver 1 positive output
21	REF	reference input voltage	36	OUTSLD1-	sled driver 1 negative output
22	VDDANA	system supply voltage	35	CURSLD2	sled driver 2 current sense
23	CP1	charge pump cap. conn. 1	34	OUTSLD2+	sled driver 2 positive output
24	CP2	charge pump cap. conn. 2	33	OUTSLD2-	sled driver 2 negative output
25	CAPY	charge pump output voltage	32	VDDSLD	sled driver power supply
26	CTL1	driver logic control input 1	31	GNDANA	ground supply
27	CTL2	driver logic control input 2	30	INSLD2	sled driver 2 input
28	TEMP	thermal warning	29	INSLD1	sled driver 1 input

**IC7408,7409 BA5995: Servo Board, 4-channel BTL driver
IC actuator and motor drive**



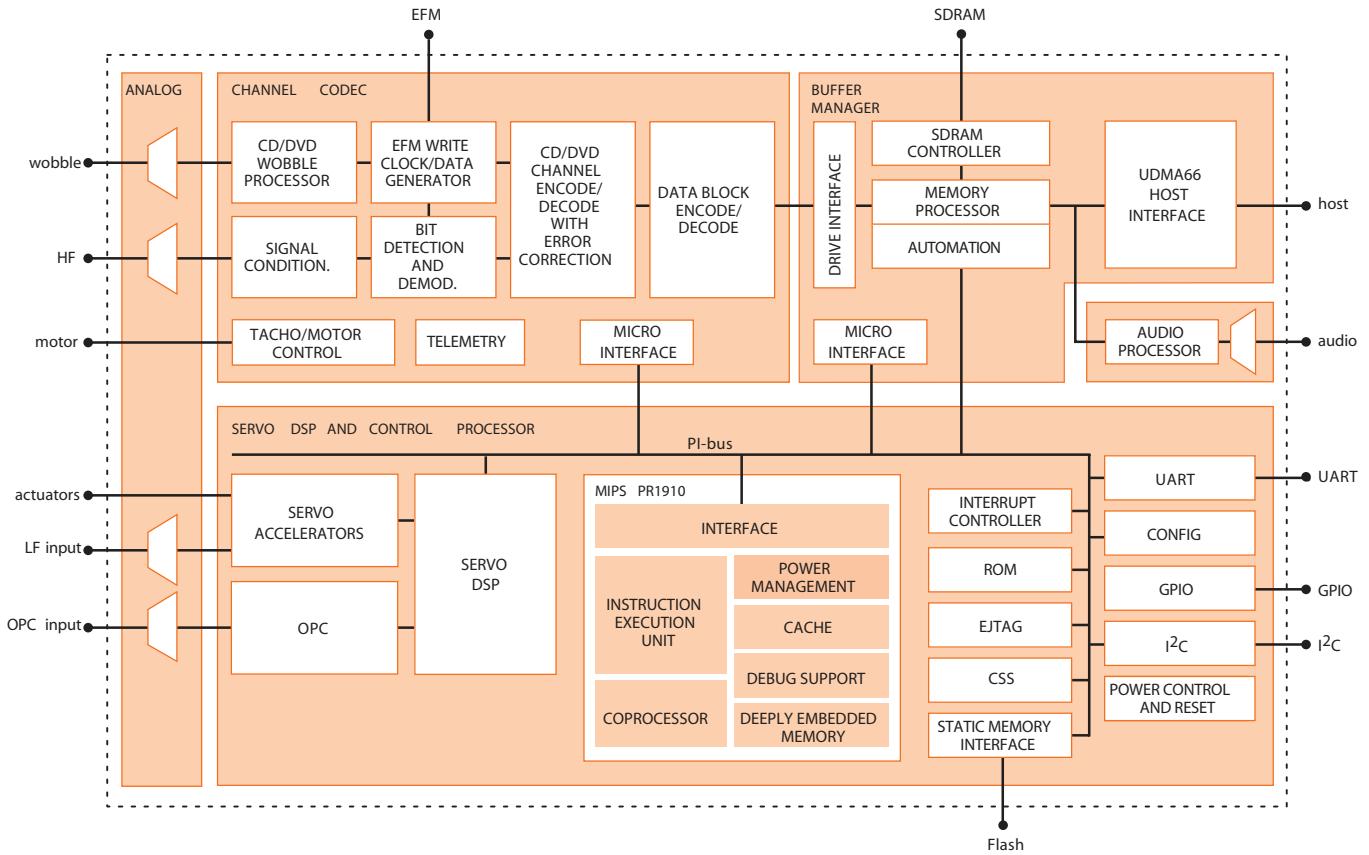
Pin No.	Pin name	Function
1	BIAS IN	Input for bias-amplifier
2	OPIN1 (+)	Non inverting input for CH1 OP-AMP
3	OPIN1 (-)	Inverting input for CH1 OP-AMP
4	OPOUT1	Output for CH1 OP-AMP
5	IN2	Input for CH2
6	MUTE	Input for CH1 mute control
7	STBY2	Input for CH2 stand by control
8	GND	Substrate ground
9	PowVcc1	Vcc for CH1 power block
10	PowVcc2	Vcc for CH2 power block
11	Vo2 (-)	Inverted output of CH2
12	Vo2 (+)	Non inverted output of CH2
13	Vo1 (-)	Inverted output of CH1
14	Vo1 (+)	Non inverted output of CH1

Note) Symbol of + and - (output of drivers) means polarity to input pin.
(For example if voltage of pin4 high, pin14 is high.)

Pin No.	Pin name	Function
15	Vo4 (+)	Non inverted output of CH4
16	Vo4 (-)	Inverted output of CH4
17	Vo3 (+)	Non inverted output of CH3
18	Vo3 (-)	Inverted output of CH3
19	PowVcc3	Vcc for CH3/4 power block
20	STBY1	Input for CH1/3/4 stand by control
21	GND	Substrate ground
22	OPOUT3	Output for CH3 OP-AMP
23	OPIN3 (-)	Inverting input for CH3 OP-AMP
24	OPIN3 (+)	Non inverting input for CH3 OP-AMP
25	OPOUT4	Output for CH4 OP-AMP
26	OPIN4 (-)	Inverting input for CH4 OP-AMP
27	OPIN4 (+)	Non inverting input for CH4 OP-AMP
28	PreVcc	Vcc for pre block

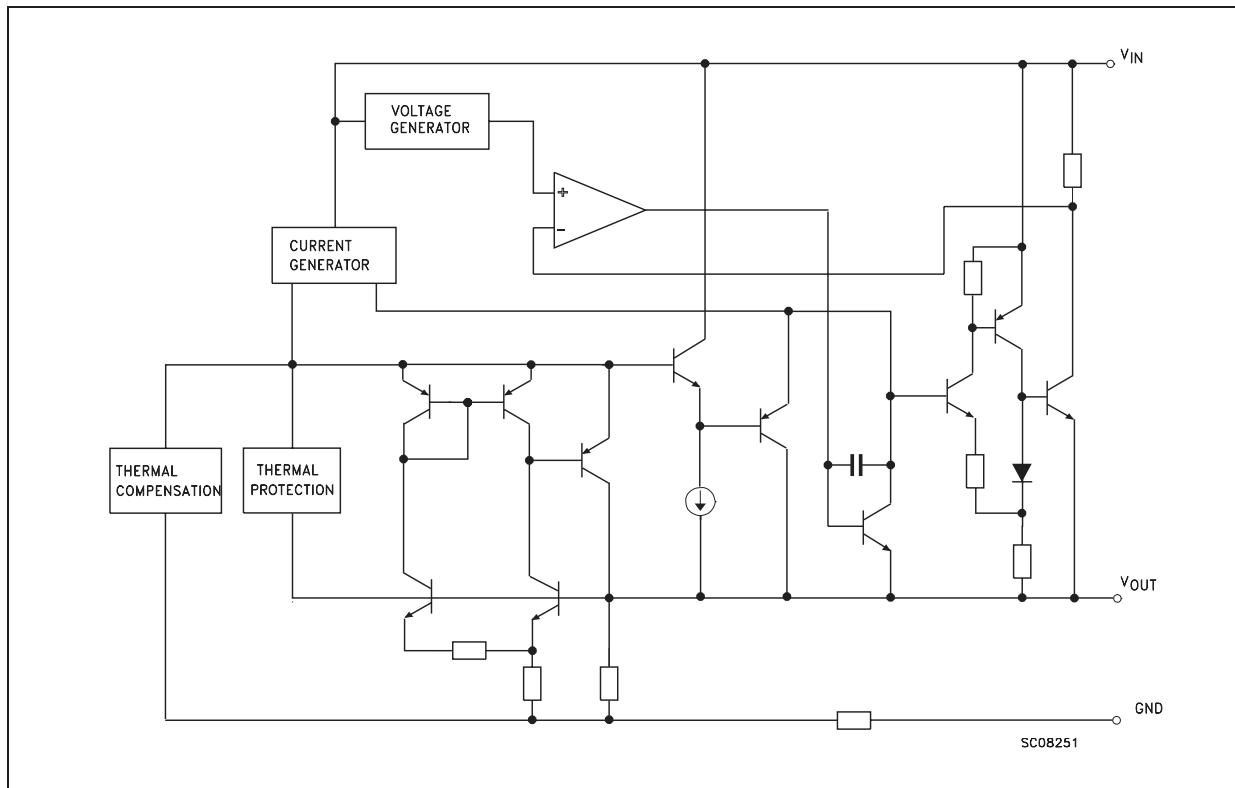
IC7500, PNX7850: Servo Board, Channel Codec/Buffer Manager/Servo Processor and Controller

Nexperia PNX7850 conceptual block diagram



IC7603, LD1117: Servo Board, Voltage Regulator

BLOCK DIAGRAM



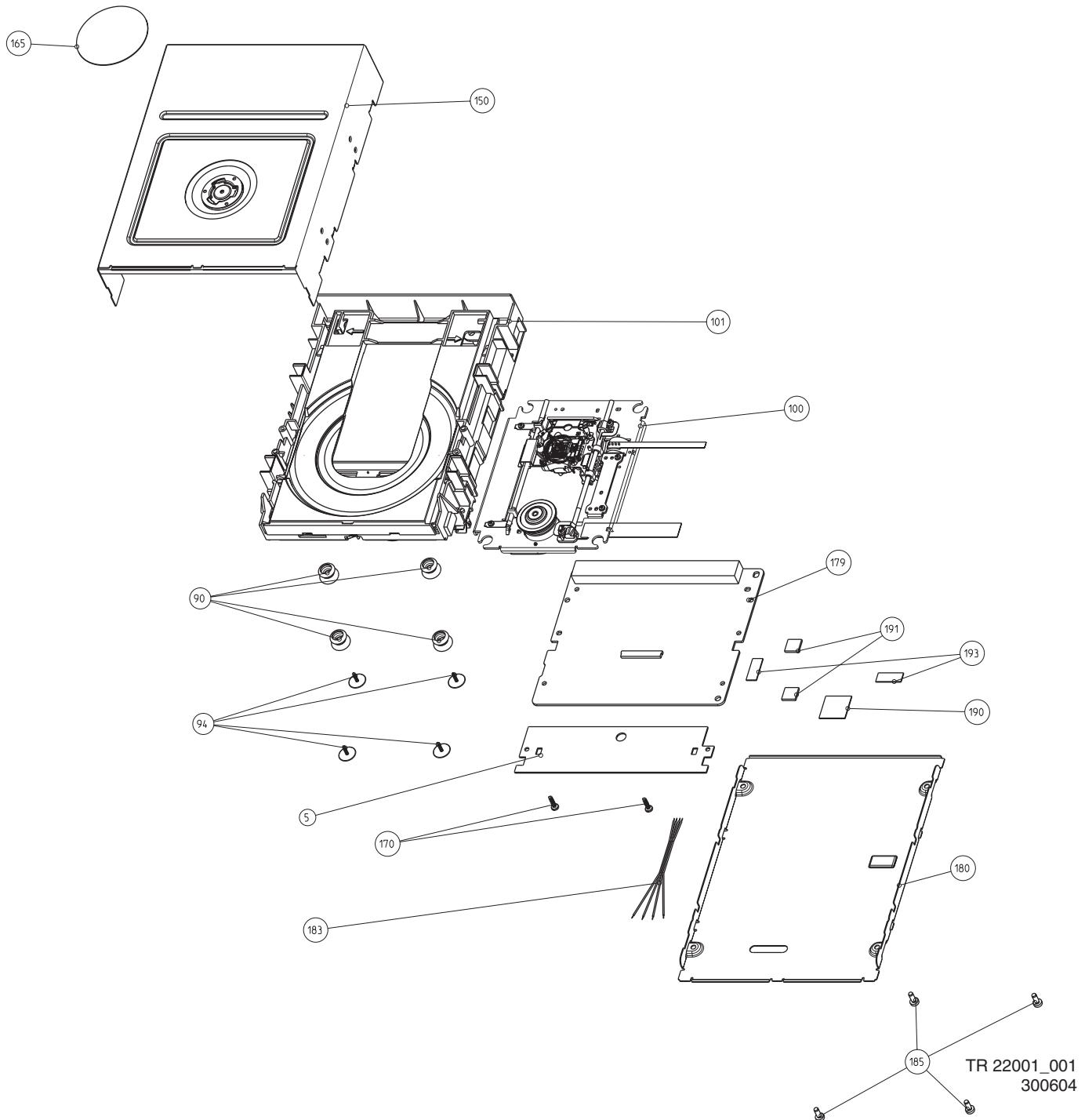
9.9 Abbreviation list

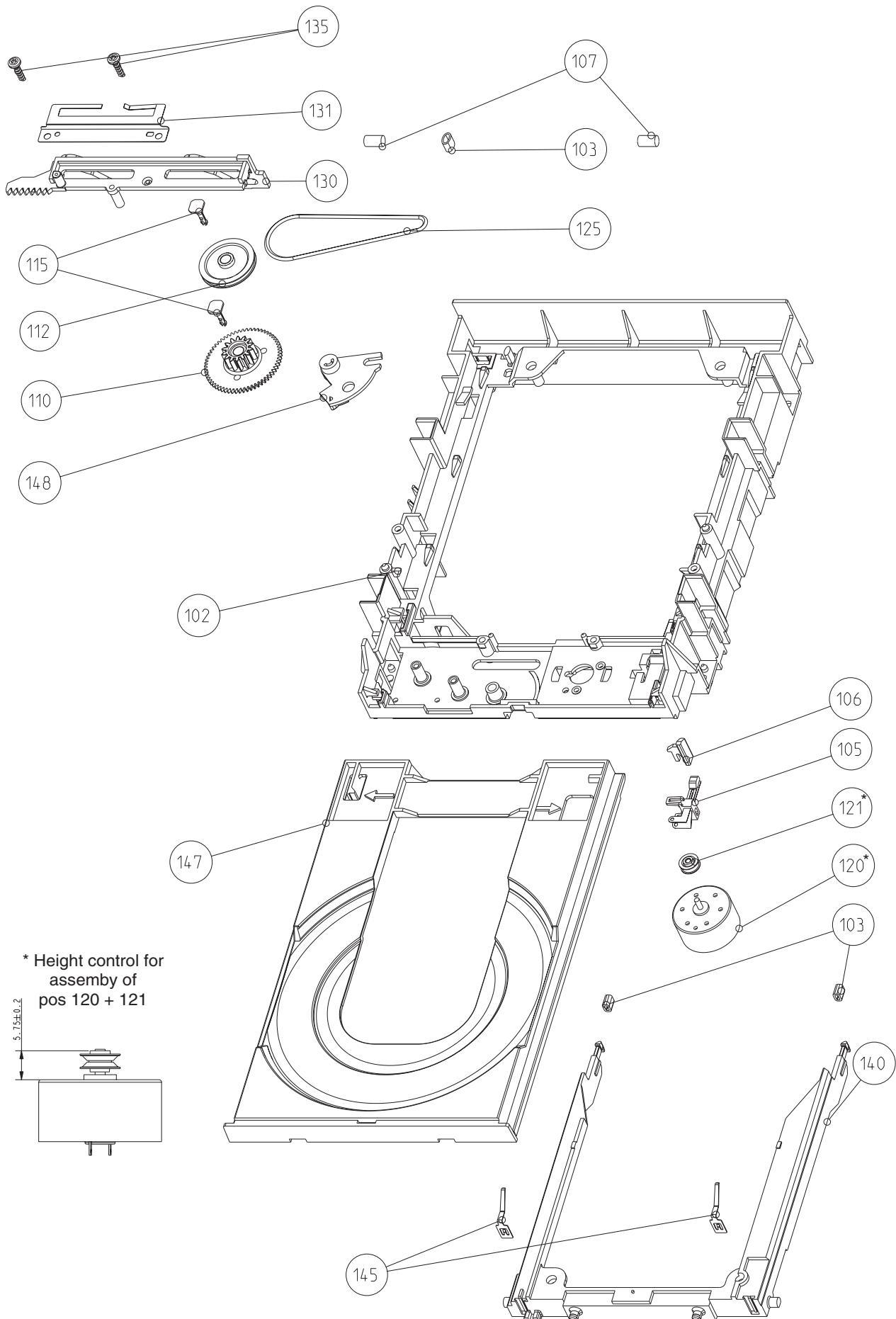
ADC	Analogue to Digital Converter	uP	Microprocessor
ADIP	ADdress In Pre-groove	VCD	Video CD
AGC	Automatic Gain Control	Y/C	Luminance (Y) and Chrominance (C) signal
CD	Compact Disc	YUV	Component video
CLV	Constant Linear Velocity		
DROPPi	Dvd Rewritable Opu Pre-Processor IC		
AM	Amplitude Modulation		
BE	Basic Engine		
ComPair	Computer aided rePair		
CD-DA	CD Digital Audio		
CS	Chip Select		
DAC	Digital to Analogue Converter		
DAIO	Digital Audio Input Output		
DENC	Digital Encoder		
DFU	Direction For Use: description for the end user		
DNR	Dynamic Noise Reduction		
DRAM	Dynamic RAM		
DSD	Direct Stream Digital		
DSP	Digital Signal Processing		
DVD	Digital Versatile Disc		
EEPROM	Electrical Erasable Programmable ROM		
EFM	Eight to Fourteen bit Modulation		
FDS	Full Diagnostic Software		
HF	High Frequency		
I2C	Integrated Ic bus (signals at 5V level)		
I2S	Integrated Ic Sound bus (signals at 3.3V level)		
IC	Integrated Circuit		
IF	Intermediate Frequency		
IRQ	Interrupt ReQuest		
LADIC	LAser Driver IC		
LLD	Loss Less Decoder		
LPCM	Linear Pulse Code Modulation		
LRCLK	Left/Right CLocK		
MACE	Mini All Cd Engine		
MPEG	Motion Pictures Experts Group		
NC	Not Connected		
NVM	Non Volatile Memory: IC containing DVD related data e.g. alignments		
OPC	Optimum Power Calibration		
OPU	Optical Pickup Unit		
PCB	Printed Circuit Board (see PWB)		
PCS	Position Control Sledge		
PLL	Phase Locked Loop		
PCM	Pulse Code Modulation		
PCM_CLK	Audio system clock for DAC		
PCM_OUTx	Audio serial output data		
PSU	Power Supply Unit		
PWB	Printed Wiring Board (see PCB)		
RAM	Random Access Memory		
RGB	Red, Green and Blue colour space		
ROM	Read Only Memory		
RF	Radio Frequency		
S2B	Serial to Basic engine, communication bus between host- and servo processor		
SCL	Serial Clock I2C		
SCLK	Audio serial bit clock		
SDA	Serial Data I2C		
SDRAM	Synchronous DRAM		
SMC	Surface Mounted Components		
S/PDIF	Sony Philips Digital InterFace		
SPIDRE	Signal Processing Ic for Dvd REwritable		
SRAM	Static Random Access Memory		
STBY	STandBY		
SVCD	Super Video CD		
SW	SoftWare		
THD	Total Harmonic Distortion		
TTL	Transistor Transistor Logic (5V logic)		

10. Spareparts List

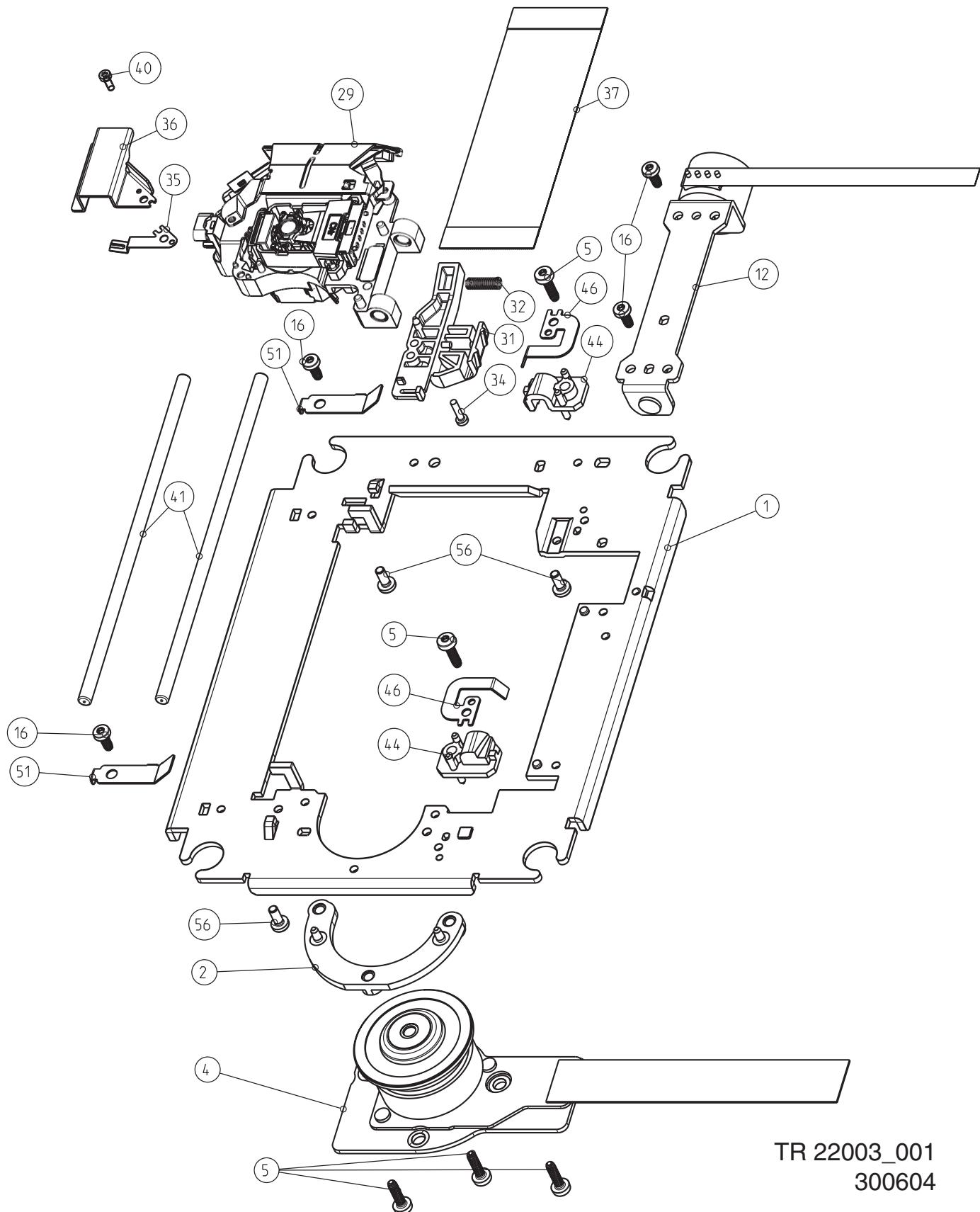
10.1 Exploded Views

Basic Engine



Loader

DVD-M

TR 22003_001
300604

5300	2422 549 44991	0603 EMI 100MHZ 600R
5301	2422 549 44991	0603 EMI 100MHZ 600R
5400	2422 536 00501	D62LCB 10 μ F PM20
5405	2422 549 44991	0603 EMI 100MHZ 600R
5406	2422 536 00501	D62LCB 10 μ F PM20
5501	2422 549 44991	0603 EMI 100MHZ 600R
5502	2422 549 44991	0603 EMI 100MHZ 600R
5504	2422 549 44991	0603 EMI 100MHZ 600R
5602	2422 549 44991	0603 EMI 100MHZ 600R
5603	2422 549 44991	0603 EMI 100MHZ 600R
5607	2422 549 45322	0603 EMI 100MHZ 150R
5609	2422 536 00501	D62LCB 10 μ F PM20
5614	2422 549 44991	0603 EMI 100MHZ 600R
5615	2422 549 45322	0603 EMI 100MHZ 150R
5616	2422 549 44991	0603 EMI 100MHZ 600R
5617	2422 536 00593	D62LCB 47 μ F 20%

→+

6100	4822 130 11397	BAS316
6400	9340 571 37115	PMEG1020EA
6401	9340 571 37115	PMEG1020EA
6402	9340 571 37115	PMEG1020EA
6403	9340 571 37115	PMEG1020EA
6426	9965 000 20150	1N4148WS SOD-323
6427	9965 000 20150	1N4148WS SOD-323
6428	5322 130 31928	BAS16
6429	5322 130 31928	BAS16
6500	4822 130 81637	PMLL4148L
6501	5322 130 31928	BAS16
6502	5322 130 31928	BAS16
6503	5322 130 31928	BAS16
6603	9322 168 86685	SK14
6604	4822 130 11522	UDZ15B
6605	9322 159 72685	MM3Z6V2
6607	9322 189 14668	SL12

Q

7101	5322 130 60159	BC846B
7102	5322 130 60159	BC846B
7103	5322 130 60159	BC846B
7104	9340 547 21215	BSH205
7105	9352 697 76118	LM75ADP
7107	9965 000 17814	2N7002E
7201	9352 713 79557	TZA1047HL
7202	5322 130 42718	BFS20
7203	5322 130 42718	BFS20
7300	9352 713 77157	TZA1042HL
7401	5322 209 82941	LM358D
7402	9352 735 89118	SA56202TW
7403	5322 209 82941	LM358D
7405	5322 209 82941	LM358D
7409	9322 164 64668	BA5995FM
7500	9352 737 02557	PNX7850E_Z_M2A
7502	9322 186 84685	MAX6352SVUK
7503	3139 198 00790	PB AV3.5
7504	9322 166 67668	MT48LC4M16A2TG-7E
7505	9322 205 94671	UPD4416016G5-A15-9JF
7506	9322 184 07685	PST3642N
7603	4822 209 17398	LD1117DT33
7604	9352 610 38118	TEA1207T_N1
7606	9322 191 07668	L5970D
7607	9322 144 97668	LD1117DT
7608	9322 197 17668	LD1117-1.8V-A