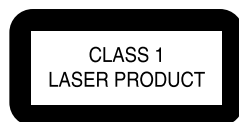


Service Service Service



Service Manual



DVD+ReWritable



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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 1 MΩ.
 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

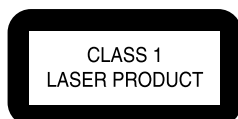


Figure 2-1 Class 1 Laser Product

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 UNNGÅ UDSÆTTELSE FOR STRÅLING
 ADVARSEL SYNLIG OG OSYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES UNNGÅ EKSPONERING FOR STRÅLEN
 VARNING SYNLIG OCH OSYNLIG LASERSTRÅLING NÅR DENNA DEL ÅR ÖPPNAD BETRÄKTA EJ STRÅLEN
 VARO! AVATT AESSA OLET ALTTIINA NÄKYVÄLLE JA NÄKYMÄTT ÖMÄLLE LASER SÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN
 VORSICHT SICHTBARE UND UNSICHTBARE LASERSTRAHLUNG 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'OUVERTURE 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.

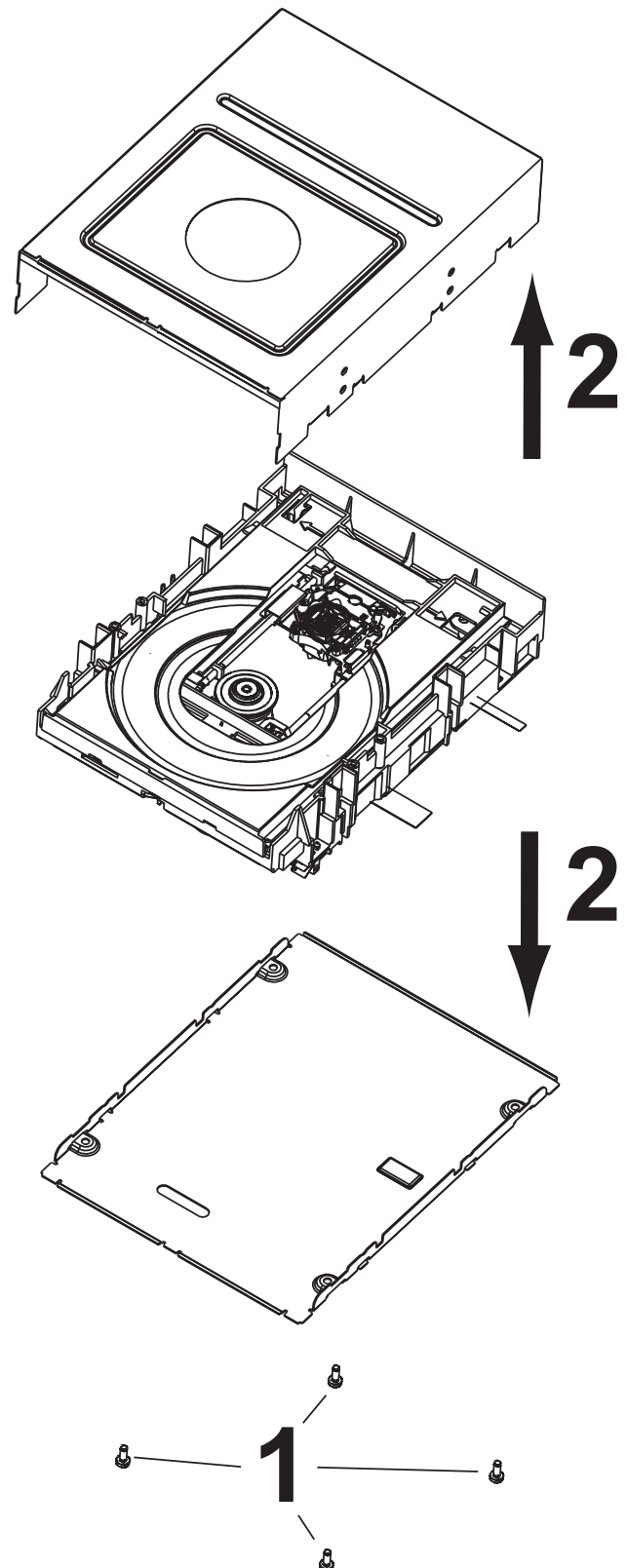


Figure 4-1 Basic Engine dismantling (part1)

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]

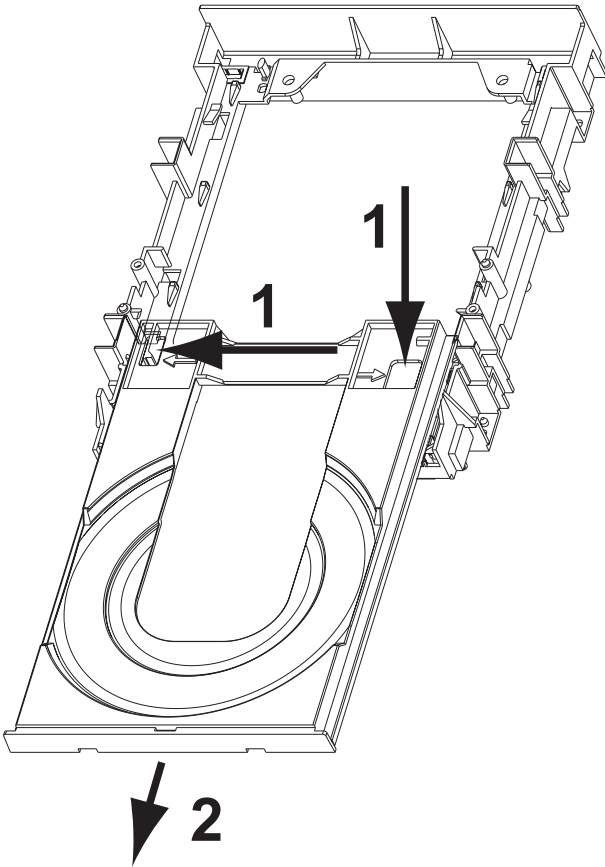


Figure 4-2 Remove Tray

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

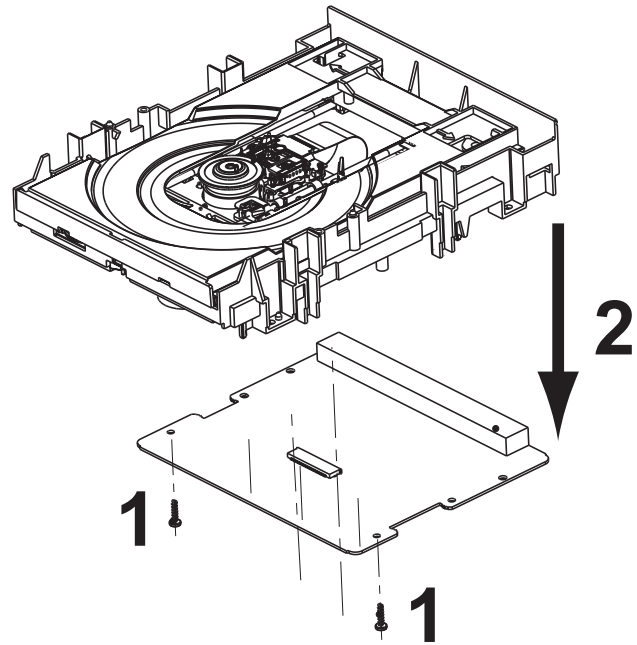


Figure 4-3 Remove PWB

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

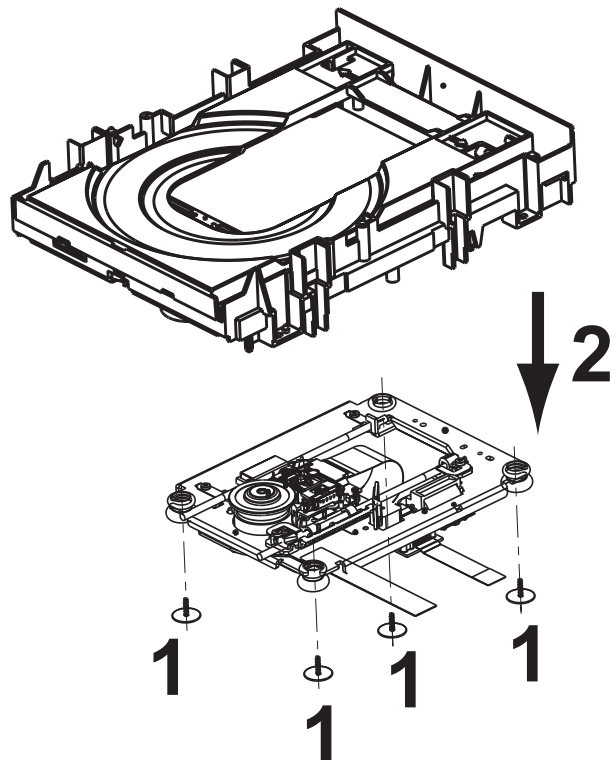


Figure 4-4 Remove DVDM

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

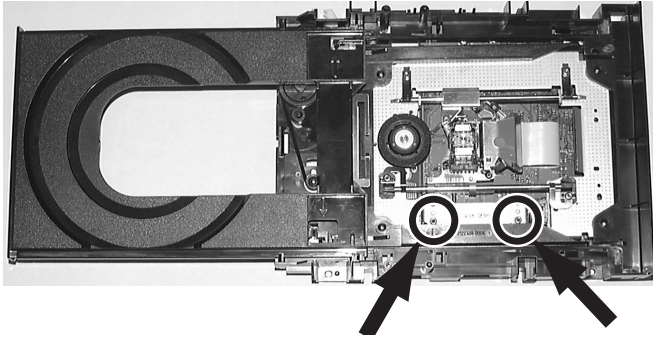


Figure 4-5 Remove Sledge Motor Assy

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"!

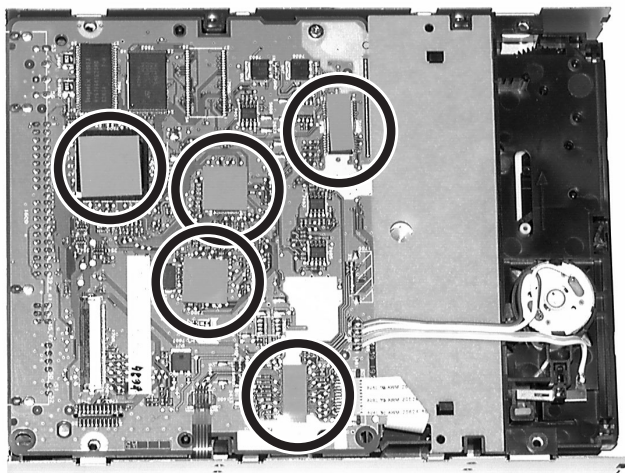


Figure 4-6 Heat Path

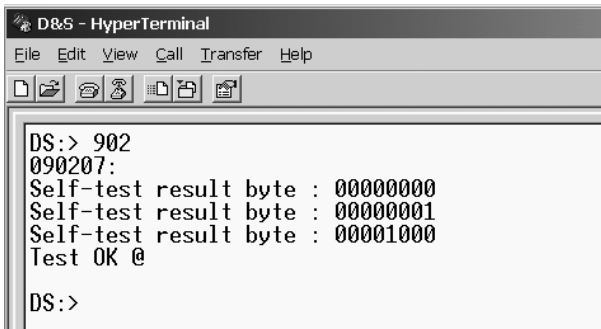
5. Service Modes, Error Codes and Fault Finding

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.



```

D&S - HyperTerminal
File Edit View Call Transfer Help
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.

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				eeeprom	eeeprom checksum*	eeeprom 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.

```

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	reserved(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_calibration_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
------------	----------	---------------------------	-------------------	-----------------------	--------------------------	--------------------------------------	------------------------

byte 3

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

byte 4

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

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
------------------	-----------------	-------------------	--------------------	---------------------	-----------------	-------------------	--------------------

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
-----------------------	---------------------	--------------------	-------------------------------	--------------------	---------------------	------------------------	----------------

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	PC ERROR
---------------------------	-----------------------------	-----------------------------------	-----------------	-----------------------------	----------------------	----------------	----------

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.

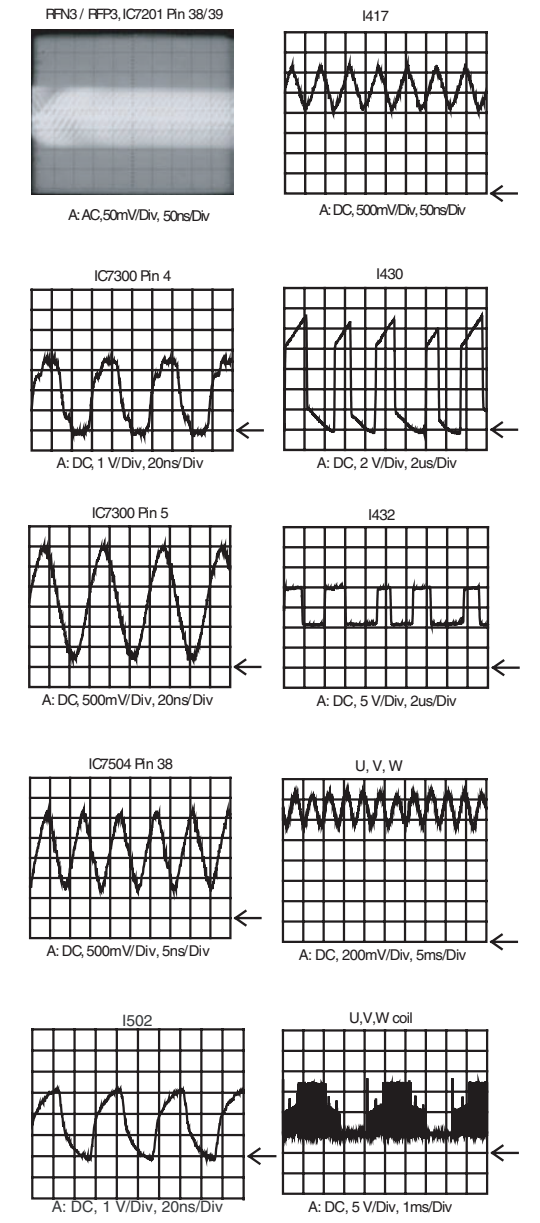
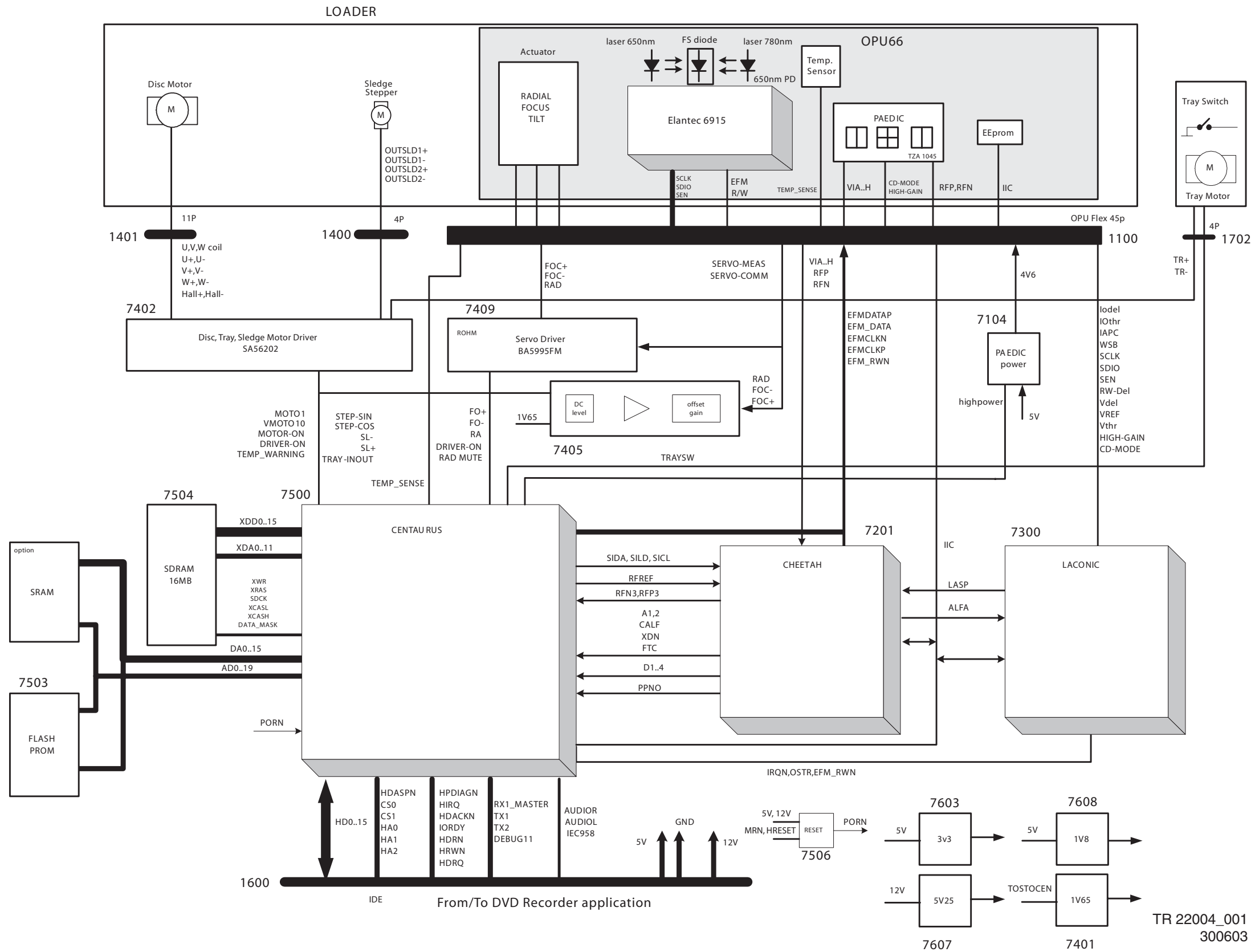
Byte 1 - 9: cumulative errors of previous player / inquiry error occurrences. These bytes are the same as the nine bytes (1-9) of the Momentary errors

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

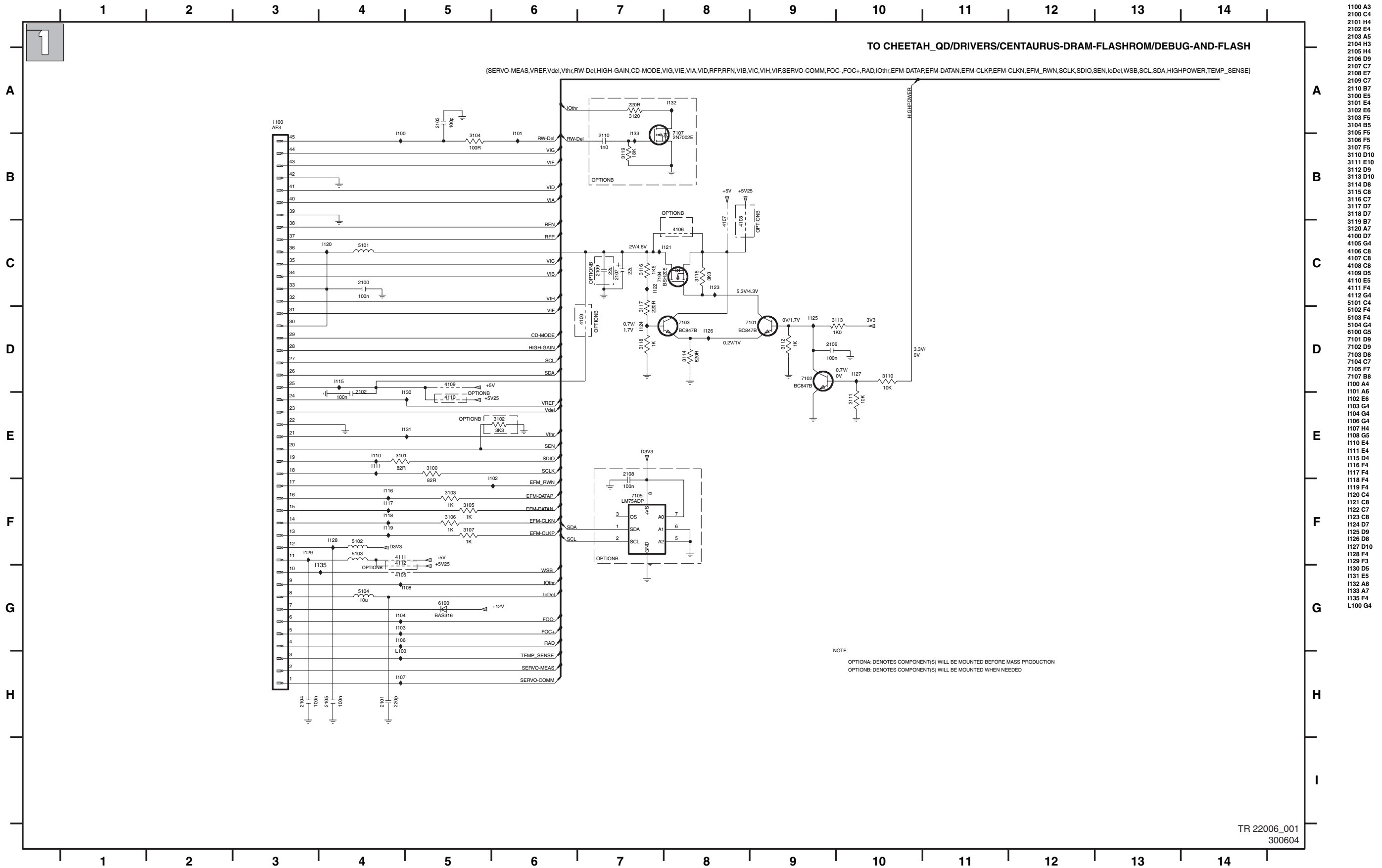
6. Block Diagrams, Waveforms, Wiring Diagram.

Block Diagram

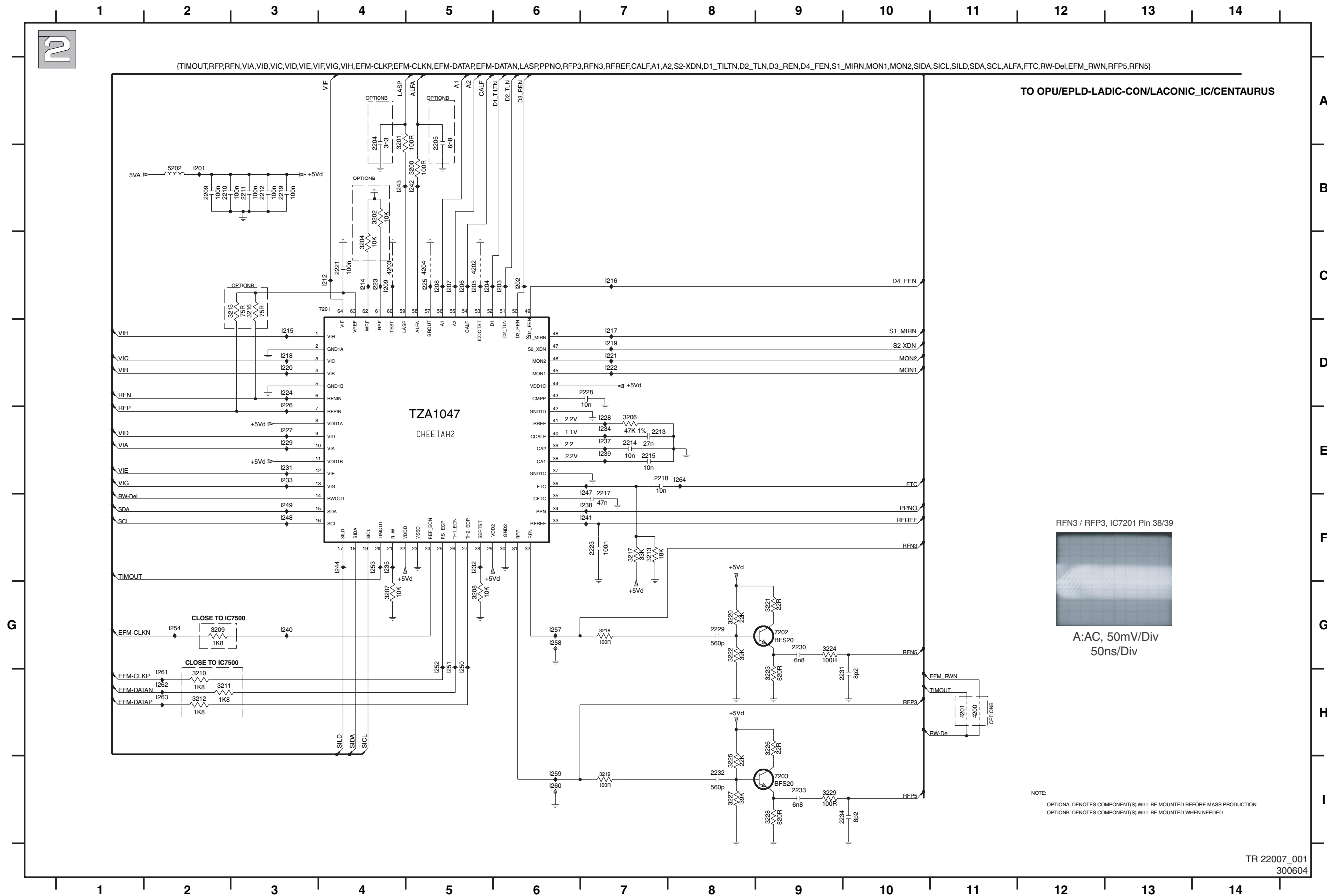


7. Electrical Diagrams and Print-Layouts

Servo Board: OPU Interface

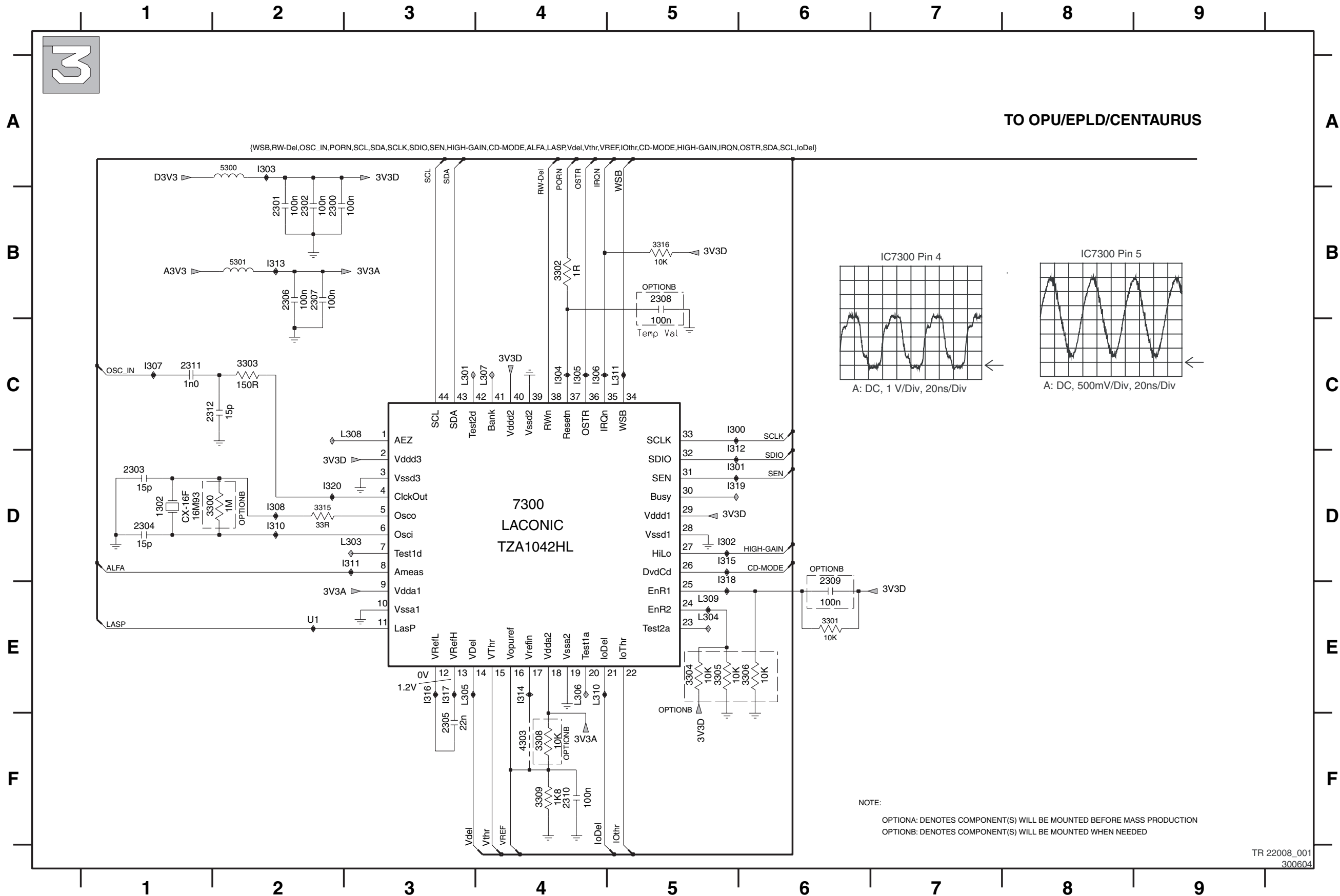


Servo Board: Cheetah



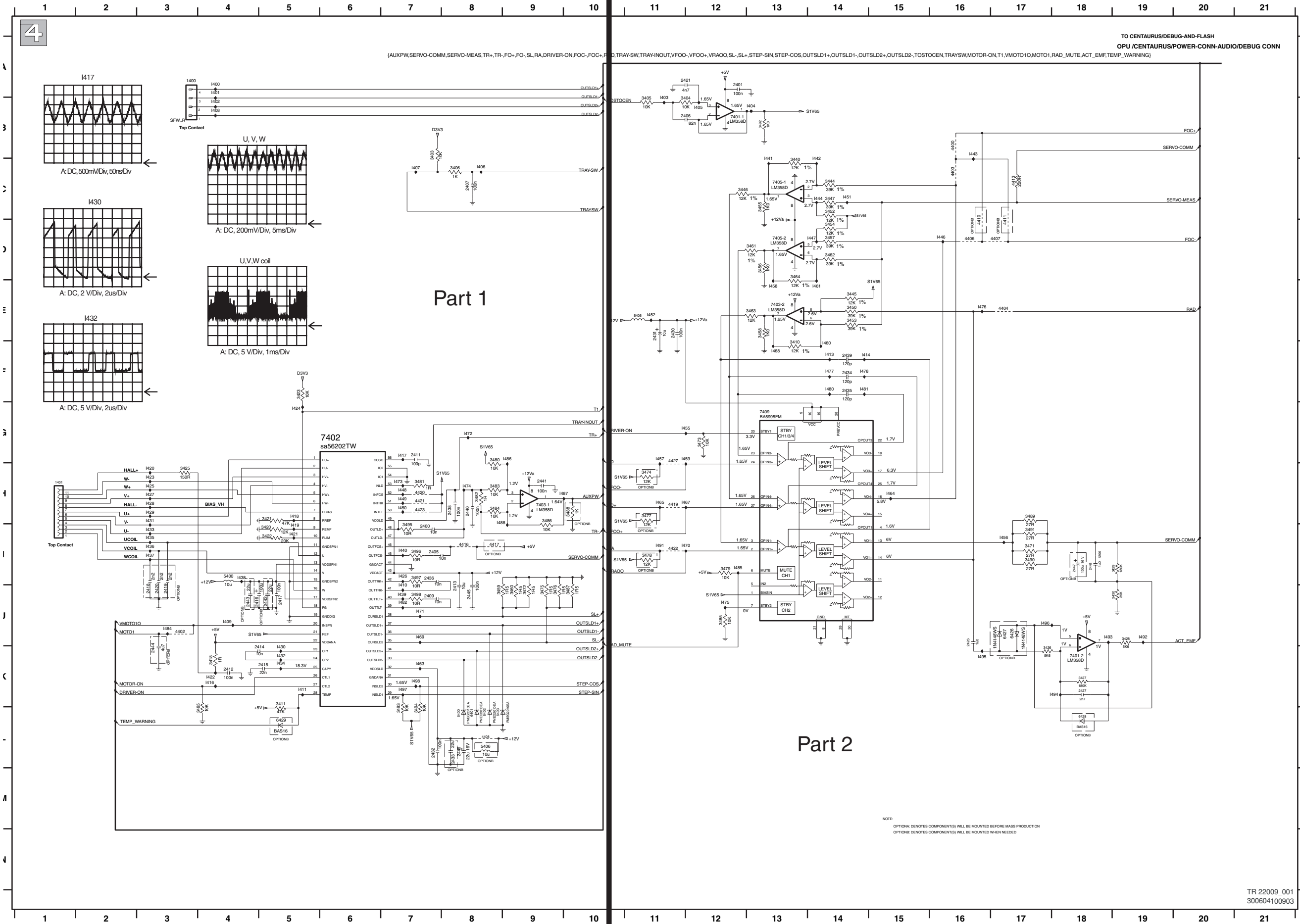
- 2204 A4
- 2205 A5
- 2209 B2
- 2210 B2
- 2211 B3
- 2212 B3
- 2213 E7
- 2214 E7
- 2215 E7
- 2217 E7
- 2218 E7
- 2219 B3
- 2221 C4
- 2223 F7
- 2228 D7
- 2229 G8
- 2230 G9
- 2231 H10
- 2232 I8
- 2233 I9
- 2234 H10
- 3200 B5
- 3201 A4
- 3202 B4
- 3204 C4
- 3206 E7
- 3207 G4
- 3208 G5
- 3209 G2
- 3210 H2
- 3211 H2
- 3212 H2
- 3213 F7
- 3215 C3
- 3216 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
- I201 B2
- I202 C6
- I203 C6
- I204 C5
- I205 C5
- I206 C5
- I207 C5
- I208 C5
- I209 C4
- I212 C4
- I214 C4
- I215 D3
- I216 C7
- I217 D7
- I218 D3
- I219 D7
- I220 D3
- I221 D7
- I222 D7
- I223 C4
- I224 D3
- I225 C5
- I226 D3
- I227 E3
- I228 E7
- I229 E3
- I231 E3
- I232 F5
- I233 E3
- I234 E7
- I235 F4
- I237 E7
- I238 F7
- I239 E7
- I240 G3
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- I242 B5
- I243 B4
- I244 F4
- I247 E7
- I248 F3
- I249 F3
- I250 G5
- I251 G5
- I252 G5
- I253 F4
- I254 G2
- I257 G6
- I258 G6
- I259 I6
- I260 I6
- I261 H2
- I262 H2
- I263 H2
- I264 E8

Servo Board: Laconic



- U1 E2
- I302 D1
- I300 B2
- I301 B2
- I302 B2
- I303 D1
- I304 D1
- I305 F3
- I306 B2
- I307 B2
- I308 B5
- I309 E6
- I310 F4
- I311 C1
- I312 C2
- I313 D2
- I314 E6
- I315 B4
- I316 C2
- I317 E5
- I318 E5
- I319 E5
- I320 D2
- I301 C3
- I303 D3
- I304 E5
- I305 E3
- I306 E4
- I307 C4
- I308 C3
- I309 E5
- I310 E4
- I311 C5

Servo Board: Drivers (Overview)

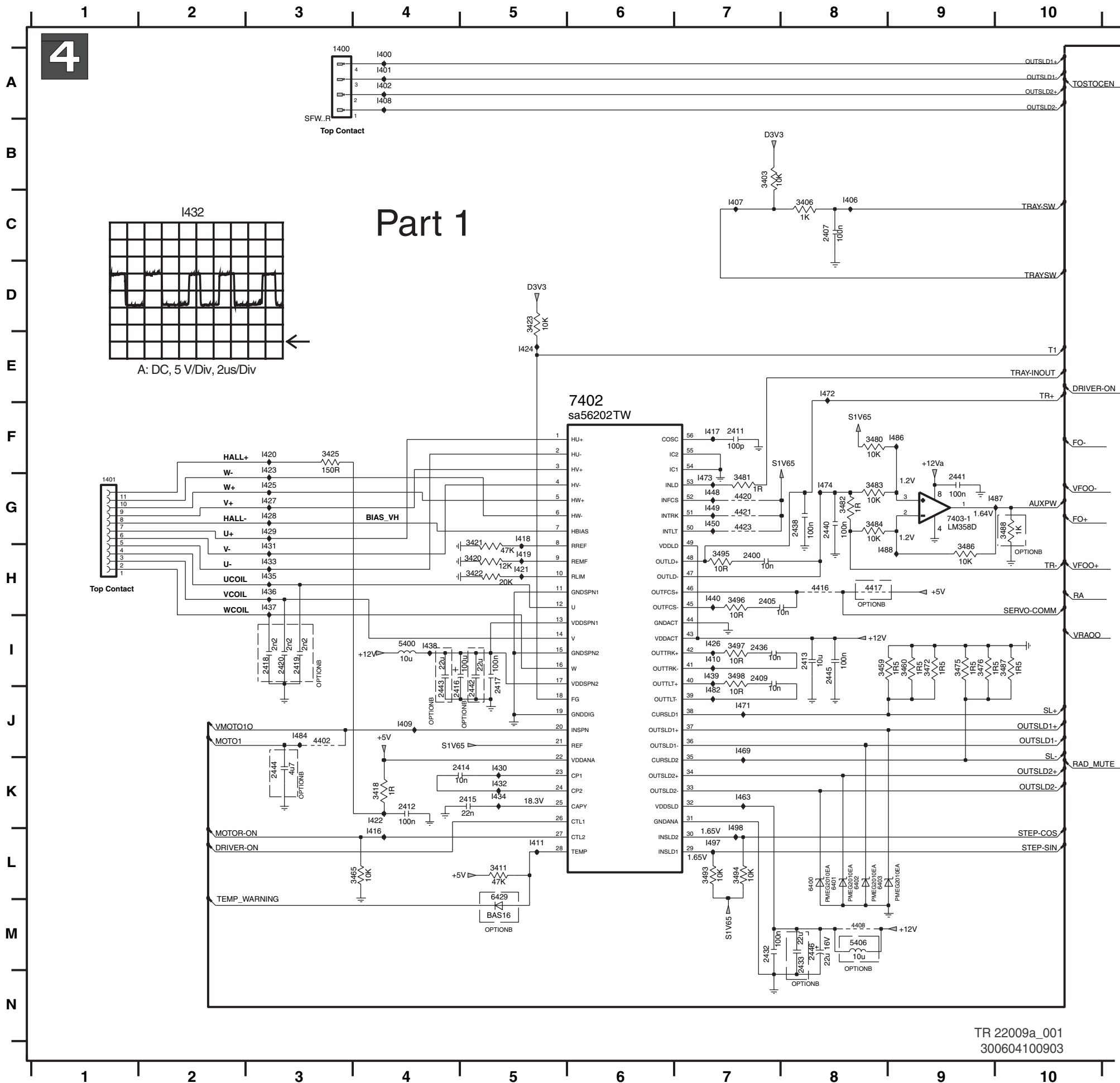


Part 1

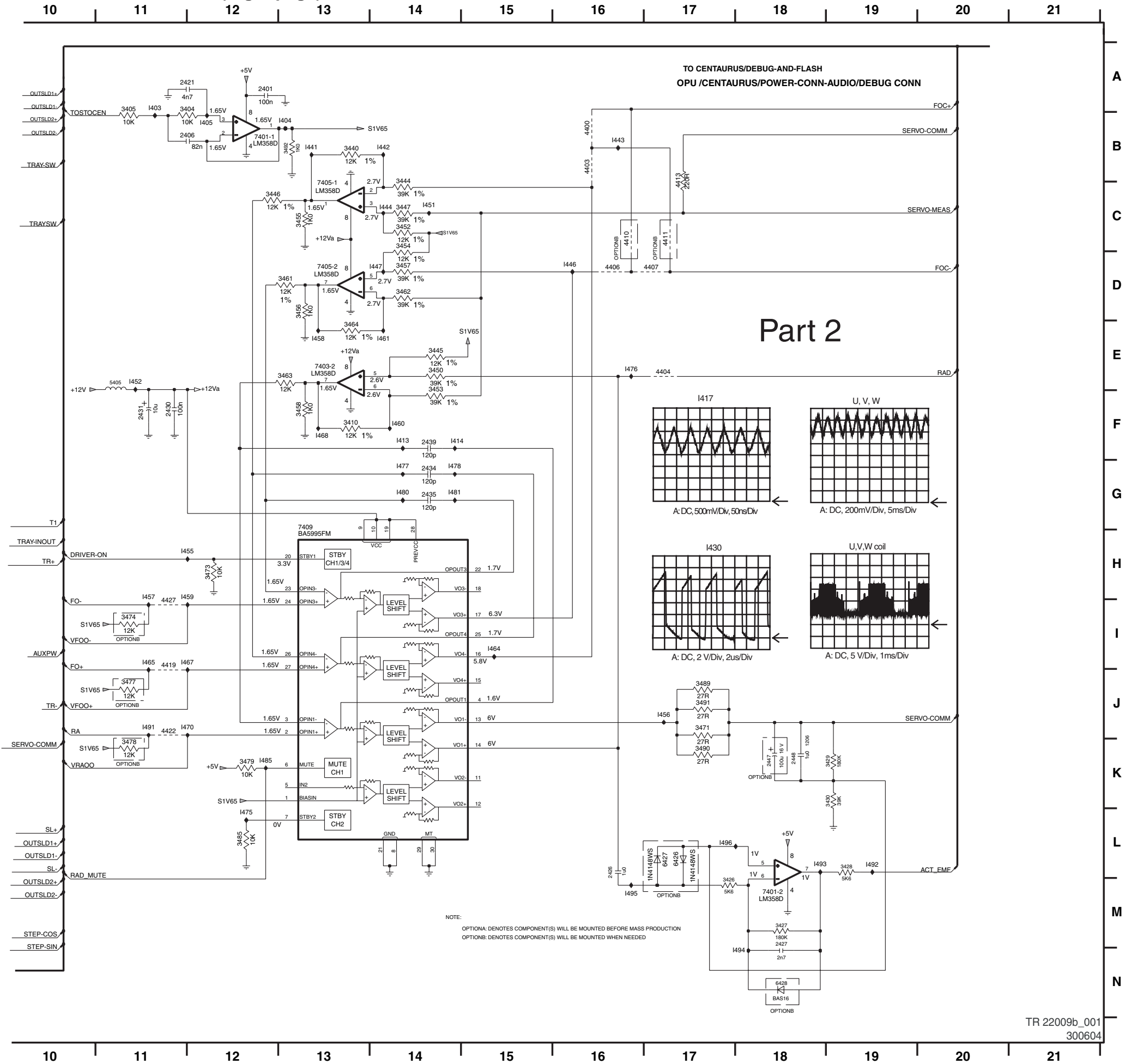
Part 2

1400 A3	1434 K5
1401 H1	1435 I3
1402 H2	1436 I2
1403 A12	1437 I3
1404 H7	1438 H4
1405 B12	1439 J7
1406 B2	1440 I7
1407 C8	1441 B13
1408 J7	1442 B14
1409 J7	1443 B16
1410 J7	1444 C14
1411 B13	1445 J5
1412 G7	1446 D16
1413 K4	1447 D14
1414 K4	1448 H7
1415 J3	1449 H7
1416 J3	1450 H7
1417 J3	1451 C14
1418 J3	1452 E11
1419 J3	1453 I2
1420 J3	1454 I2
1421 A12	1455 D12
1422 J16	1456 I7
1423 K18	1457 D11
1424 E11	1458 E13
1425 E11	1459 G12
1426 L7	1460 F14
1427 L8	1461 E14
1428 F14	1462 K7
1429 I7	1463 H15
1430 H8	1464 H11
1431 H8	1465 H11
1432 H8	1466 H12
1433 F14	1467 F13
1434 H8	1468 J7
1435 H8	1469 J7
1436 H8	1470 I12
1437 H8	1471 J7
1438 H8	1472 G8
1439 K3	1473 H7
1440 J8	1474 H8
1441 L8	1475 J12
1442 H8	1476 E16
1443 H8	1477 F14
1444 H8	1478 F14
1445 J5	1479 F14
1446 J4	1480 F14
1447 K3	1481 F14
1448 J8	1482 J7
1449 L8	1483 J3
1450 L8	1484 J3
1451 H12	1485 H12
1452 H8	1486 O9
1453 H8	1487 H10
1454 H8	1488 H8
1455 I5	1489 I11
1456 I5	1490 I11
1457 F8	1491 J12
1458 H3	1492 J18
1459 H8	1493 J18
1460 K17	1494 K18
1461 K18	1495 K16
1462 J19	1496 J17
1463 J19	1497 K7
1464 J19	1498 K7
1465 C13	
1466 C13	
1467 C13	
1468 C13	
1469 C13	
1470 C13	
1471 C13	
1472 C13	
1473 C13	
1474 C13	
1475 C13	
1476 C13	
1477 C13	
1478 C13	
1479 C13	
1480 C13	
1481 C13	
1482 C13	
1483 C13	
1484 C13	
1485 C13	
1486 C13	
1487 C13	
1488 C13	
1489 C13	
1490 C13	
1491 C13	
1492 C13	
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1494 C13	
1495 C13	
1496 C13	
1497 C13	
1498 C13	
1499 C13	
1500 C13	

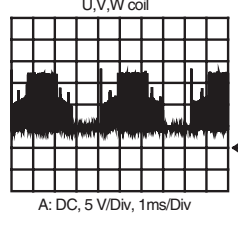
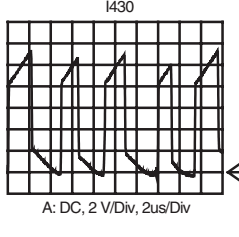
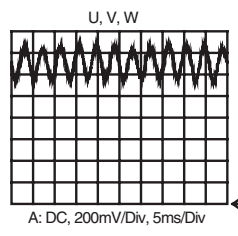
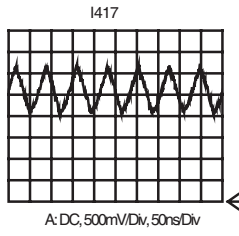
Servo Board: Drivers (Left page)



Servo Board: Drivers (Right page)

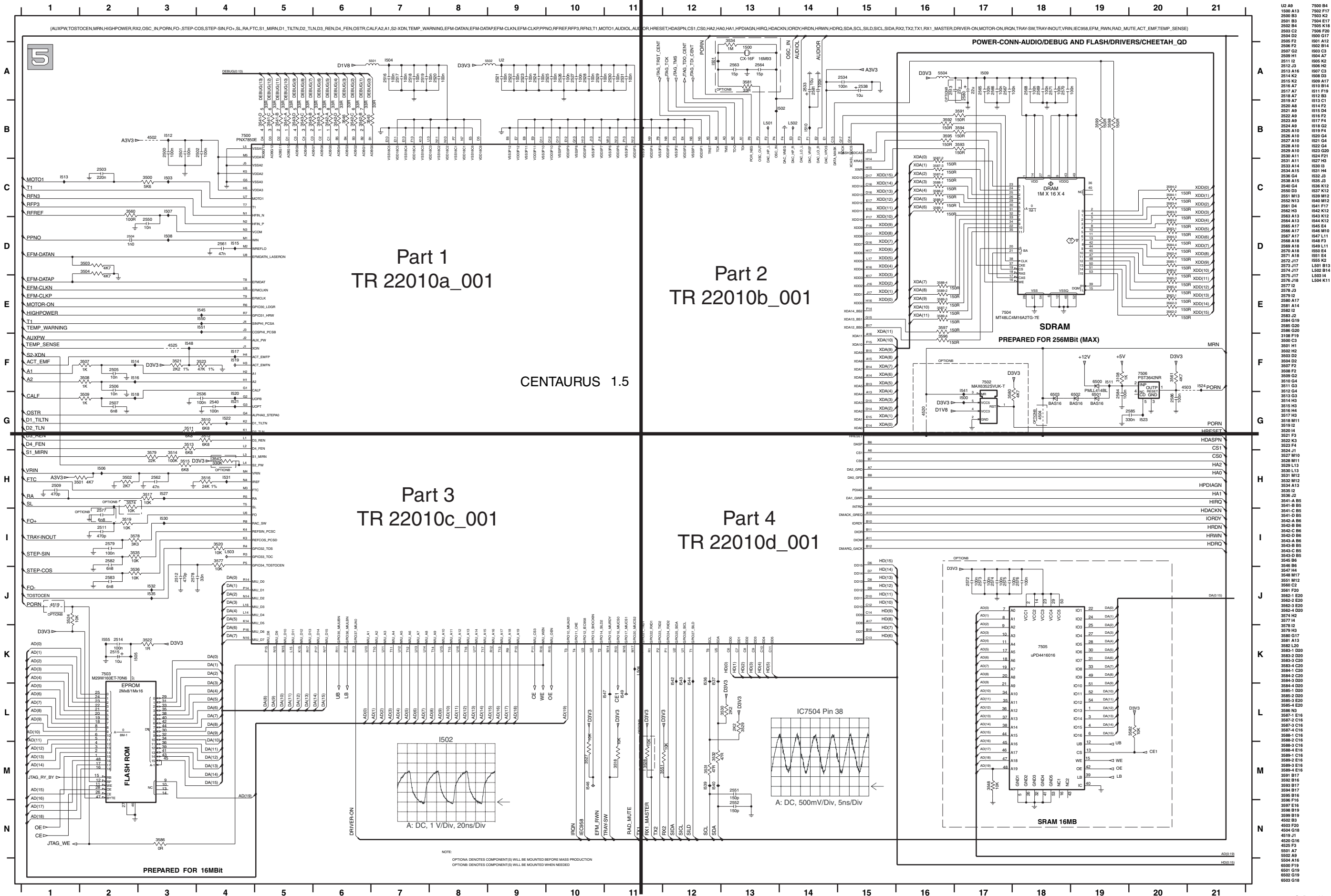


Part 2



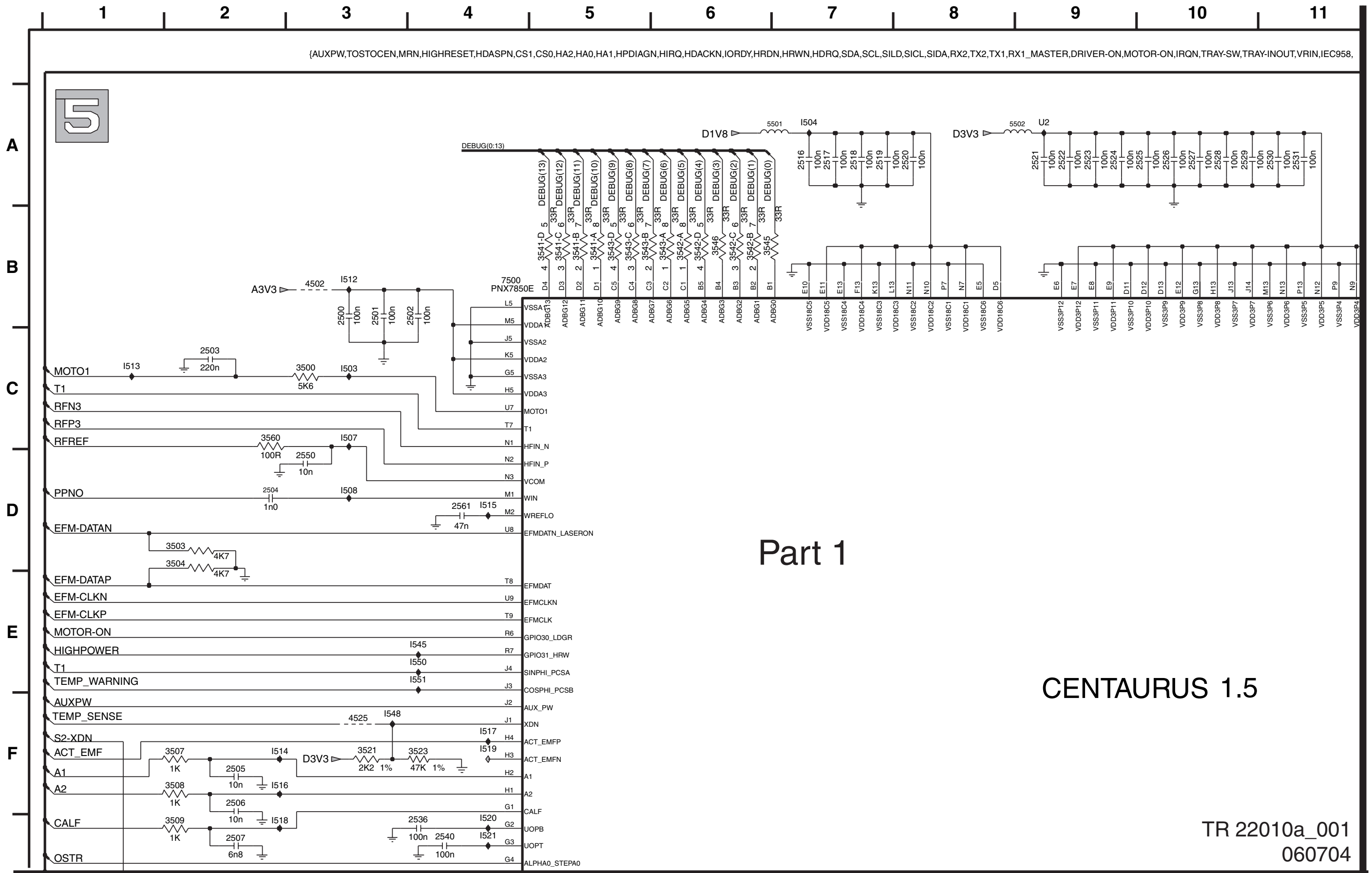
NOTE:
 OPTIONA: DENOTES COMPONENT(S) WILL BE MOUNTED BEFORE MASS PRODUCTION
 OPTIONB: DENOTES COMPONENT(S) WILL BE MOUNTED WHEN NEEDED

Servo Board: Centaurus (Overview)



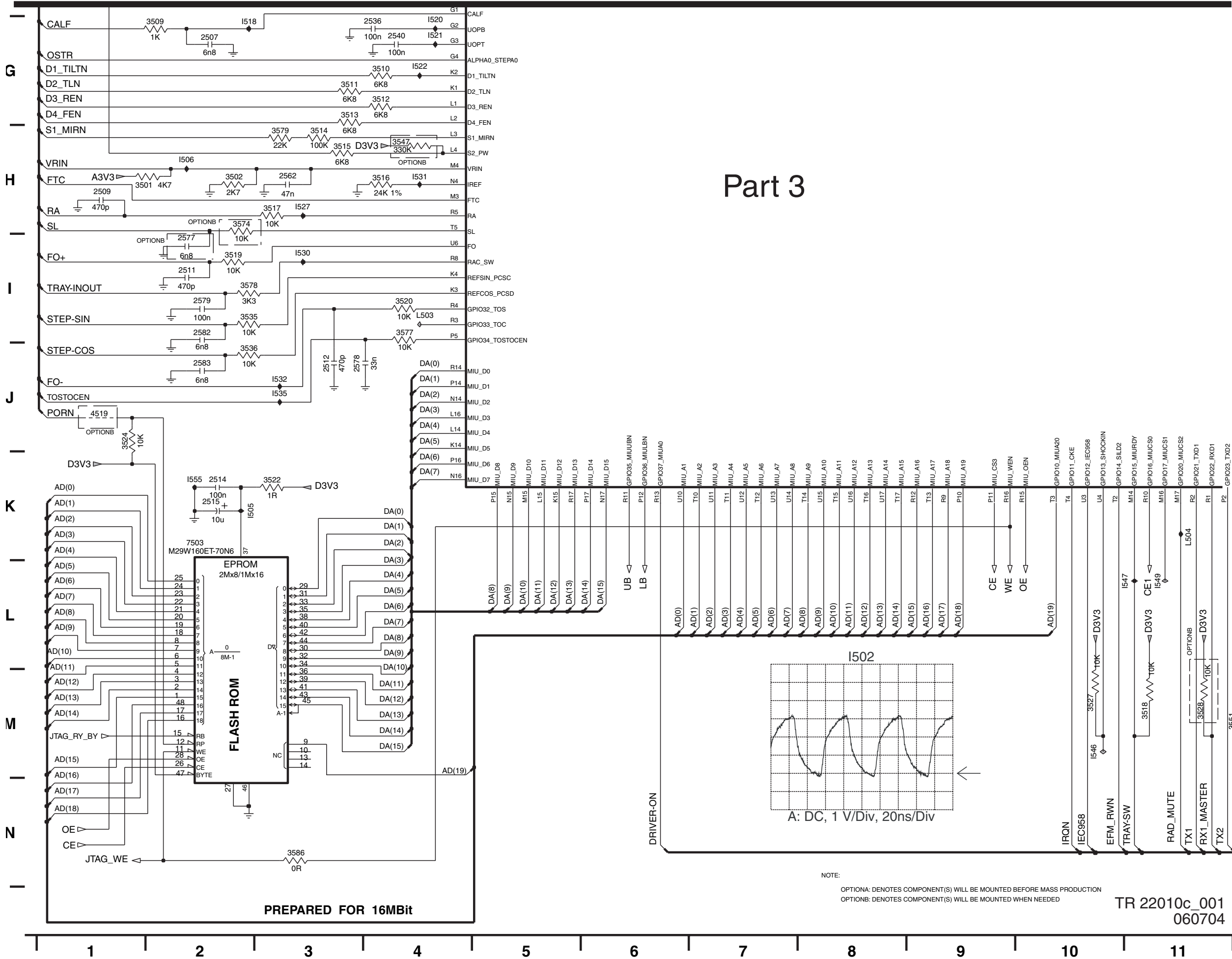
U2 A9	7500 B4
1500 A13	7502 F17
2500 B3	7502 K2
2501 B3	7504 E17
2502 B4	7505 B16
2503 C2	7506 F20
2504 D2	7506 G17
2505 F2	7507 A12
2506 F2	7507 B14
2507 G2	7507 C13
2509 H1	7507 D12
2511 I2	7507 E12
2512 J3	7507 F12
2513 A16	7507 G12
2514 K2	7507 H12
2516 A7	7507 I12
2517 A7	7507 J12
2518 A7	7507 K12
2519 A7	7507 L12
2520 A8	7507 M12
2521 A8	7507 N12
2522 A8	7507 O12
2523 A8	7507 P12
2524 A9	7507 Q12
2525 A10	7507 R12
2526 A10	7507 S12
2527 A10	7507 T12
2528 A10	7507 U12
2529 A10	7507 V12
2530 A11	7507 W12
2531 A11	7507 X12
2532 A11	7507 Y12
2533 A11	7507 Z12
2534 A15	7508 A12
2535 G4	7508 B12
2536 G4	7508 C12
2538 A15	7508 D12
2540 G4	7508 E12
2550 D3	7508 F12
2551 M13	7508 G12
2552 N13	7508 H12
2561 D4	7508 I12
2562 H3	7508 J12
2563 A13	7508 K12
2564 A13	7508 L12
2565 A17	7508 M12
2566 A17	7508 N12
2567 A17	7508 O12
2568 A18	7508 P12
2569 A18	7508 Q12
2570 A18	7508 R12
2571 A18	7508 S12
2572 J17	7508 T12
2573 J17	7508 U12
2574 J17	7508 V12
2575 J17	7508 W12
2576 J18	7508 X12
2577 I2	7508 Y12
2579 I2	7508 Z12
2580 A17	7509 A12
2581 A14	7509 B12
2582 I2	7509 C12
2583 J2	7509 D12
2584 G19	7509 E12
2585 G20	7509 F12
2586 G20	7509 G12
3108 F19	7509 H12
3500 C3	7509 I12
3501 H1	7509 J12
3502 H2	7509 K12
3503 D2	7509 L12
3504 D2	7509 M12
3505 F2	7509 N12
3506 F2	7509 O12
3509 G2	7509 P12
3510 G4	7509 Q12
3511 G3	7509 R12
3512 G4	7509 S12
3513 H3	7509 T12
3514 H3	7509 U12
3515 H3	7509 V12
3516 H4	7509 W12
3517 H3	7509 X12
3518 M11	7509 Y12
3519 I2	7509 Z12
3520 H4	7510 A12
3521 F3	7510 B12
3522 K3	7510 C12
3523 F4	7510 D12
3524 J1	7510 E12
3527 M10	7510 F12
3528 M11	7510 G12
3529 L13	7510 H12
3530 L13	7510 I12
3531 M12	7510 J12
3532 M12	7510 K12
3533 I2	7510 L12
3534 J2	7510 M12
3541-A B5	7510 N12
3541-B B5	7510 O12
3541-C B5	7510 P12
3541-D B5	7510 Q12
3542-A B6	7510 R12
3542-B B6	7510 S12
3542-C B6	7510 T12
3542-D B6	7510 U12
3543-A B6	7510 V12
3543-B B6	7510 W12
3543-C B6	7510 X12
3543-D B6	7510 Y12
3545 B6	7510 Z12
3546 B6	7511 A12
3547 H4	7511 B12
3548 M17	7511 C12
3551 M12	7511 D12
3552 C2	7511 E12
3561 F20	7511 F12
3562-1 E20	7511 G12
3562-2 E20	7511 H12
3562-3 E20	7511 I12
3582 L20	7511 J12
3583-1 D20	7511 K12
3583-2 D20	7511 L12
3583-3 C20	7511 M12
3584-A C20	7511 N12
3584-1 C20	7511 O12
3584-2 C20	7511 P12
3584-3 D20	7511 Q12
3585-1 D20	7511 R12
3585-2 D20	7511 S12
3585-3 E20	7511 T12
3586 A13	7511 U12
3586 L20	7511 V12
3587-1 D20	7511 W12
3587-2 C16	7511 X12
3587-3 C16	7511 Y12
3587-4 C16	7511 Z12
3588-1 C16	7512 A12
3588-2 C16	7512 B12
3588-3 C16	7512 C12
3588-4 C16	7512 D12
3589-1 C16	7512 E12
3589-2 E16	7512 F12
3589-3 E16	7512 G12
3589-4 E16	7512 H12
3591 B17	7512 I12
3592 B16	7512 J12
3593 B17	7512 K12
3594 B17	7512 L12
3595 B16	7512 M12
3596 F16	7512 N12
3597 E16	7512 O12
3598 B18	7512 P12
3599 B19	7512 Q12
4502 B3	7512 R12
4503 F20	7512 S12
4504 G18	7512 T12
6502 G18	7512 U12
6503 G18	7512 V12
	7512 W12
	7512 X12
	7512 Y12
	7512 Z12

Servo Board: Centaurus Part1



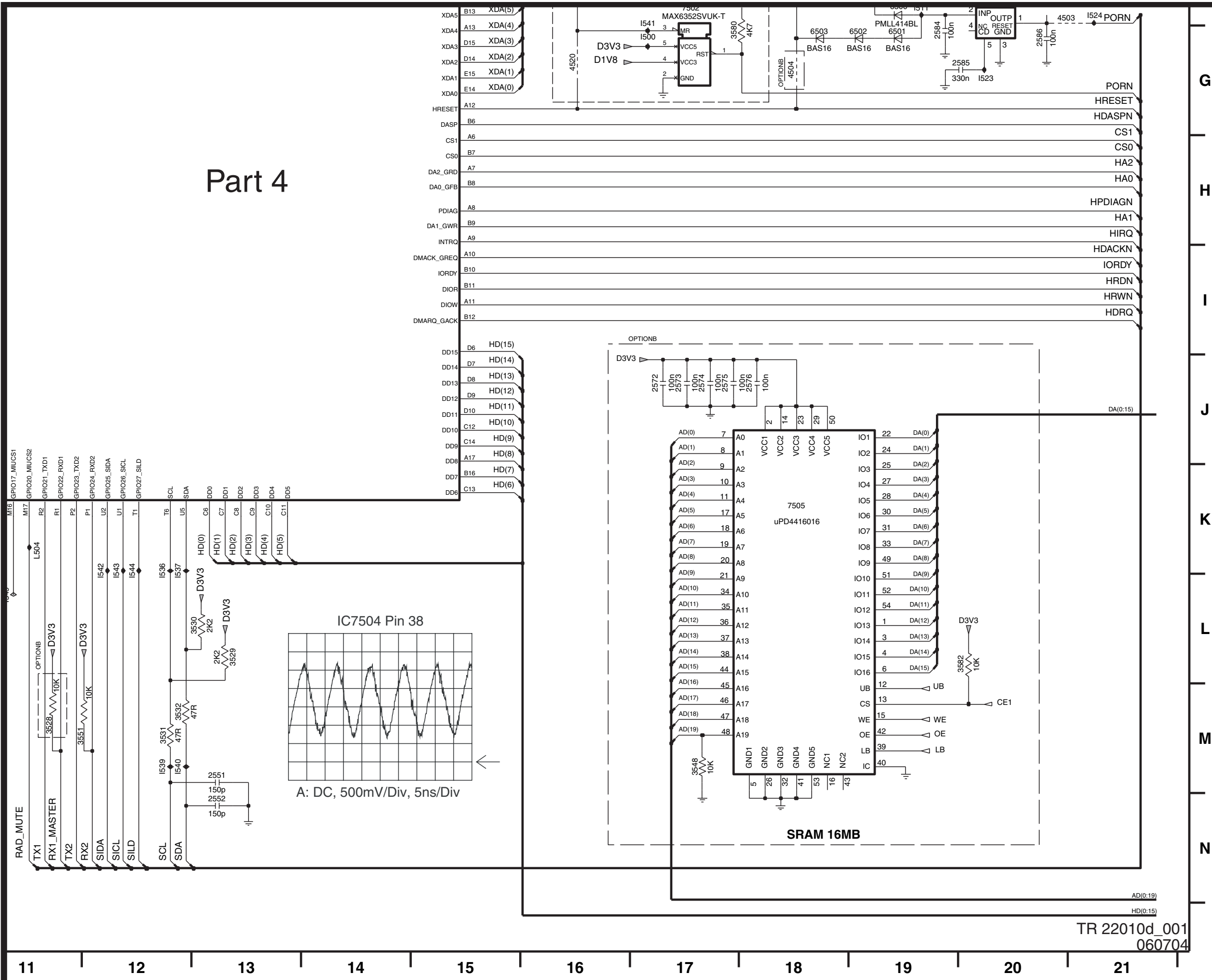
Servo Board: Centaurus Part 3

Part 3

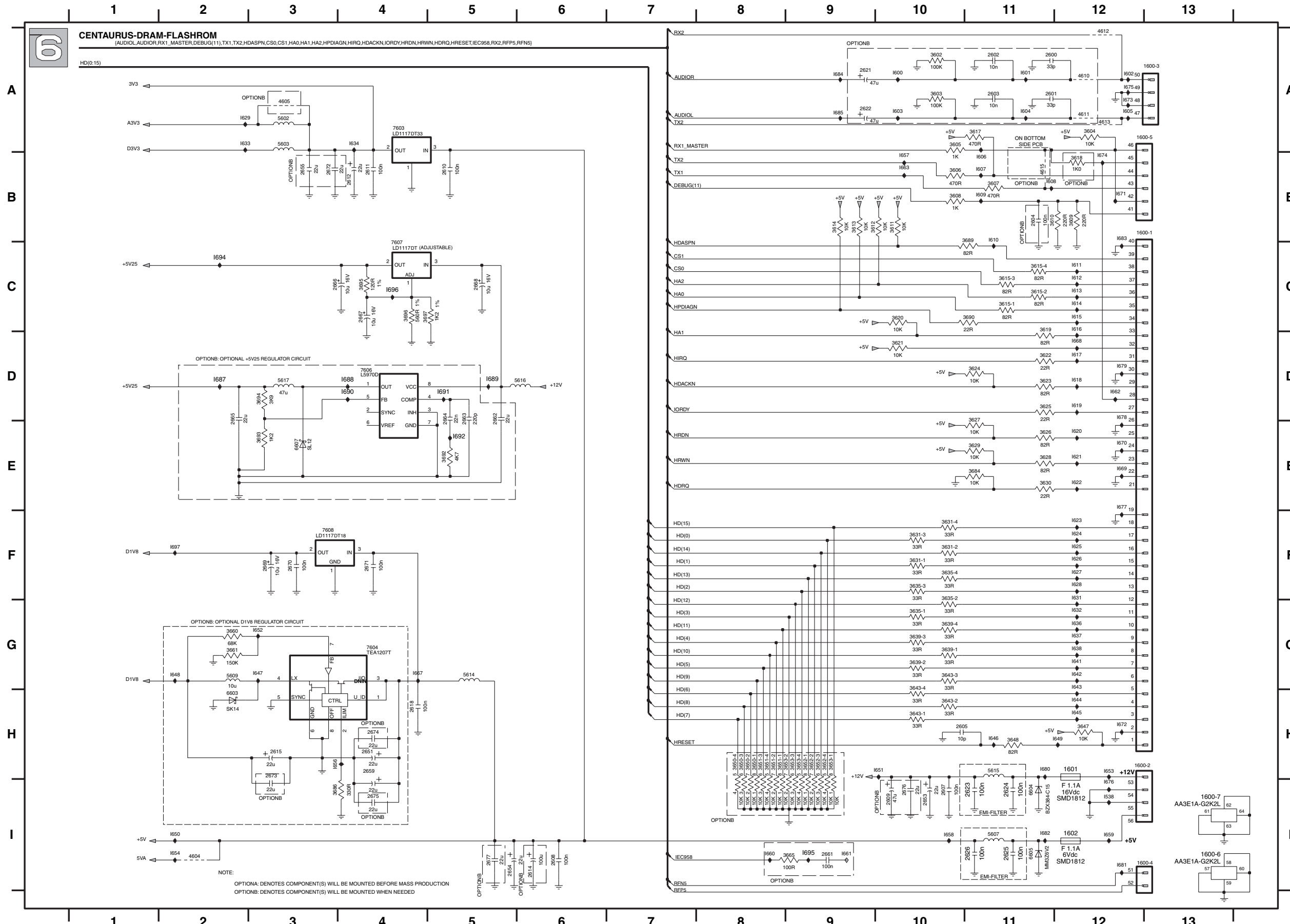


Servo Board: Centaurus Part 4

Part 4

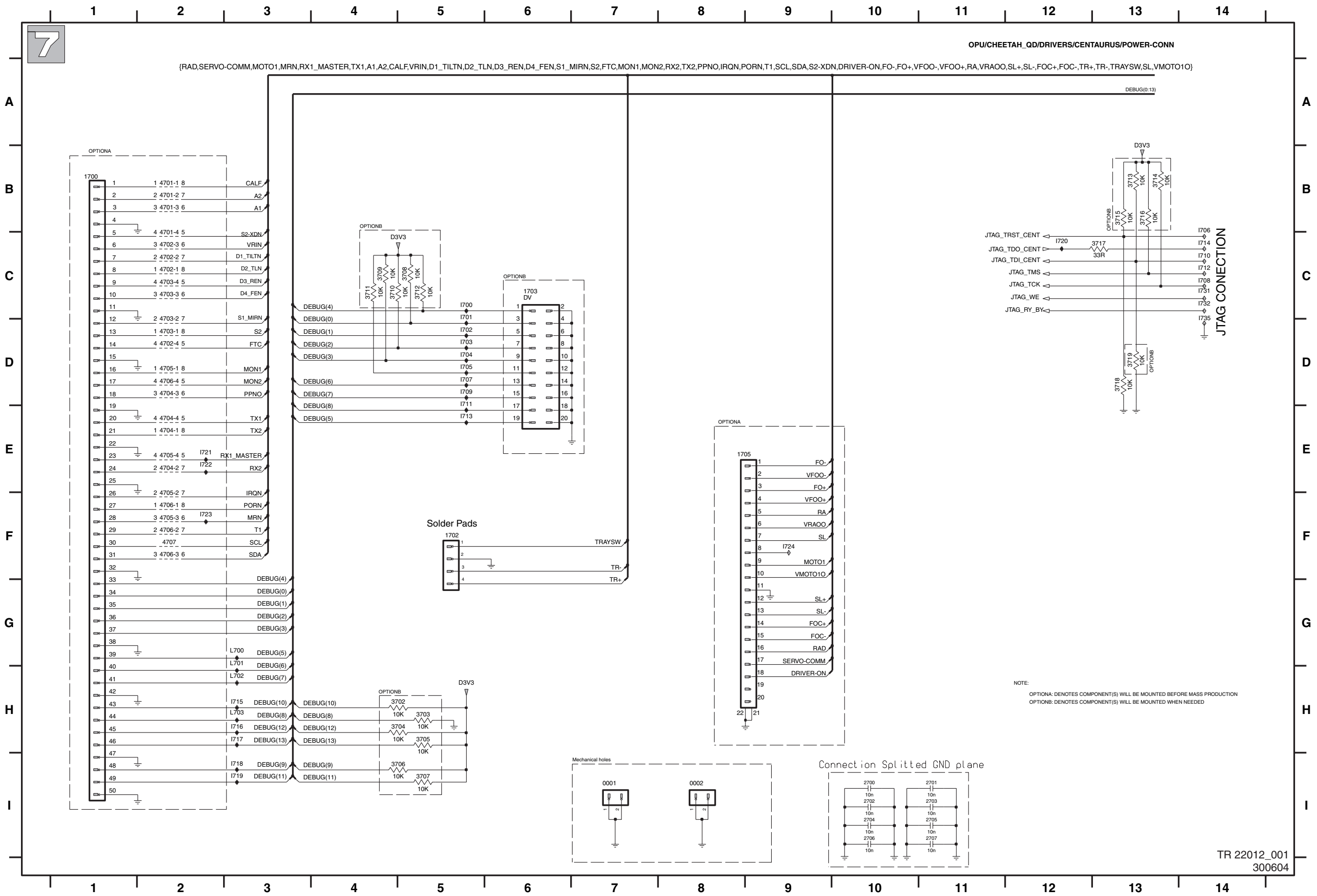


Servo Board: Power, Connectors



1600-1 B12	3661 G2	I690 D4
1600-2 H12	3665 I9	I691 D5
1600-3 A12	3684 E11	I692 E5
1600-4 I12	3686 I3	I694 C2
1600-5 A12	3689 C11	I695 I9
1600-6 I13	3690 C11	I696 C4
1600-7 I13	3692 E5	I697 F2
1601 H12	3693 E3	
1602 I12	3694 D3	
2600 A11	3695 C4	
2601 A11	3696 C4	
2602 A11	3697 C4	
2603 A11	4604 I2	
2604 B11	4605 A3	
2605 H10	4610 A12	
2607 H10	4611 A12	
2608 I6	4612 A12	
2609 H10	4613 A12	
2610 B5	4615 B11	
2611 B4	5602 A3	
2612 B4	5603 A3	
2614 I6	5607 I11	
2615 H3	5609 G2	
2618 H4	5614 G5	
2621 A9	5615 H11	
2622 A9	5616 D6	
2623 I11	5617 D3	
2624 I11	6603 H2	
2625 I11	6604 I11	
2626 I11	6605 I11	
2651 H4	6607 E3	
2653 I10	7603 A4	
2654 I5	7604 G4	
2655 B3	7606 D4	
2659 H4	7607 C4	
2661 I9	7608 F3	
2662 D5	1538 I12	
2663 D5	I600 A10	
2664 D5	I601 A11	
2665 D2	I602 A12	
2666 C3	I603 A10	
2667 C4	I604 A11	
2668 C5	I605 A12	
2669 F3	I606 B11	
2670 F3	I607 B11	
2671 F4	I608 B11	
2672 B3	I609 B11	
2673 H3	I610 B11	
2674 H4	I611 C12	
2675 I4	I612 C12	
2676 I10	I613 C12	
2677 I5	I614 C12	
3602 A10	I615 C12	
3603 A10	I616 C12	
3604 A12	I617 D12	
3605 A10	I618 D12	
3606 B10	I619 D12	
3607 B11	I620 E12	
3608 B10	I621 E12	
3609 B12	I622 E12	
3610 B11	I623 F12	
3611 B10	I624 F12	
3612 B9	I625 F12	
3613 B9	I626 F12	
3614 B9	I627 F12	
3615-1 C11	I628 F12	
3615-2 C11	I629 A2	
3615-3 C11	I631 F12	
3615-4 C11	I632 G12	
3617 A11	I633 A2	
3618 B12	I634 A4	
3619 D11	I636 G12	
3620 C10	I637 G12	
3621 D10	I638 G12	
3622 D11	I641 G12	
3623 D11	I642 G12	
3624 D11	I643 G12	
3625 D11	I644 H12	
3626 E11	I645 H12	
3627 E11	I646 H11	
3628 E11	I647 G3	
3629 E11	I648 G2	
3630 E11	I649 H12	
3631-1 F10	I650 I2	
3631-2 F10	I651 H10	
3631-3 F10	I652 G3	
3631-4 F10	I653 H12	
3635-1 G10	I654 I2	
3635-2 G10	I656 H3	
3635-3 G10	I657 B10	
3635-4 F10	I658 I10	
3639-1 G10	I659 I12	
3639-2 G10	I660 I8	
3639-3 G10	I661 I9	
3639-4 G10	I662 D12	
3643-1 H10	I663 B10	
3643-2 H10	I667 G4	
3643-3 G10	I668 D12	
3643-4 H10	I669 E12	
3647 H12	I670 E12	
3648 H11	I671 B12	
3650-1 H8	I672 H12	
3650-2 H8	I673 A12	
3650-3 H8	I674 B12	
3650-4 H8	I675 A12	
3651-1 H8	I676 H12	
3651-2 H8	I677 E12	
3651-3 H8	I678 D12	
3651-4 H8	I679 D12	
3652-1 H9	I680 H11	
3652-2 H9	I681 I12	
3652-3 H9	I682 I11	
3652-4 H9	I683 B12	
3653-1 H9	I684 A9	
3653-2 H9	I685 A9	
3653-3 H9	I687 D2	
3653-4 H9	I688 D4	
3660 G2	I689 D5	

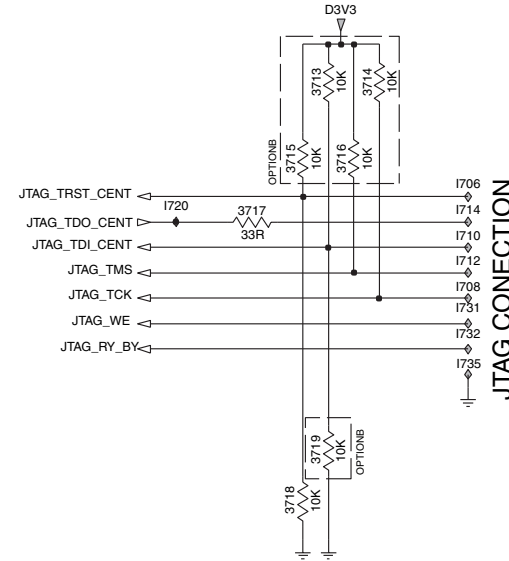
Servo Board: Tray Motor Connections



OPU/CHEETAH_QD/DRIVERS/CENTAURUS/POWER-CONN

{RAD,SERVO-COMM,MOTO1,MRN,RX1_MASTER,TX1,A1,A2,CALF,VRIN,D1_TILTN,D2_TLNL,D3_REN,D4_FEN,S1_MIRN,S2,FTG,MON1,MON2,RX2,TX2,PPNO,IRQN,PORN,T1,SCL,SDA,S2_XDN,DRIVER-ON,FO-,FO+,VFOO-,VFOO+,RA,VRAO,SL+,SL-,FOC+,FOC-,TR-,TR-,TRAYSW,SL,VMOTO1O}

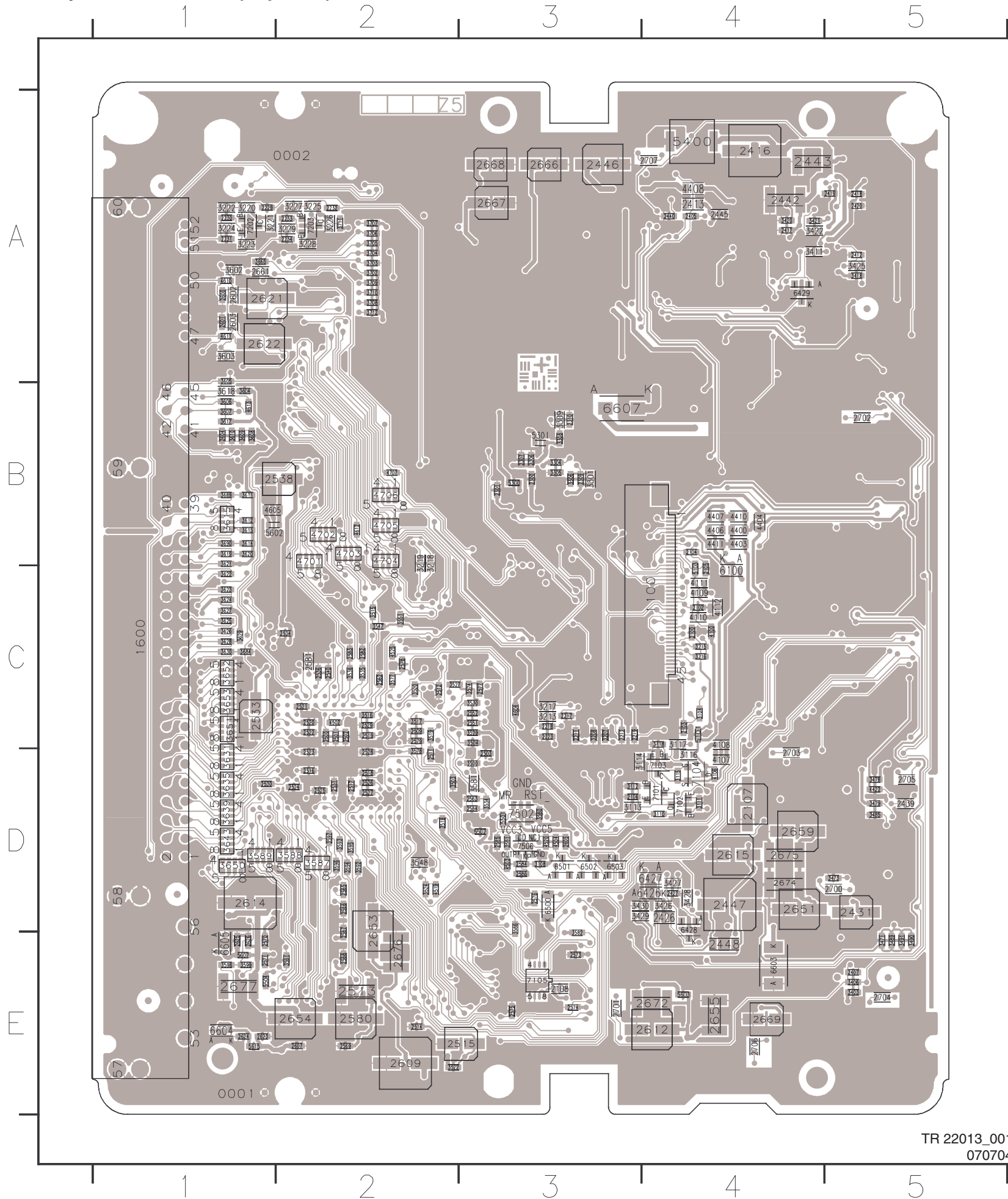
DEBUG(0:13)



NOTE:
 OPTIONA: DENOTES COMPONENT(S) WILL BE MOUNTED BEFORE MASS PRODUCTION
 OPTIONB: DENOTES COMPONENT(S) WILL BE MOUNTED WHEN NEEDED

- 0001 I7
- 0002 I8
- 1700 B1
- 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 I5
- 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 I3
- I719 I3
- I720 C12
- I721 E2
- I722 E2
- I723 F2
- I724 F9
- I731 C14
- I732 C14
- I735 C14
- L700 G3
- L701 G3
- L702 H3
- L703 H3

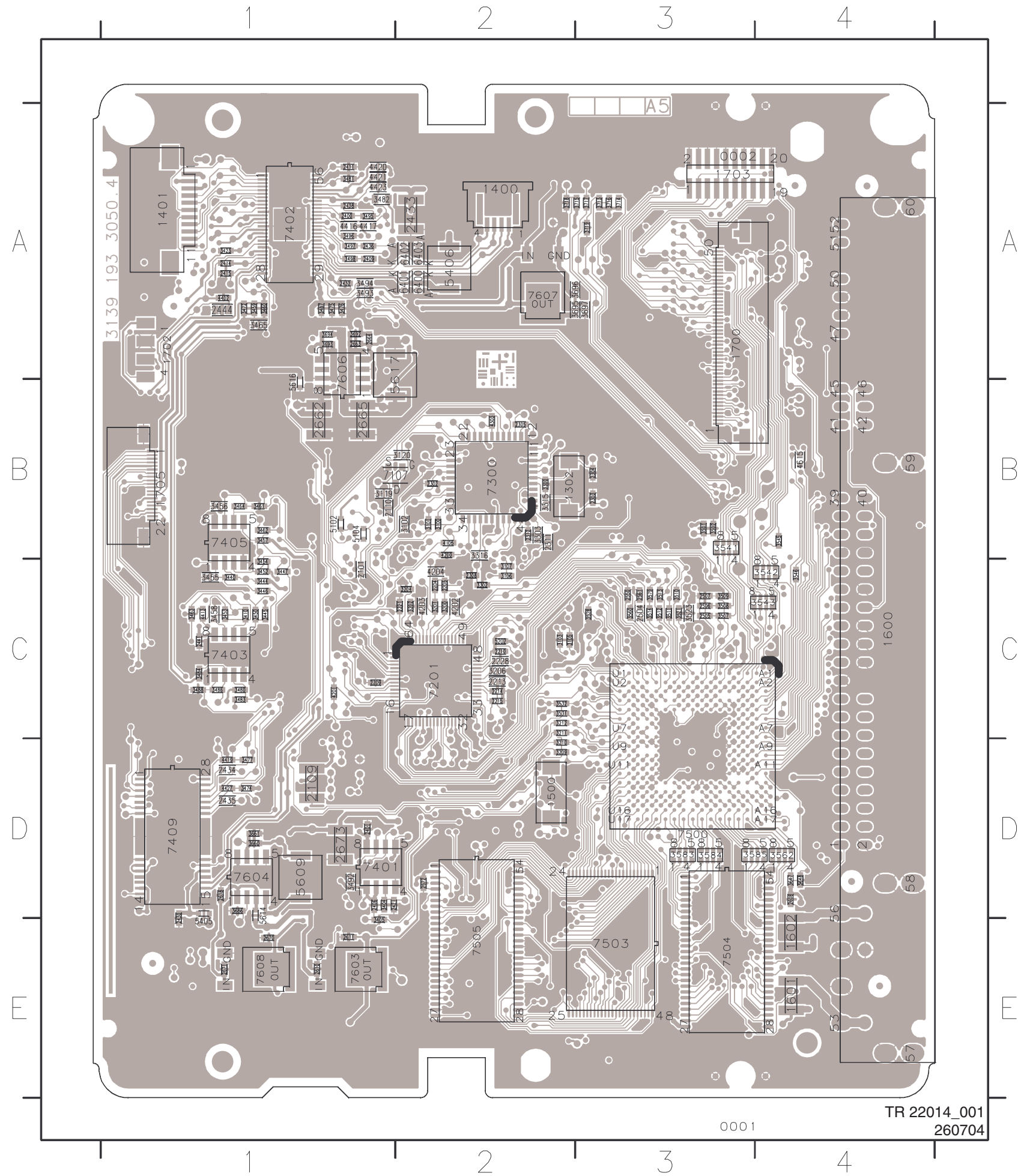
Layout Servo Board (Top Side)



TR 22013_001
070704

1100 C4	2527 D2	2701 E3	3518 O2	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 O2	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 O3	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 O2	3709 A2	7105 E3
2218 C3	2563 D3	3114 D3	3551 C2	3710 A2	7202 A1
2219 C3	2564 D3	3115 D4	3561 O3	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 O2	4106 O4	
2231 A1	2568 E2	3207 C3	3580 O3	4107 D4	
2232 A2	2569 E2	3208 C3	3581 O3	4108 C4	
2233 A2	2570 E1	3213 C3	3582 E3	4109 C4	
2234 A2	2571 E1	3215 C4	3586 O3	4110 C4	
2300 B3	2573 E3	3216 C4	3587 O2	4111 C4	
2301 B3	2574 E3	3217 C3	3588 O2	4112 C4	
2306 B3	2575 E3	3218 B2	3589 O1	4400 B4	
2307 B3	2576 D3	3219 B2	3591 E2	4403 B4	
2309 B3	2577 C3	3220 A1	3592 O2	4404 B4	
2310 B3	2578 C2	3221 A1	3593 O2	4406 B4	
2405 A4	2579 C2	3222 A1	3594 O2	4407 B4	
2407 E5	2580 E2	3223 A1	3595 O2	4408 A4	
2412 A5	2581 C2	3224 A1	3596 O2	4410 B4	
2413 A4	2582 C2	3225 A2	3597 O2	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 O3	
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 O4	3619 B1	4706 B2	
2503 D3	2625 E1	3427 O4	3620 B1	4707 B2	
2509 C2	2626 E1	3428 O4	3621 B1	5101 C4	
2511 D2	2651 D4	3429 O3	3622 C1	5103 C4	
2512 C2	2653 D2	3430 O3	3623 C1	5300 B3	
2513 E2	2654 E2	3471 E5	3624 C1	5301 B3	
2514 E2	2655 E4	3473 O5	3625 C1	5400 A4	
2515 E3	2659 D4	3478 O5	3626 C1	5501 D3	
2516 D2	2661 A1	3479 O5	3627 C1	5502 O3	
2517 D2	2666 A3	3485 O5	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 O1	5607 E1	
2521 C2	2672 E4	3500 O3	3635 D1	5615 E1	
2522 C2	2674 D4	3503 O2	3639 D1	6100 C4	
2523 D2	2675 D4	3504 C3	3643 D1	6426 O4	
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	

Layout Servo Board (Bottom Side)



1302	B2	3456	B1	6401	A2
1400	A2	3457	B1	6402	A2
1401	A1	3458	C1	6403	A2
1500	D2	3459	A1	7107	B1
1601	E4	3460	A1	7201	C2
1602	E4	3461	B1	7300	B2
1700	A3	3462	B1	7401	D1
1702	A1	3463	C1	7402	A1
1703	A3	3464	B1	7403	C1
1705	B1	3465	A1	7405	B1
2101	C1	3472	A1	7409	D1
2109	D1	3474	D1	7500	D3
2110	B1	3475	A1	7503	E3
2204	C2	3476	A1	7504	E3
2205	C2	3477	D1	7505	E2
2209	C1	3480	C1	7603	E1
2210	C2	3481	A1	7604	D1
2213	C2	3482	A1	7606	A1
2214	C2	3483	C1	7607	A1
2215	C2	3484	C1	7608	A2
2221	C2	3486	C1		
2228	C2	3487	A1		
2302	B2	3488	C1		
2303	B3	3492	D1		
2304	B3	3493	A1		
2305	B2	3494	A1		
2308	C2	3495	A1		
2311	B2	3496	A1		
2312	B2	3497	A1		
2400	A1	3498	A1		
2401	D1	3501	B3		
2406	D1	3502	B3		
2409	A1	3507	C3		
2411	A1	3508	C3		
2414	A1	3509	C3		
2415	A1	3510	C3		
2421	D1	3511	C3		
2430	E1	3512	C3		
2432	A1	3513	C3		
2433	A2	3514	C3		
2434	D1	3521	C3		
2435	D1	3523	C3		
2436	A1	3528	C3		
2438	A1	3531	C2		
2441	C1	3532	C2		
2444	A1	3541	B3		
2504	C3	3542	C4		
2505	C3	3543	C4		
2506	C3	3545	B4		
2507	C3	3546	C4		
2550	C3	3560	C3		
2561	C3	3562	D4		
2572	D2	3579	C3		
2608	D4	3583	D3		
2610	E1	3584	D3		
2611	E1	3585	D4		
2618	D1	3647	D4		
2662	B1	3648	D4		
2663	A1	3660	D1		
2664	A1	3661	D1		
2665	B1	3686	D1		
2670	E1	3692	A1		
2671	E1	3693	A1		
2673	D1	3694	A1		
3100	B2	3695	A2		
3101	B2	3696	A2		
3102	B2	3697	A3		
3103	C2	3713	A3		
3105	C2	3714	A3		
3106	C2	3715	A3		
3107	C2	3716	A3		
3119	B1	3717	A3		
3120	B2	3718	A2		
3200	C2	3719	A3		
3201	C2	4105	B2		
3202	C2	4200	B2		
3204	C2	4201	C1		
3206	C2	4202	C2		
3209	D2	4203	C2		
3210	D2	4204	C2		
3211	C2	4303	B2		
3212	C2	4402	A1		
3300	B2	4413	C1		
3302	C2	4416	A1		
3303	B2	4417	A1		
3315	B2	4419	D1		
3316	B2	4420	A1		
3404	D1	4421	A1		
3405	E1	4423	A1		
3410	C1	4427	D1		
3423	A1	4615	B4		
3440	C1	5102	B1		
3444	C1	5104	B1		
3445	C1	5202	C2		
3446	C1	5405	E1		
3447	C1	5406	A2		
3450	C1	5609	D1		
3452	C1	5614	D1		
3453	C1	5616	B1		
3454	C1	5617	A1		
3455	C1	6400	A2		

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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

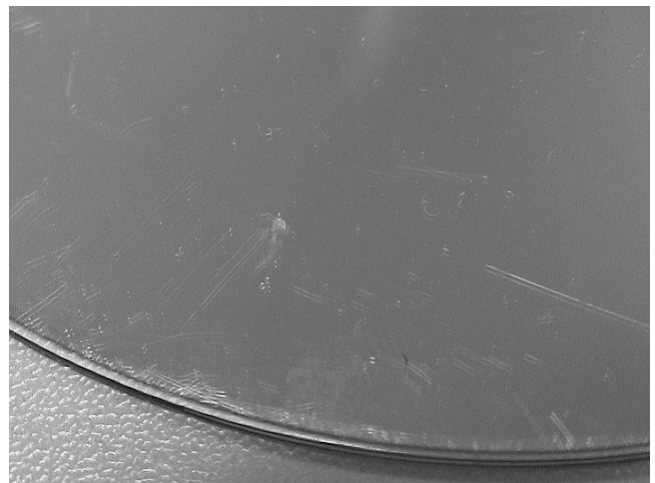


Figure 8-2

Flowchart for test instruction

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

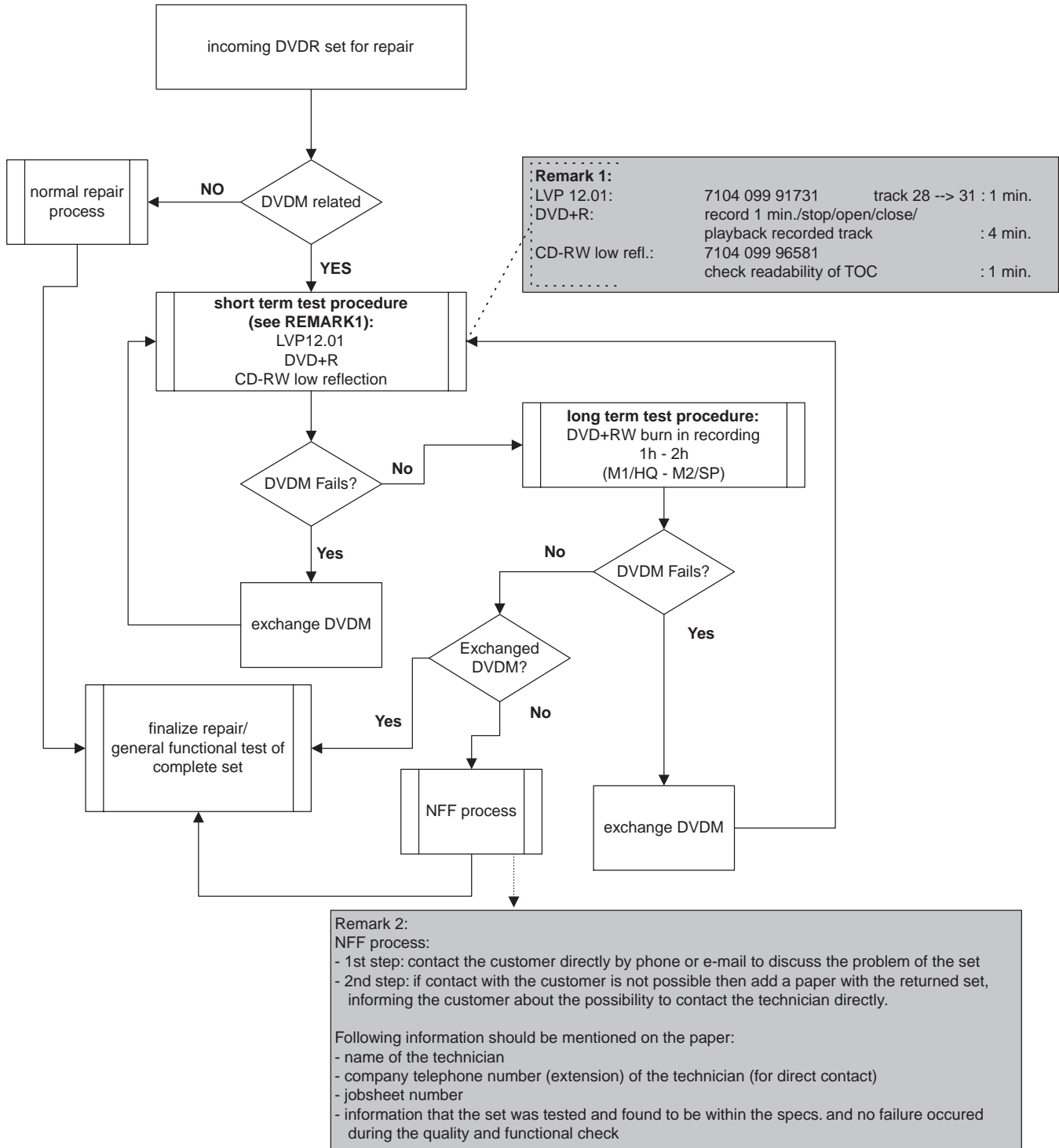


Figure 8-3

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

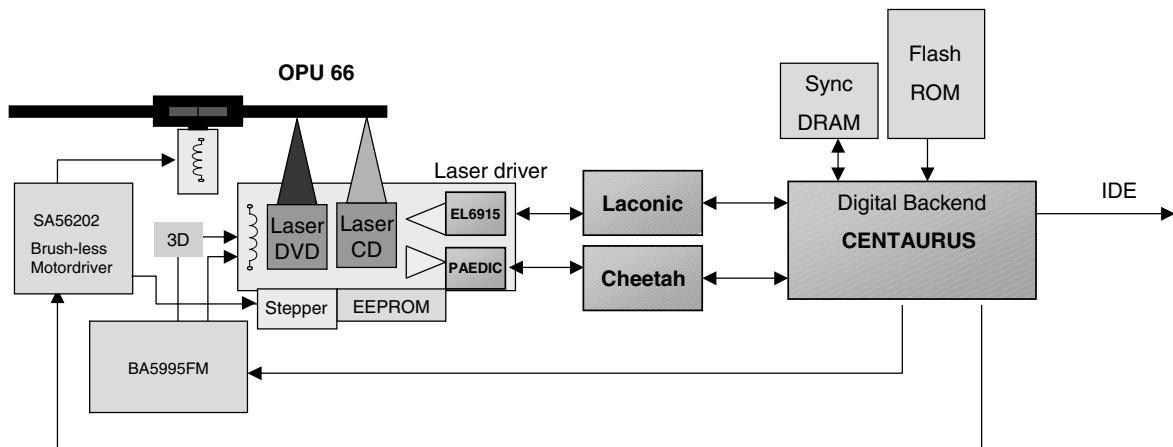


Figure 9-1

9.3 Centaurus

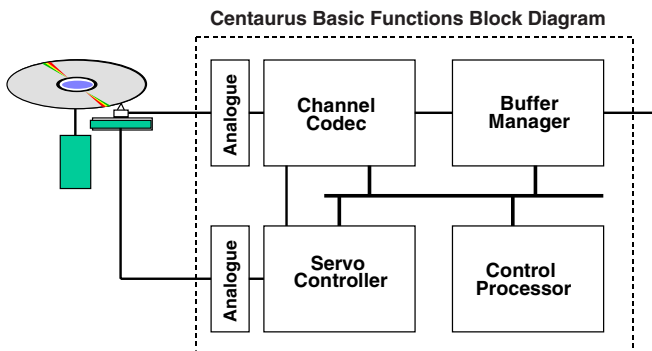


Figure 9-2

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 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 IIC 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.

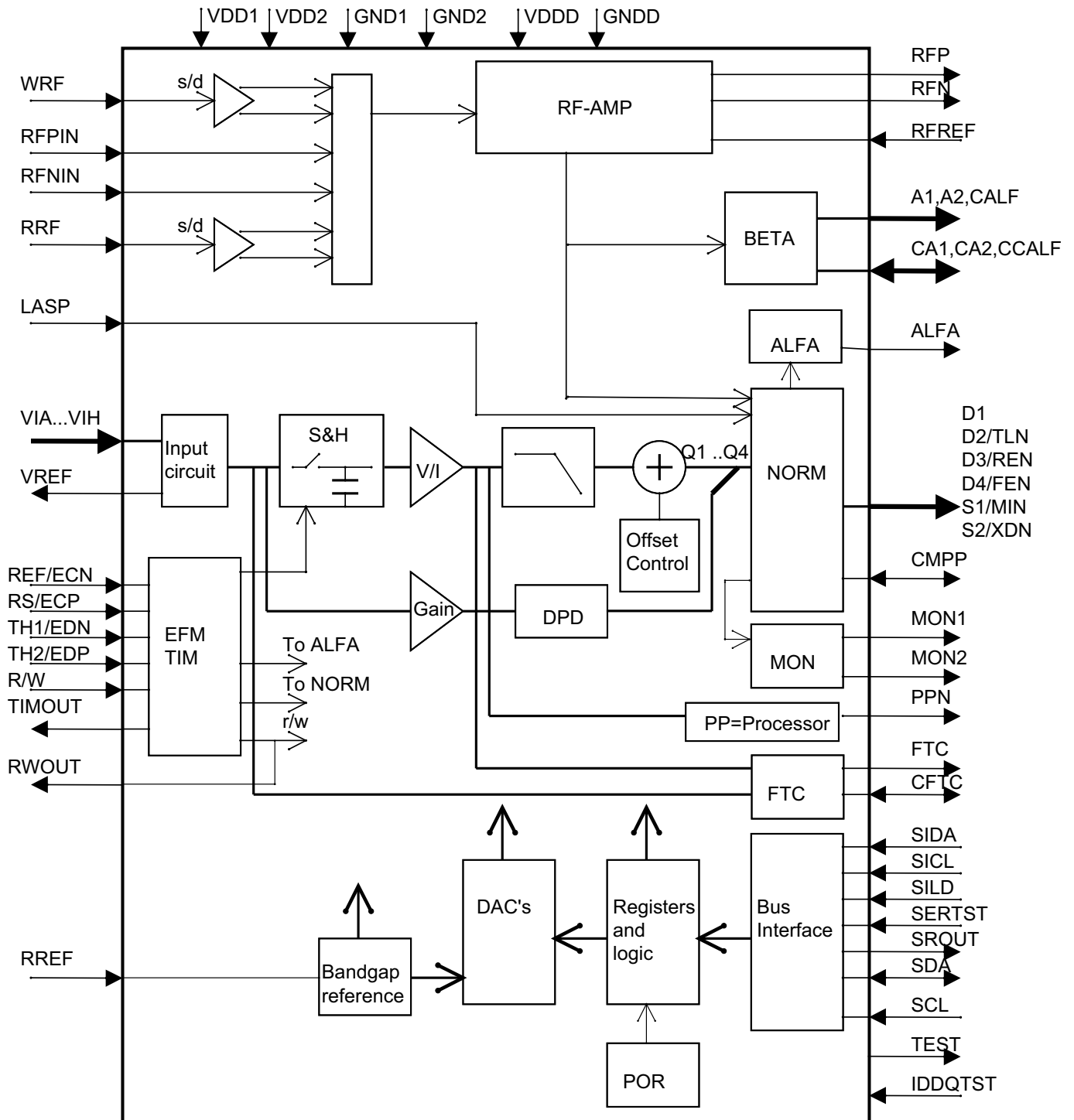
9.7 Motor and Servo drivers

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

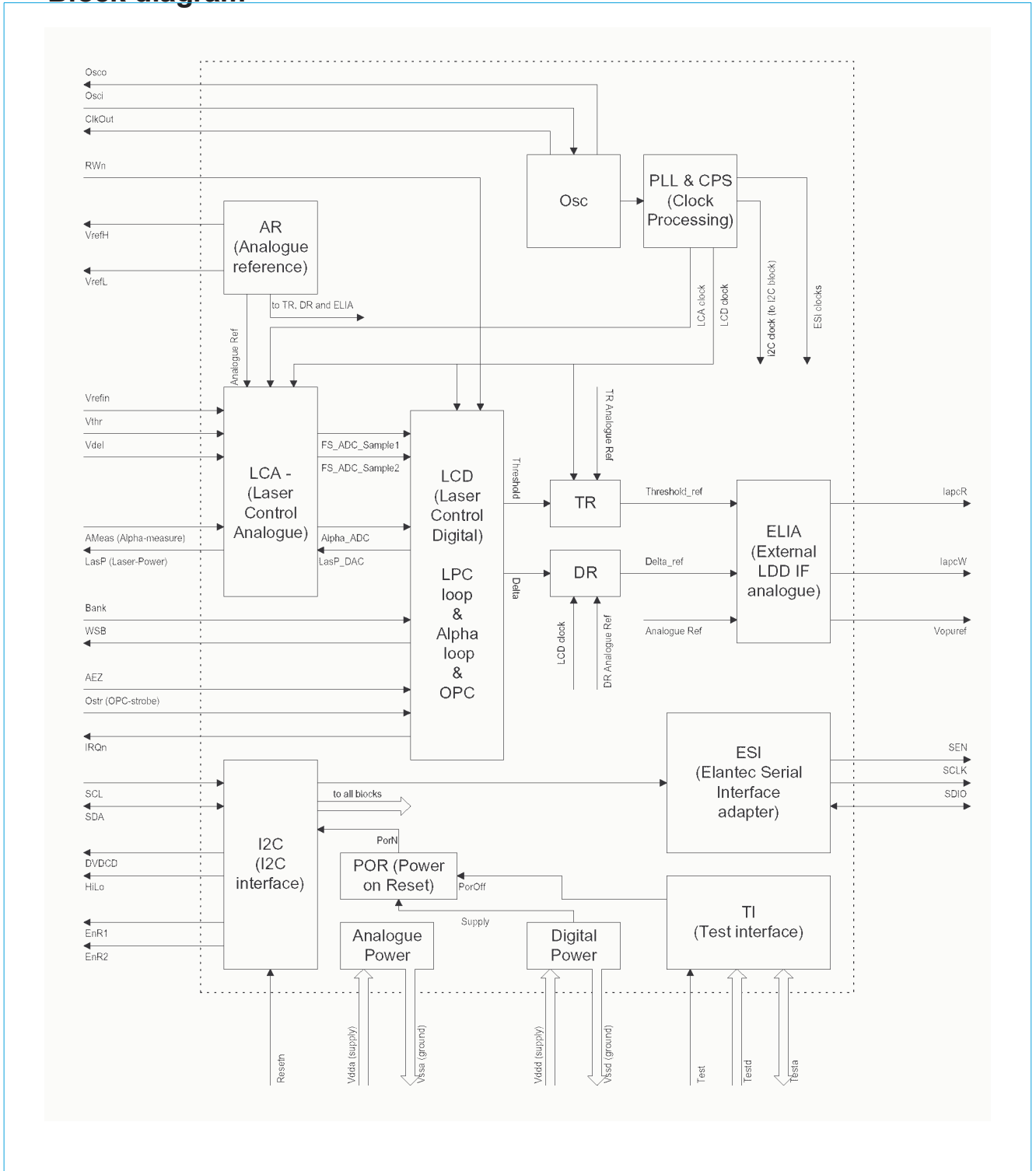
Symbol	Pin	Description
WRF	62	Single ended RF write input voltage
VREF	63	PDIC reference voltage output
VIF	64	Satellite segment F input

[1] Only in EFM bypass mode

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

IC7300, TZA1042: Servo Board, Laser Power Controller

Block diagram



Pin description

Symbol	Pin	Type	Drive /Thr.	Description
AEZ	1	I hy pd	T	Alpha Error Zero/Alpha Set Zero
V _{DD3}	2	P	-	Digital Pad Supply
V _{SS3}	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)
DVDCD	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 _{DD1}	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

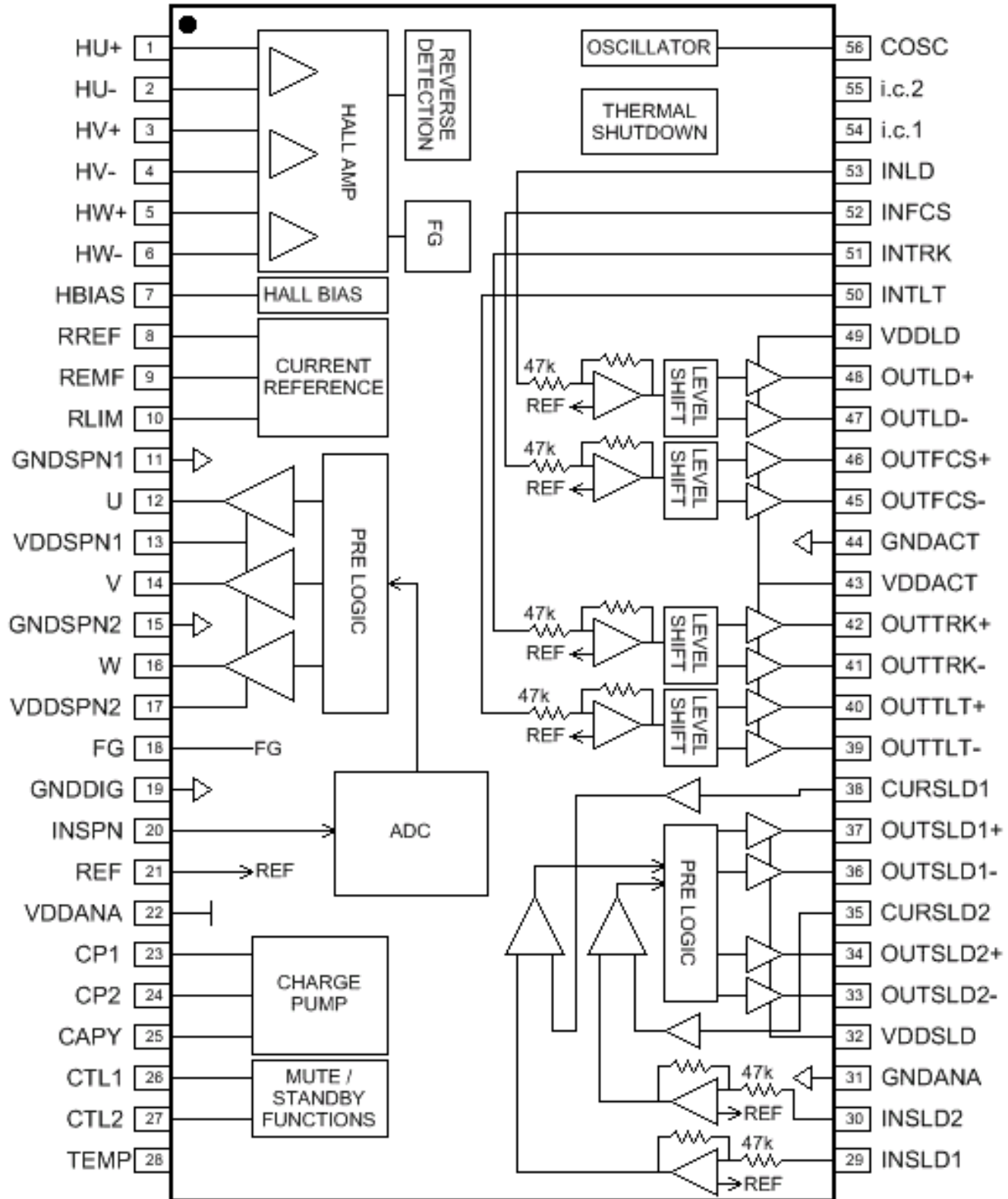
Symbol	Pin	Type	Drive /Thr.	Description
IRQN	35	OD	M	Interrupt Request Not – active low interrupt request
OSTR	36	I hy pd	T	OPC Strobe – request step in alpha setpoint / Board test input
RESETN	37	I hy pd	T	Reset Not – active low reset input
RWN	38	B	M/T	Read/Write not – indicates power setpoints/Board test IO
V _{SSD2}	39	P	-	Digital Core Supply
V _{DDD2}	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

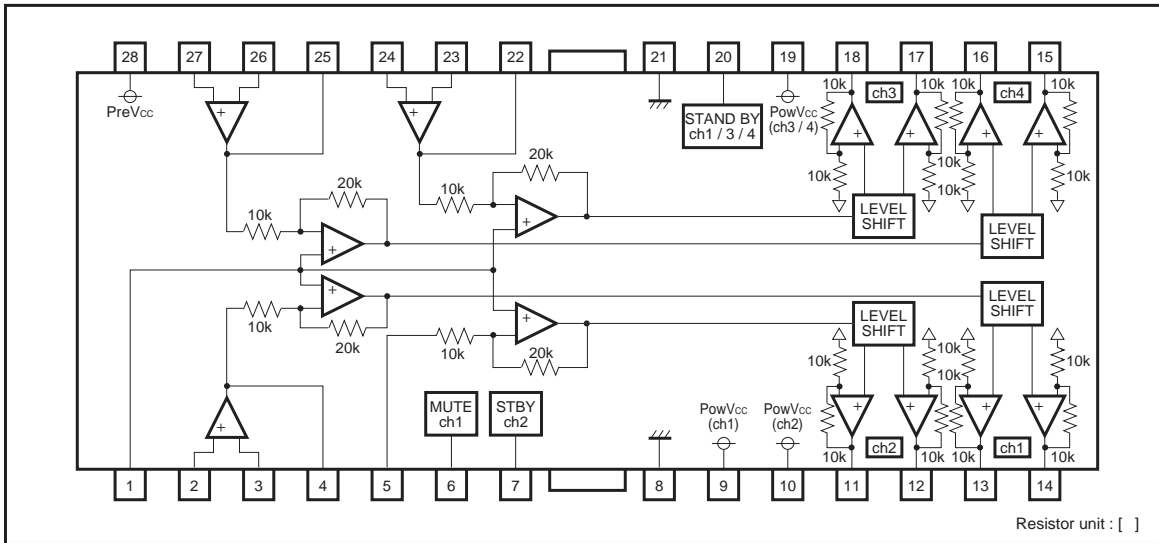
IC7402, SSA56202: Servo Board, Motor Driver



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	VDDL	loading driver power supply
9	REMF	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	OUTTTL+	tilting driver pos. output
18	FG	frequency generator output	39	OUTTTL-	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



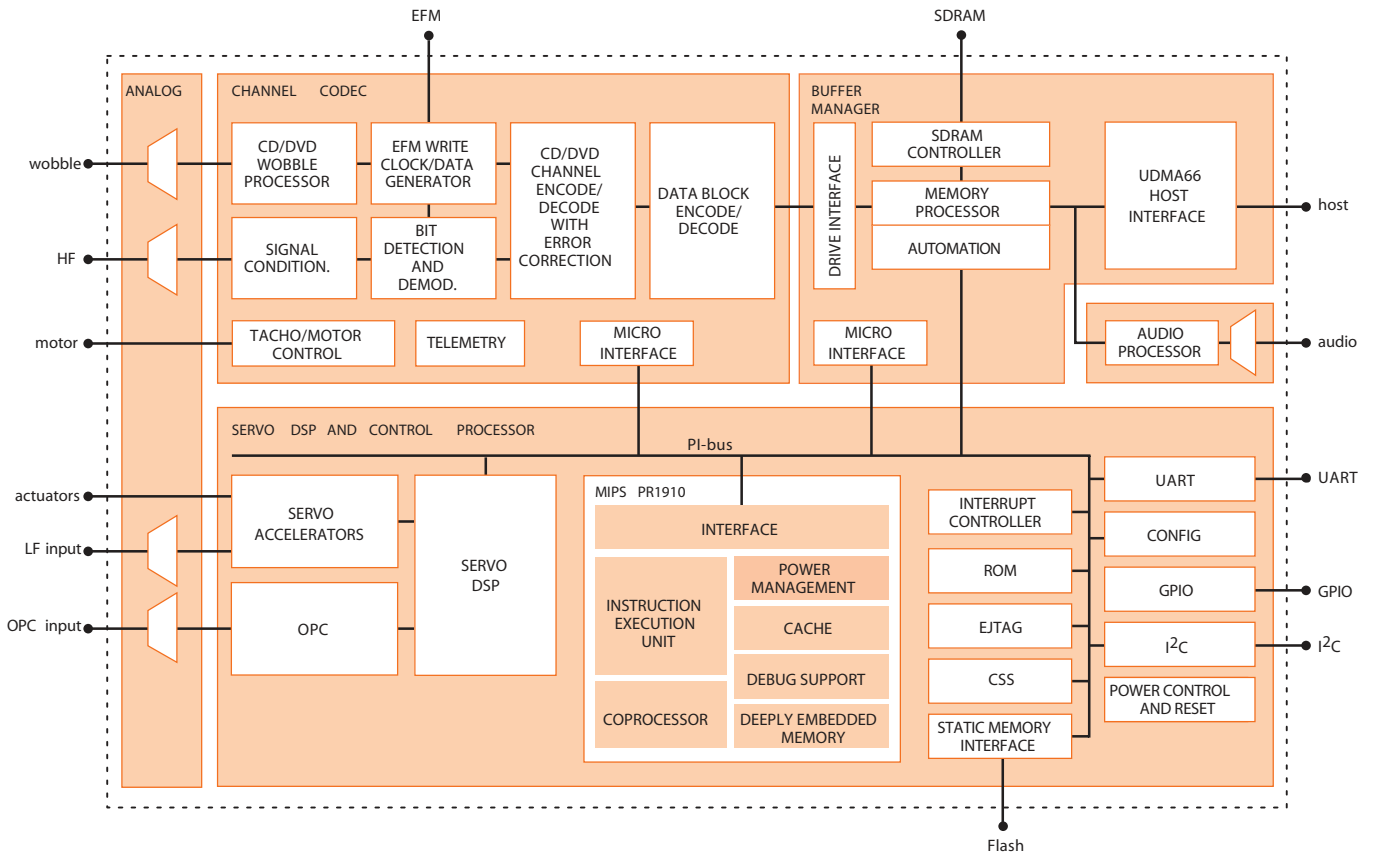
Pin No.	Pin name	Function
1	BIAS IN	Input for bias-amplifier
2	OPIN1 (+)	Non inverting input for CH1 OP-AMP
3	OPIN1 ()	Inverting input for CH1 OP-AMP
4	OPOUT1	Output for CH1 OP-AMP
5	IN2	Input for CH2
6	MUTE	Input for CH1 mute control
7	STBY2	Input for CH2 stand by control
8	GND	Substrate ground
9	PowVcc1	Vcc for CH1 power block
10	PowVcc2	Vcc for CH2 power block
11	V _{O2} ()	Inverted output of CH2
12	V _{O2} (+)	Non inverted output of CH2
13	V _{O1} ()	Inverted output of CH1
14	V _{O1} (+)	Non inverted output of CH1

Pin No.	Pin name	Function
15	V _{O4} (+)	Non inverted output of CH4
16	V _{O4} ()	Inverted output of CH4
17	V _{O3} (+)	Non inverted output of CH3
18	V _{O3} ()	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

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

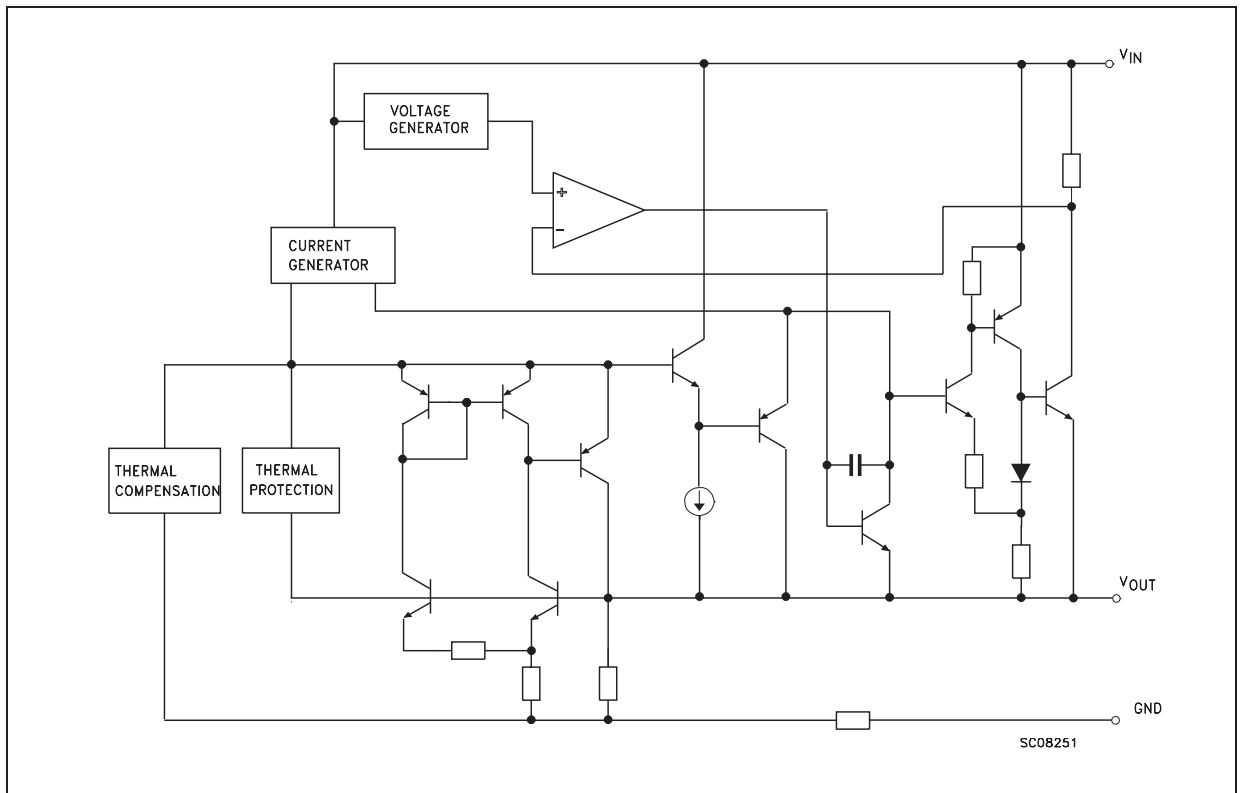
IC7500, PNX7850: Servo Board, Channel Codec/Buffer Manager/Servo Processor and Controller

Nexperia PNX7850 conceptual block diagram



IC7603, LD1117: Servo Board, Voltage Regulator

BLOCK DIAGRAM



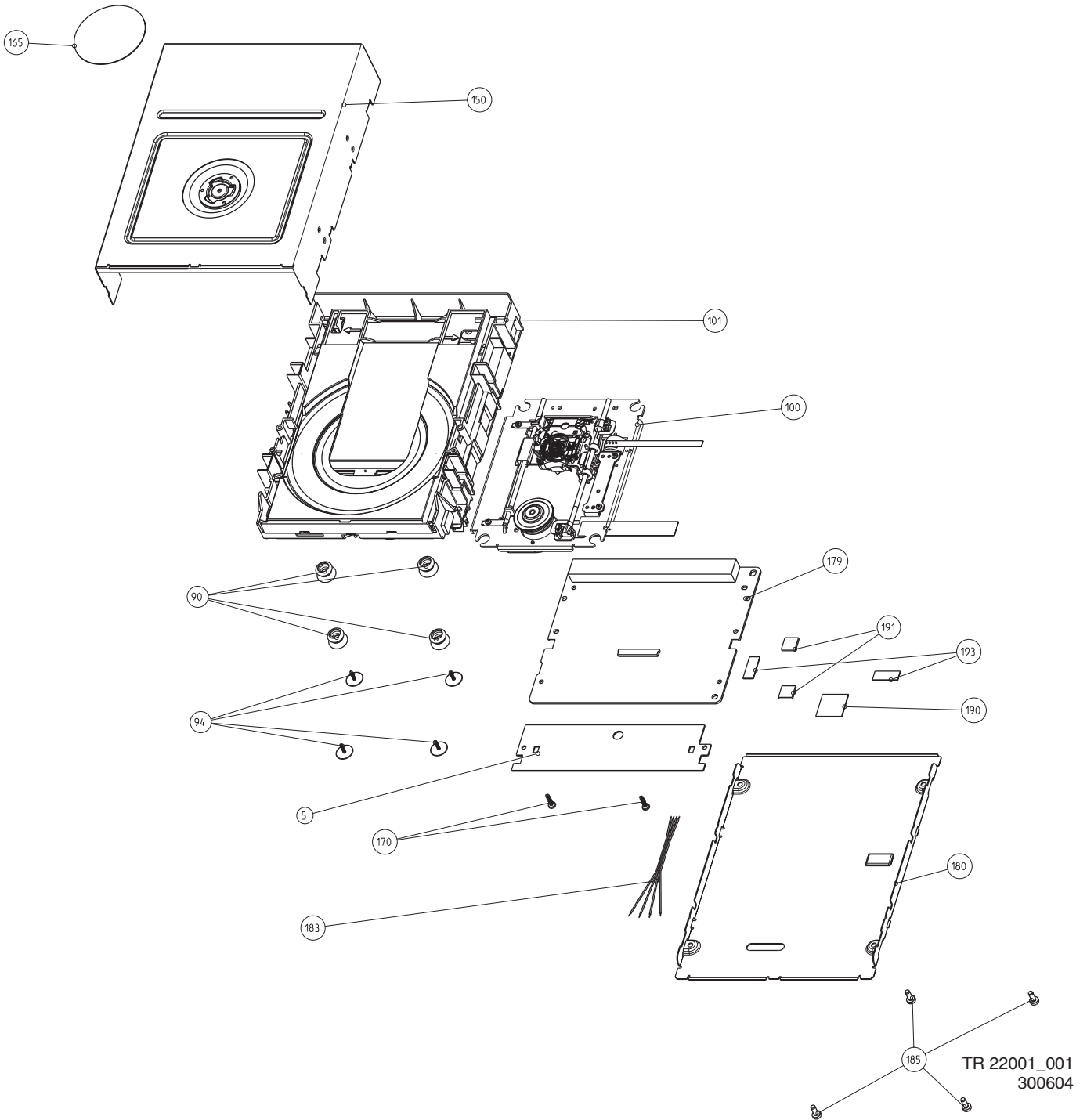
9.9 Abbreviation list

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

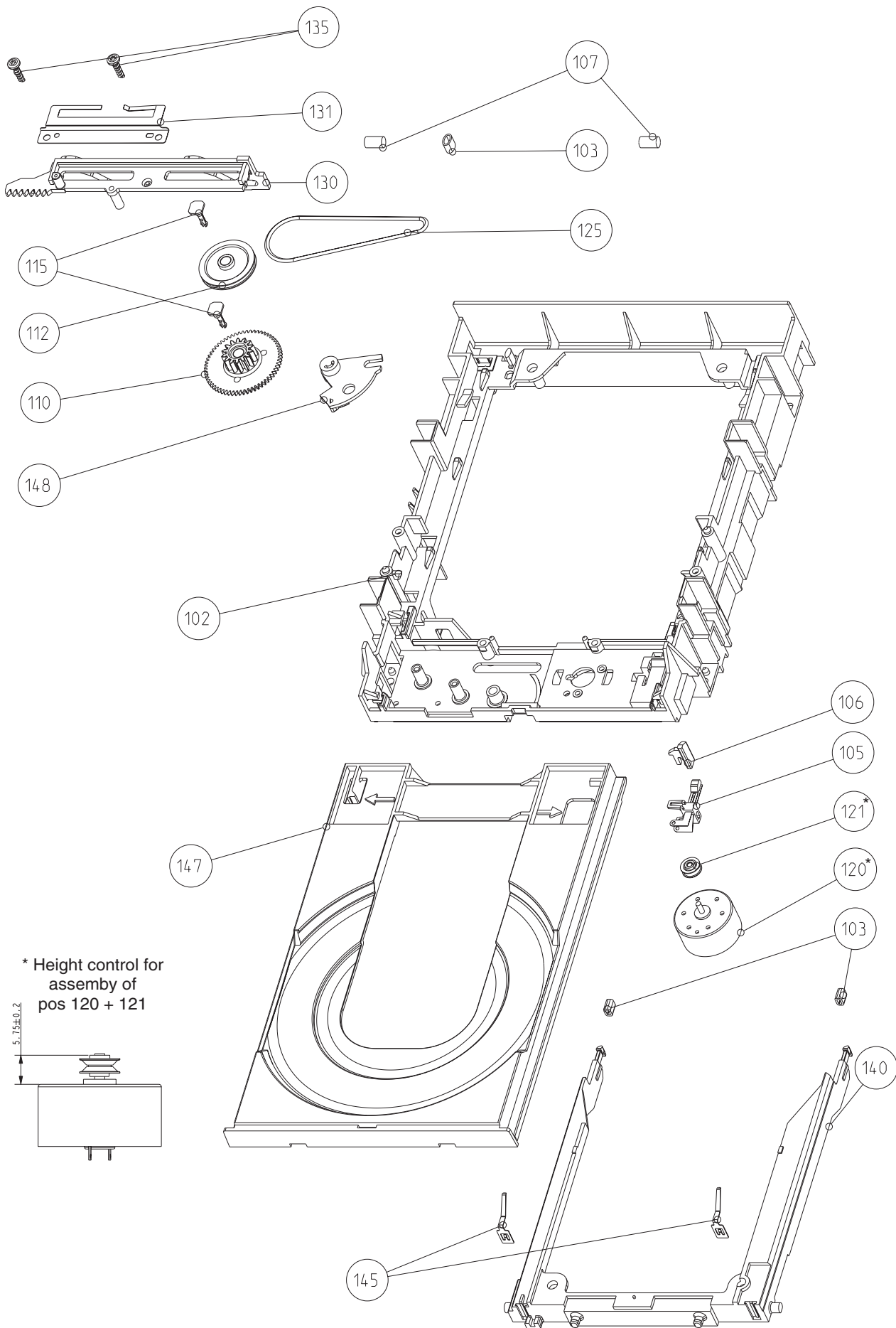
10.1 Exploded Views

Basic Engine

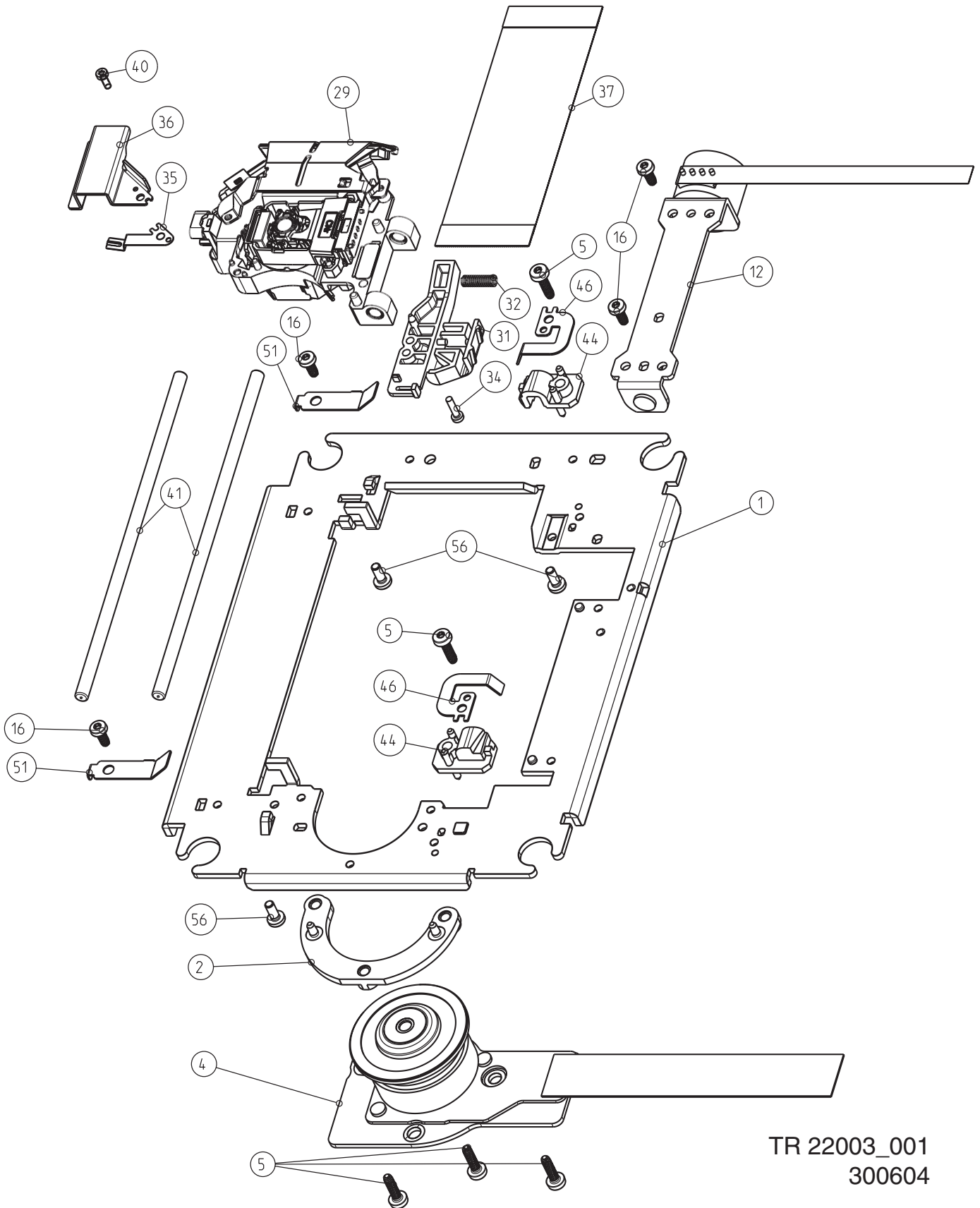


TR 22001_001
300604

Loader



DVD-M

TR 22003_001
300604

Mechanical

Various

0001	7104 099 91851	LVP12.01
0002	7104 099 96581	CD-RW LOW REFLECTION AUDIO DISC
0003	7104 099 94261	RICOH +R (4 SPEED) BLANK DISC
0005	3139 194 01581	SEALING STRIP
0090	3104 144 10730	SUSPENSION
0095	3139 198 80010	TRAY SWITCH
0100	9305 022 84101	VAM8041/01
100/12	3104 148 01950	SLEDGE MOTOR
100/37	3104 143 30780	OPU FLEX CABLE 45P 0.5
0101	3104 144 04272	TRAY
0120	3139 198 00620	TRAY MOTOR
0121	3104 144 04980	MOTOR PULLEY, TRAY
0125	3104 144 10121	TRAY MOTOR BELT
0183	3139 191 00200	4-WAY CABLE
0190	3139 194 01541	HEAT SINK PAD (CENTAURUS)
0191	3139 194 01551	HEAT SINK PAD (CHEETAH)
0193	3139 194 01561	HEAT SINK PAD (DRIVER)

Printed Board

Various

1100	2422 025 17821	CON H 45P F 0.50
1302	2422 543 01025	Crystal 16.93 MHz
1400	2422 025 05548	CON H 4P F 1.00
1401	2422 025 18382	CON H 11P F 1.00
1500	2422 543 01025	Crystal 16.93 MHz
1600	2422 033 00396	SOC COMBI H 56P
1601	2122 662 00152	0.18Ω PTC 1812 16V
1602	2122 662 00136	0.21Ω PTC 1812 6V
1700	2422 025 17909	CON BM H 50P F 0.5
1703	3139 190 20051	CON V 2X 10P M 1.27
1705	2422 025 05544	CON H 20P F 0.50

—||—

2100	2238 586 59812	100nF 20-80% 50V 0603
2101	4822 126 13883	220pF 5% 50V
2102	2238 586 59812	100nF 20-80% 50V 0603
2103	2020 552 94427	100pF 5% 50V 0603
2104	2238 586 59812	100nF 20-80% 50V 0603
2105	2238 586 59812	100nF 20-80% 50V 0603
2106	2238 586 59812	100nF 20-80% 50V 0603
2107	5322 124 41945	22µF 20% 35V SMD
2108	2238 586 59812	100nF 20-80% 50V 0603
2109	2022 552 05635	22µF 16V X5R 10%
2110	3198 016 31020	1nF 10% 25V 0603
2204	5322 126 11579	3.3nF 10% 63V
2205	5322 126 11582	6.8nF 10% 63V
2209	2238 586 59812	100nF 20-80% 50V 0603
2210	2238 586 59812	100nF 20-80% 50V 0603
2211	2238 586 59812	100nF 20-80% 50V 0603
2212	2238 586 59812	100nF 20-80% 50V 0603
2213	2238 786 56642	27nF 16V 0603 X7R 10%
2214	5322 126 11583	10nF 10% 50V 0603
2215	5322 126 11583	10nF 10% 50V 0603
2217	3198 017 34730	47nF 16V 0603
2218	5322 126 11583	10nF 10% 50V 0603
2219	2238 586 59812	100nF 20-80% 50V 0603
2221	2238 586 59812	100nF 20-80% 50V 0603
2223	2238 586 59812	100nF 20-80% 50V 0603
2228	5322 126 11583	10nF 10% 50V 0603
2229	4822 126 14249	560pF 10% 50V 0603
2230	5322 126 11582	6.8nF 10% 63V
2231	4822 126 14487	8.2pF 0.5% 50V 0603
2232	4822 126 14249	560pF 10% 50V 0603
2233	5322 126 11582	6.8nF 10% 63V
2234	4822 126 14487	8.2pF 0.5% 50V 0603
2300	2238 586 59812	100nF 20-80% 50V 0603
2301	2238 586 59812	100nF 20-80% 50V 0603
2302	2238 586 59812	100nF 20-80% 50V 0603
2303	4822 122 33752	15pF 5% 50V
2304	4822 122 33752	15pF 5% 50V
2305	2238 916 15641	22nF 10% 25V 0603
2306	2238 586 59812	100nF 20-80% 50V 0603
2307	2238 586 59812	100nF 20-80% 50V 0603
2308	2238 586 59812	100nF 20-80% 50V 0603
2309	2238 586 59812	100nF 20-80% 50V 0603
2310	2238 586 59812	100nF 20-80% 50V 0603
2311	5322 126 11578	1nF 10% 50V 0603
2312	4822 122 33752	15pF 5% 50V
2400	5322 126 11583	10nF 10% 50V 0603

2401	2238 586 59812	100nF 20-80% 50V 0603
2405	5322 126 11583	10nF 10% 50V 0603
2406	2238 786 55648	82nF 10% 16V 0603
2407	2238 586 59812	100nF 20-80% 50V 0603
2409	5322 126 11583	10nF 10% 50V 0603
2411	2020 552 94427	100pF 5% 50V 0603
2412	2238 586 59812	100nF 20-80% 50V 0603
2413	2020 552 96637	10µF 6.3V 0805 X5R
2414	5322 126 11583	10nF 10% 50V 0603
2415	2238 916 15641	22nF 10% 25V 0603
2416	4822 124 12095	100µF 20% 16V
2417	2238 586 59812	100nF 20-80% 50V 0603
2418	4822 126 14238	2.2nF 50V 0603
2419	4822 126 14238	2.2nF 50V 0603
2420	4822 126 14238	2.2nF 50V 0603
2421	4822 126 13193	4.7nF 10% 63V
2426	4822 126 14043	1µF 20% 16V
2427	2238 586 15628	2.7nF 10% 50V 0603
2430	2238 586 59812	100nF 20-80% 50V 0603
2431	4822 124 23002	10µF 20% 16V
2432	2238 586 59812	100nF 20-80% 50V 0603
2433	2022 552 05635	22µF 16V X5R 10%
2434	5322 122 33861	120pF10% 50V
2435	5322 122 33861	120pF10% 50V
2436	5322 126 11583	10nF 10% 50V 0603
2438	2238 586 59812	100nF 20-80% 50V 0603
2439	5322 122 33861	120pF10% 50V
2440	2238 586 59812	100nF 20-80% 50V 0603
2441	2238 586 59812	100nF 20-80% 50V 0603
2442	2022 552 05635	22µF 16V X5R 10%
2443	2022 552 05635	22µF 16V X5R 10%
2444	2022 552 05616	4.7µF 6.3V 0805 X5R
2445	2238 586 59812	100nF 20-80% 50V 0603
2446	5322 124 41945	22µF 20% 35V SMD
2447	4822 124 12095	100µF 20% 16V
2448	2020 552 95812	1µF 1206 X7R 16V 10%
2500	2238 586 59812	100nF 20-80% 50V 0603
2501	2238 586 59812	100nF 20-80% 50V 0603
2502	2238 586 59812	100nF 20-80% 50V 0603
2503	4822 126 13879	220nF 20% 16V
2504	3198 016 31020	1nF 10% 25V 0603
2505	5322 126 11583	10nF 10% 50V 0603
2506	5322 126 11583	10nF 10% 50V 0603
2507	5322 126 11582	6.8nF 10% 63V
2509	4822 126 13881	470pF 5% 50V
2511	4822 126 13881	470pF 5% 50V
2512	4822 126 13881	470pF 5% 50V
2513	2022 552 05635	22µF 16V X5R 10%
2514	2238 586 59812	100nF 20-80% 50V 0603
2515	4822 124 23002	10µF 20% 16V
2516	2238 586 59812	100nF 20-80% 50V 0603
2517	2238 586 59812	100nF 20-80% 50V 0603
2518	2238 586 59812	100nF 20-80% 50V 0603
2519	2238 586 59812	100nF 20-80% 50V 0603
2520	2238 586 59812	100nF 20-80% 50V 0603
2521	2238 586 59812	100nF 20-80% 50V 0603
2522	2238 586 59812	100nF 20-80% 50V 0603
2523	2238 586 59812	100nF 20-80% 50V 0603
2524	2238 586 59812	100nF 20-80% 50V 0603
2525	2238 586 59812	100nF 20-80% 50V 0603
2526	2238 586 59812	100nF 20-80% 50V 0603
2527	2238 586 59812	100nF 20-80% 50V 0603
2528	2238 586 59812	100nF 20-80% 50V 0603
2529	2238 586 59812	100nF 20-80% 50V 0603
2530	2238 586 59812	100nF 20-80% 50V 0603
2531	2238 586 59812	100nF 20-80% 50V 0603
2533	4822 124 23002	10µF 20% 16V
2534	2238 586 59812	100nF 20-80% 50V 0603
2536	2238 586 59812	100nF 20-80% 50V 0603
2538	4822 124 23002	10µF 20% 16V
2540	2238 586 59812	100nF 20-80% 50V 0603
2550	5322 126 11583	10nF 10% 50V 0603
2551	3198 016 31510	150pF 10% 50V 0603
2552	3198 016 31510	150pF 10% 50V 0603
2561	3198 017 34730	47nF 16V 0603
2562	3198 017 34730	47nF 16V 0603
2563	4822 122 33752	15pF 5% 50V
2564	4822 122 33752	15pF 5% 50V
2565	2238 586 59812	100nF 20-80% 50V 0603
2566	2238 586 59812	100nF 20-80% 50V 0603
2567	2238 586 59812	100nF 20-80% 50V 0603
2568	2238 586 59812	100nF 20-80% 50V 0603
2569	2238 586 59812	100nF 20-80% 50V 0603
2570	2238 586 59812	100nF 20-80% 50V 0603
2571	2238 586 59812	100nF 20-80% 50V 0603
2572	2238 586 59812	100nF 20-80% 50V 0603
2573	2238 586 59812	100nF 20-80% 50V 0603
2574	2238 586 59812	100nF 20-80% 50V 0603
2575	2238 586 59812	100nF 20-80% 50V 0603
2576	2238 586 59812	100nF 20-80% 50V 0603
2577	5322 126 11582	6.8nF 10% 63V
2578	3198 017 33330	CER2 0603 X7R 16V 33N
2579	2238 586 59812	100nF 20-80% 50V 0603
2580	5322 124 41945	22µF 20% 35V SMD

2581	2238 586 59812	100nF 20-80% 50V 0603
2582	5322 126 11582	6.8nF 10% 63V
2583	5322 126 11582	6.8nF 10% 63V
2584	2238 586 59812	100nF 20-80% 50V 0603
2585	2020 552 96899	330nF 0603 X5R 16V 10%
2586	2238 586 59812	100nF 20-80% 50V 0603
2600	2222 867 15339	33pF 5% 50V 0603
2601	2222 867 15339	33pF 5% 50V 0603
2602	5322 126 11583	10nF 10% 50V 0603
2603	5322 126 11583	10nF 10% 50V 0603
2604	2238 586 59812	100nF 20-80% 50V 0603
2605	4822 122 33741	10pF 10% 50V
2607	2238 586 59812	100nF 20-80% 50V 0603
2608	2238 586 59812	100nF 20-80% 50V 0603
2609	4822 124 80151	47µF 20% 16V
2610	2238 586 59812	100nF 20-80% 50V 0603
2611	2238 586 59812	100nF 20-80% 50V 0603
2612	5322 124 41945	22µF 20% 35V SMD
2614	4822 124 12095	100µF 20% 16V
2615	5322 124 41945	22µF 20% 35V SMD
2618	2238 586 59812	100nF 20-80% 50V 0603
2621	4822 124 11131	47UF 6.3V
2622	4822 124 11131	47UF 6.3V
2623	2238 586 59812	100nF 20-80% 50V 0603
2624	2238 586 59812	100nF 20-80% 50V 0603
2625	2238 586 59812	100nF 20-80% 50V 0603
2626	2238 586 59812	100nF 20-80% 50V 0603
2651	5322 124 41945	22µF 20% 35V SMD
2653	5322 124 41945	22µF 20% 35V SMD
2654	5322 124 41945	22µF 20% 35V SMD
2655	2022 552 05635	22µF 16V X5R 10%
2659	5322 124 41945	22µF 20% 35V SMD
2661	2238 586 59812	100nF 20-80% 50V 0603
2662	2022 552 05635	22µF 16V X5R 10%
2663	4822 126 13883	220pF 5% 50V
2664	2238 916 15641	22nF 10% 25V 0603
2665	2022 552 05635	22µF 16V X5R 10%
2666	4822 124 23002	10µF 20% 16V
2667	4822 124 23002	10µF 20% 16V
2668	4822 124 23002	10µF 20% 16V
2669	4822 124 23002	10µF 20% 16V
2670	2238 586 59812	100nF 20-80% 50V 0603
2671	2238 586 59812	100nF 20-80% 50V 0603
2672	2022 552 05635	22µF 16V X5R 10%
2673	2022 552 05635	22µF 16V X5R 10%
2674	2022 552 05635	22µF 16V X5R 10%
2675	2022 552 05635	22µF 16V X5R 10%
2676	2022 552 05635	22µF 16V X5R 10%
2677	2022 552 05635	22µF 16V X5R 10%
2700	5322 126 11583	10nF 10% 50V 0603
2701	5322 126 11583	10nF 10% 50V 0603
2702	5322 126 11583	10nF 10% 50V 0603
2703	5322 126 11583	10nF 10% 50V 0603
2704	5322 126 11583	10nF 10% 50V 0603
2705	5322 126 11583	10nF 10% 50V 0603
2706	5322 126 11583	10nF 10% 50V 0603
2707	5322 126 11583	10nF

3216	4822 051 30759	75Ω 5% 0.062W	3504	4822 051 30472	4.7kΩ 5% 0.062W	3647	4822 051 30103	10kΩ 5% 0.062W
3217	4822 051 30333	33kΩ 5% 0.062W	3507	4822 051 30102	1kΩ 5% 0.062W	3648	2322 702 60829	82Ω 5% 0603
3218	4822 051 30101	100Ω 5% 0.062W	3508	4822 051 30102	1kΩ 5% 0.062W	3650	3198 031 11030	1206 4X 10K PM5 COL R
3219	4822 051 30101	100Ω 5% 0.062W	3509	4822 051 30102	1kΩ 5% 0.062W	3651	3198 031 11030	1206 4X 10K PM5 COL R
3220	4822 051 30223	22kΩ 5% 0.062W	3510	4822 051 30682	6.8kΩ 5% 0.062W	3652	3198 031 11030	1206 4X 10K PM5 COL R
3221	4822 117 12139	22Ω 5% 0.062W	3511	4822 051 30682	6.8kΩ 5% 0.062W	3653	3198 031 11030	1206 4X 10K PM5 COL R
3222	4822 051 30393	39kΩ 5% 0.062W	3512	4822 051 30682	6.8kΩ 5% 0.062W	3660	4822 051 30683	68kΩ 5% 0.062W
3223	4822 117 12968	820Ω 5% 0.62W	3513	4822 051 30682	6.8kΩ 5% 0.062W	3661	4822 051 30154	150kΩ 5% 0.062W
3224	4822 051 30101	100Ω 5% 0.062W	3514	4822 117 13632	100kΩ 1% 0603 0.62W	3665	4822 051 30101	100Ω 5% 0.062W
3225	4822 051 30223	22kΩ 5% 0.062W	3515	4822 051 30682	6.8kΩ 5% 0.062W	3684	4822 051 30103	10kΩ 5% 0.062W
3226	4822 117 12139	22Ω 5% 0.062W	3516	4822 117 13525	24kΩ 1% 0.62W 0603	3686	4822 051 30331	330Ω 5% 0.062W
3227	4822 051 30393	39kΩ 5% 0.062W	3517	4822 051 30103	10kΩ 5% 0.062W	3689	2322 702 60829	82Ω 5% 0603
3228	4822 117 12968	820Ω 5% 0.62W	3518	4822 051 30103	10kΩ 5% 0.062W	3690	4822 117 12139	22Ω 5% 0.062W
3229	4822 051 30101	100Ω 5% 0.062W	3519	4822 051 30103	10kΩ 5% 0.062W	3692	4822 051 30472	4.7kΩ 5% 0.062W
3300	4822 051 30105	1MΩ 5% 0.062W	3520	4822 051 30103	10kΩ 5% 0.062W	3693	4822 117 11817	1.2kΩ 1% 1/16W
3301	4822 051 30103	10kΩ 5% 0.062W	3521	2322 704 62202	2.2kΩ 0603 1%	3694	4822 051 30392	3.9kΩ 5% 0.063W 0603
3302	4822 117 12917	1Ω 5% 0.062W 0603	3522	4822 117 12917	1Ω 5% 0.062W 0603	3695	2322 704 61201	120Ω 0603 1%
3303	4822 051 30151	150Ω 5% 0.062W	3523	4822 117 12925	47kΩ 1% 0.063W 0603	3696	2322 704 65601	560Ω 1% 0603
3304	4822 051 30103	10kΩ 5% 0.062W	3524	4822 051 30103	10kΩ 5% 0.062W	3697	5322 117 13036	1.2kΩ 5% 0.063W 0603
3305	4822 051 30103	10kΩ 5% 0.062W	3527	4822 051 30103	10kΩ 5% 0.062W	3702	4822 051 30103	10kΩ 5% 0.062W
3306	4822 051 30103	10kΩ 5% 0.062W	3528	4822 051 30103	10kΩ 5% 0.062W	3703	4822 051 30103	10kΩ 5% 0.062W
3308	4822 051 30103	10kΩ 5% 0.062W	3529	4822 051 30222	2.2kΩ 5% 0.062W	3704	4822 051 30103	10kΩ 5% 0.062W
3309	4822 117 12903	1.8kΩ 1% 0.063W 0603	3530	4822 051 30222	2.2kΩ 5% 0.062W	3705	4822 051 30103	10kΩ 5% 0.062W
3315	4822 051 30339	33Ω 5% 0.062W	3531	4822 051 30479	47Ω 5% 0.062W	3706	4822 051 30103	10kΩ 5% 0.062W
3316	4822 051 30103	10kΩ 5% 0.062W	3532	4822 051 30479	47Ω 5% 0.062W	3707	4822 051 30103	10kΩ 5% 0.062W
3403	4822 051 30103	10kΩ 5% 0.062W	3534	4822 051 30105	1MΩ 5% 0.062W	3708	4822 051 30103	10kΩ 5% 0.062W
3404	4822 051 30103	10kΩ 5% 0.062W	3535	4822 051 30103	10kΩ 5% 0.062W	3709	4822 051 30103	10kΩ 5% 0.062W
3405	4822 051 30103	10kΩ 5% 0.062W	3536	4822 051 30103	10kΩ 5% 0.062W	3710	4822 051 30103	10kΩ 5% 0.062W
3406	4822 051 30102	1kΩ 5% 0.062W	3541	3198 031 13390	1206 4X 33R PM5 COL	3711	4822 051 30103	10kΩ 5% 0.062W
3410	5322 117 13028	12kΩ 1% 0.063W 0603	3542	3198 031 13390	1206 4X 33R PM5 COL	3712	4822 051 30103	10kΩ 5% 0.062W
3411	4822 117 12925	47kΩ 1% 0.063W 0603	3543	3198 031 13390	1206 4X 33R PM5 COL	3713	4822 051 30103	10kΩ 5% 0.062W
3418	4822 117 12917	1Ω 5% 0.062W 0603	3545	4822 051 30339	33Ω 5% 0.062W	3714	4822 051 30103	10kΩ 5% 0.062W
3420	4822 051 30123	12kΩ 5% 0.062W	3546	4822 051 30339	33Ω 5% 0.062W	3715	4822 051 30103	10kΩ 5% 0.062W
3421	4822 117 12925	47kΩ 1% 0.063W 0603	3547	4822 051 30334	330kΩ 5% 0.062W	3716	4822 051 30103	10kΩ 5% 0.062W
3422	4822 051 30203	20K00 5% 0.062W	3548	4822 051 30103	10kΩ 5% 0.062W	3717	4822 051 30339	33Ω 5% 0.062W
3423	4822 051 30103	10kΩ 5% 0.062W	3551	4822 051 30103	10kΩ 5% 0.062W	3718	4822 051 30103	10kΩ 5% 0.062W
3425	4822 051 30151	150Ω 5% 0.062W	3560	4822 051 30101	100Ω 5% 0.062W	3719	4822 051 30103	10kΩ 5% 0.062W
3426	4822 051 30562	5.6kΩ 5% 0.063W 0603	3561	4822 051 30472	4.7kΩ 5% 0.062W	4100	4822 051 30008	Jumper 0603
3427	2322 702 60184	180kΩ 5% 0603	3562	4822 117 13526	150Ω 5% 0.63W	4105	4822 051 30008	Jumper 0603
3428	4822 051 30562	5.6kΩ 5% 0.063W 0603	3574	4822 051 30103	10kΩ 5% 0.062W	4106	4822 051 30008	Jumper 0603
3429	2322 702 60184	180kΩ 5% 0603	3577	4822 051 30103	10kΩ 5% 0.062W	4107	4822 051 30008	Jumper 0603
3430	4822 051 30393	39kΩ 5% 0.062W	3578	4822 051 30332	3.3kΩ 5% 0.062W	4108	4822 051 30008	Jumper 0603
3440	5322 117 13028	12kΩ 1% 0.063W 0603	3579	4822 051 30223	22kΩ 5% 0.062W	4109	4822 051 30008	Jumper 0603
3444	5322 117 13064	39kΩ 1% 0.063W 0603	3580	4822 051 30472	4.7kΩ 5% 0.062W	4110	4822 051 30008	Jumper 0603
3445	5322 117 13028	12kΩ 1% 0.063W 0603	3581	4822 051 30339	33Ω 5% 0.062W	4111	4822 051 30008	Jumper 0603
3446	5322 117 13028	12kΩ 1% 0.063W 0603	3582	4822 051 30103	10kΩ 5% 0.062W	4112	4822 051 30008	Jumper 0603
3447	5322 117 13064	39kΩ 1% 0.063W 0603	3583	4822 117 13526	150Ω 5% 0.63W	4200	4822 051 30008	Jumper 0603
3450	5322 117 13064	39kΩ 1% 0.063W 0603	3584	4822 117 13526	150Ω 5% 0.63W	4201	4822 051 30008	Jumper 0603
3452	5322 117 13028	12kΩ 1% 0.063W 0603	3585	4822 117 13526	150Ω 5% 0.63W	4202	4822 051 30008	Jumper 0603
3453	5322 117 13064	39kΩ 1% 0.063W 0603	3586	4822 051 30008	Jumper 0603	4203	4822 051 30008	Jumper 0603
3454	5322 117 13028	12kΩ 1% 0.063W 0603	3587	4822 117 13526	150Ω 5% 0.63W	4204	4822 051 30008	Jumper 0603
3455	4822 051 30102	1kΩ 5% 0.062W	3588	4822 117 13526	150Ω 5% 0.63W	4303	4822 051 30008	Jumper 0603
3456	4822 051 30102	1kΩ 5% 0.062W	3589	4822 117 13526	150Ω 5% 0.63W	4400	4822 051 20008	Jumper 0805
3457	5322 117 13064	39kΩ 1% 0.063W 0603	3591	4822 051 30151	150Ω 5% 0.062W	4402	4822 051 30008	Jumper 0603
3458	4822 051 30102	1kΩ 5% 0.062W	3592	4822 051 30151	150Ω 5% 0.062W	4403	4822 051 20008	Jumper 0805
3459	2322 702 60158	1.5Ω 0603 5%	3593	4822 051 30151	150Ω 5% 0.062W	4404	4822 051 20008	Jumper 0805
3460	2322 702 60158	1.5Ω 0603 5%	3594	4822 051 30151	150Ω 5% 0.062W	4406	4822 051 20008	Jumper 0805
3461	5322 117 13028	12kΩ 1% 0.063W 0603	3595	4822 051 30151	150Ω 5% 0.062W	4407	4822 051 20008	Jumper 0805
3462	5322 117 13064	39kΩ 1% 0.063W 0603	3596	4822 051 30151	150Ω 5% 0.062W	4408	4822 051 20008	Jumper 0805
3463	4822 051 30123	12kΩ 5% 0.062W	3597	4822 051 30151	150Ω 5% 0.062W	4410	4822 051 20008	Jumper 0805
3464	5322 117 13028	12kΩ 1% 0.063W 0603	3598	4822 051 30151	150Ω 5% 0.062W	4411	4822 051 20008	Jumper 0805
3465	4822 051 30103	10kΩ 5% 0.062W	3599	4822 051 30151	150Ω 5% 0.062W	4413	4822 051 30221	220Ω 5% 0.062W
3471	2322 702 60279	27Ω 5% 0.1W 0603	3602	4822 117 13632	100kΩ 1% 0603 0.62W	4416	4822 051 30008	Jumper 0603
3472	2322 702 60158	1.5Ω 0603 5%	3603	4822 117 13632	100kΩ 1% 0603 0.62W	4417	4822 051 30008	Jumper 0603
3473	4822 051 30103	10kΩ 5% 0.062W	3604	4822 051 30103	10kΩ 5% 0.062W	4419	4822 051 30008	Jumper 0603
3474	4822 051 30123	12kΩ 5% 0.062W	3605	4822 051 30102	1kΩ 5% 0.062W	4420	4822 051 30008	Jumper 0603
3475	2322 702 60158	1.5Ω 0603 5%	3606	4822 051 30471	470Ω 5% 0.062W	4421	4822 051 30008	Jumper 0603
3476	2322 702 60158	1.5Ω 0603 5%	3607	4822 051 30471	470Ω 5% 0.062W	4422	4822 051 30008	Jumper 0603
3477	4822 051 30123	12kΩ 5% 0.062W	3608	4822 051 30102	1kΩ 5% 0.062W	4423	4822 051 30008	Jumper 0603
3478	4822 051 30123	12kΩ 5% 0.062W	3609	4822 051 30221	220Ω 5% 0.062W	4427	4822 051 30008	Jumper 0603
3479	4822 051 30103	10kΩ 5% 0.062W	3610	4822 051 30221	220Ω 5% 0.062W	4502	4822 051 30008	Jumper 0603
3480	4822 051 30103	10kΩ 5% 0.062W	3611	4822 051 30103	10kΩ 5% 0.062W	4503	4822 051 30008	Jumper 0603
3481	4822 117 12917	1Ω 5% 0.062W 0603	3612	4822 051 30103	10kΩ 5% 0.062W	4504	4822 051 30008	Jumper 0603
3482	4822 051 20108	1Ω 5% 0.1W	3613	4822 051 30103	10kΩ 5% 0.062W	4519	4822 051 30008	Jumper 0603
3483	4822 051 30103	10kΩ 5% 0.062W	3614	4822 051 30103	10kΩ 5% 0.062W	4520	4822 051 30008	Jumper 0603
3484	4822 051 30103	10kΩ 5% 0.062W	3615	2350 035 10829	ARV24 4X 82R PM5	4525	4822 051 30008	Jumper 0603
3485	4822 051 30103	10kΩ 5% 0.062W	3617	4822 051 30471	470Ω 5% 0.062W	4604	4822 051 30008	Jumper 0603
3486	4822 051 30103	10kΩ 5% 0.062W	3618	4822 051 30102	1kΩ 5% 0.062W	4605	4822 051 20008	Jumper 0805
3487	2322 702 60158	1.5Ω 0603 5%	3619	2322 702 60829	82Ω 5% 0603	4610	4822 051 30008	Jumper 0603
3488	4822 051 30102	1kΩ 5% 0.062W	3620	4822 051 30103	10kΩ 5% 0.062W	4611	4822 051 30008	Jumper 0603
3489	2322 702 60279	27Ω 5% 0.1W 0603	3621	4822 051 30103	10kΩ 5% 0.062W	4612	4822 051 30008	Jumper 0603
3490	2322 702 60279	27Ω 5% 0.1W 0603	3622	4822 117 12139	22Ω 5% 0.062W	4613	4822 051 30008	Jumper 0603
3491	2322 702 60279	27Ω 5% 0.1W 0603	3623	2322 702 60829	82Ω 5% 0603	4615	4822 051 30008	Jumper 0603
3492	4822 051 30102	1kΩ 5% 0.062W	3624	4822 051 30103	10kΩ 5% 0.062W	4707	4822 051 30008	Jumper 0603
3493	4822 051 30103	10kΩ 5% 0.062W	3625	4822 117 12139	22Ω 5% 0.062W	4xxx	2350 035 91001	ARV24 4X JUMPER
3494	4822 051 30103	10kΩ 5% 0.062W	3626	2322 702 60829	82Ω 5% 060			

5300	2422 549 44991	0603 EMI 100MHZ 600R
5301	2422 549 44991	0603 EMI 100MHZ 600R
5400	2422 536 00501	D62LCB 10µF PM20
5405	2422 549 44991	0603 EMI 100MHZ 600R
5406	2422 536 00501	D62LCB 10µF 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 10µF 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 47µF 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



7101	5322 130 60159	BC846B
7102	5322 130 60159	BC846B
7103	5322 130 60159	BC846B
7104	9340 547 21215	B5H205
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