



# SUMP Logic Analyzer

Analyseur logique sur base FPGA

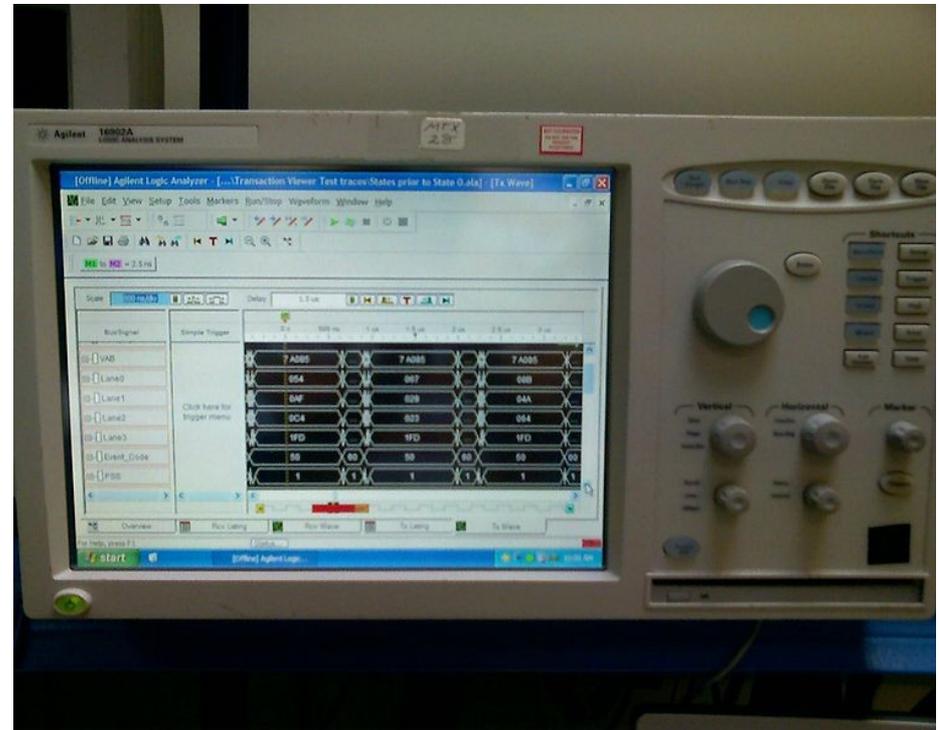
Etude de l'Amiga 500

# Analyseur Logique

- Qu'est-ce que c'est ?
- A quoi ça sert ?
- Caractéristiques
  - Nombre de voies
  - Fréquence
  - Mémoire
  - Triggers
  - Logiciel
- Modèles

# Analyseur Logique

- Actuels
  - Avantages
    - Puissance
    - Exploitation
  - Inconvénients
    - Prix
    - Encombrement



# Analyseur Logique

- Anciens
  - Avantages
    - Rapport qualité/prix
    - Puissance
  - Inconvénients
    - Approvisionnement
    - Encombrement
    - Exploitation



# Analyseur Logique

- USB
  - Avantages
    - Prix
    - Exploitation
    - Encombrement
  - Inconvénients
    - Puissance



# Analyseur Logique

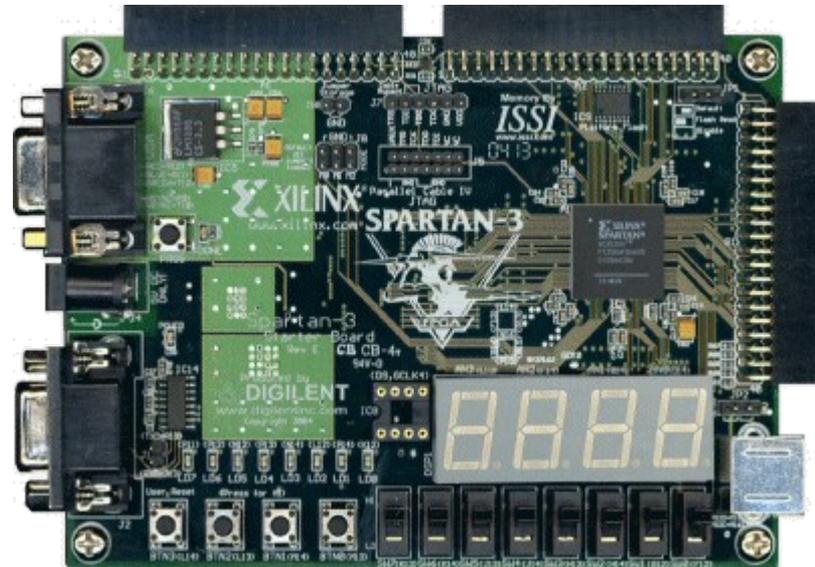
- SUMP Logic Analyzer

- Avantages

- Prix
    - Exploitation
    - Encombrement
    - Puissance
    - Autres utilisations

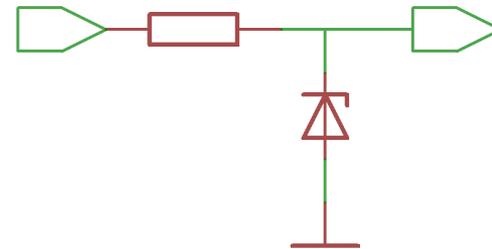
- Inconvénients

- Amateur



# SUMP Logic Analyzer

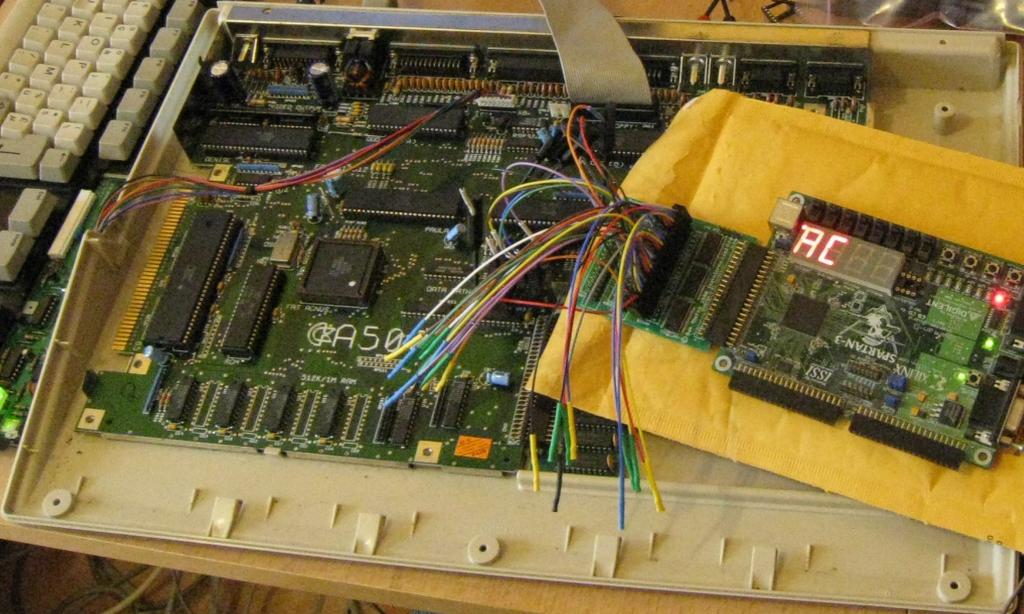
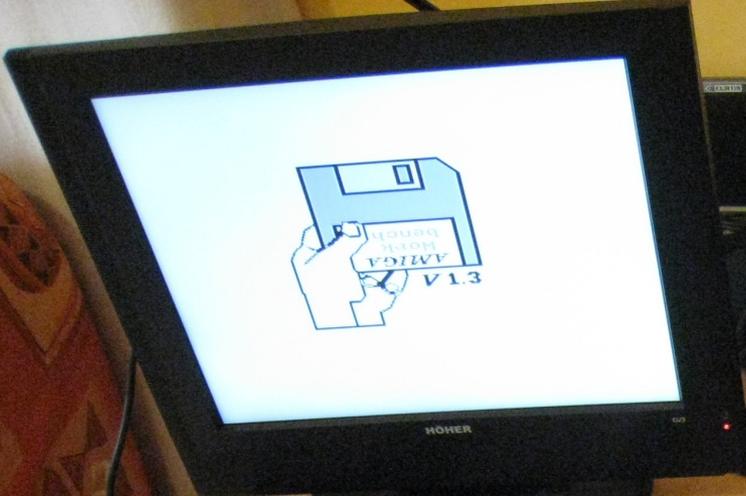
- Projet sous GPL de Michael Poppitz  
<http://www.sump.org/projects/analyzer/>
- Matériel
  - Spartan-3 Starter Board (ou autres)
  - Conversion 5V -> 3.3V
  - Sondes

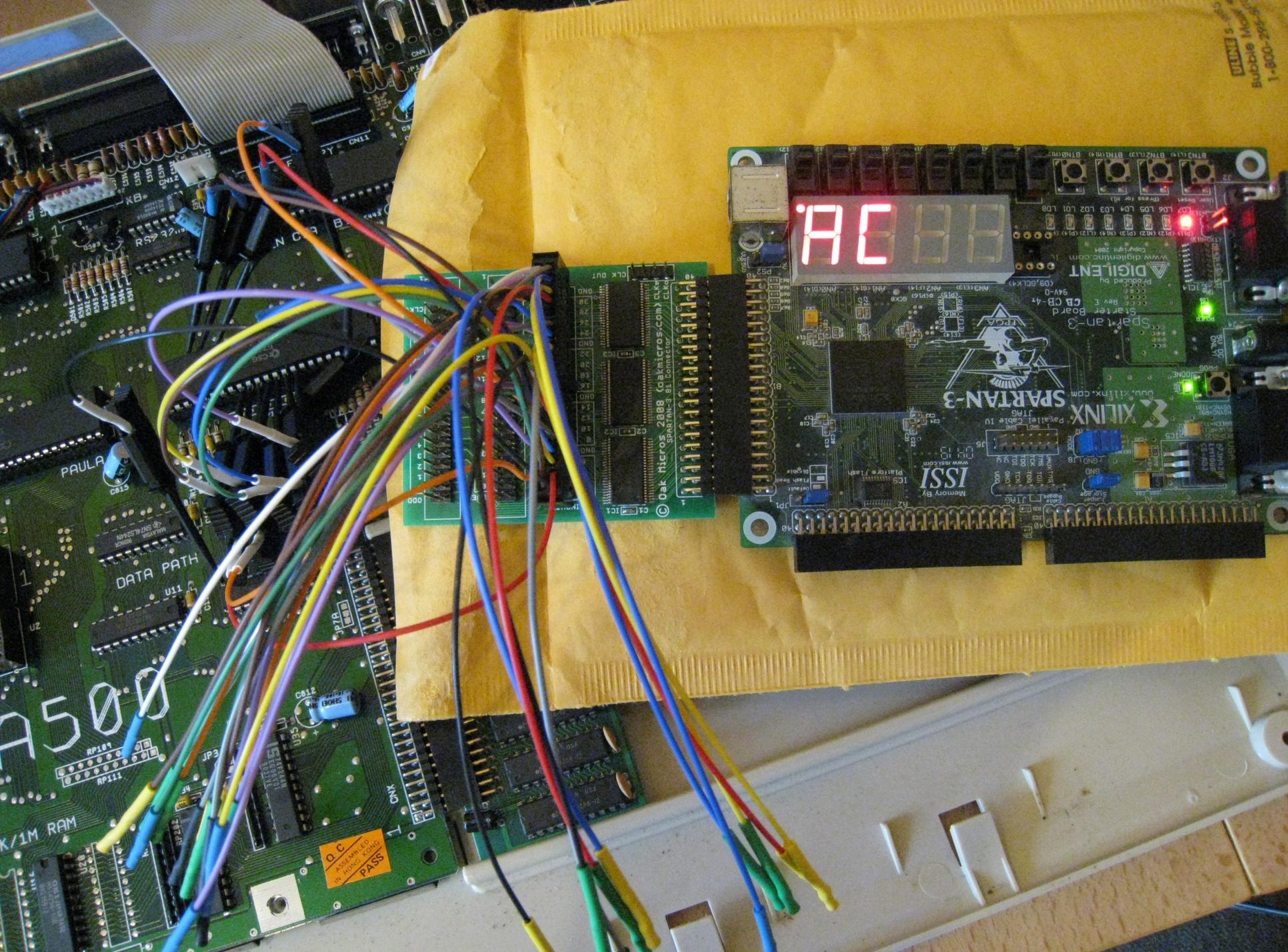


# SUMP LA - Caractéristiques

- 16 ou 32 voies
- 200 Mhz
- 256 Ksamples
- Triggers
  - Série
  - Parallèle
  - Simples ou complexes
- Logiciel open-source (GPL)







**XILINX**  
Spartan-3 Starter Board  
Rev E CB-47  
Produced by  
www.digilent.com  
Digilent

0000

Memory By  
**ISSI**  
Parallel Cable I/O  
J116

PS2

BTN3(L1-9) BTN2(L10) BTN1(M-4) BTN0(M1)

L06 L05 L04 L03 L02 L01 L00

Power Reset

U14

U13

U12

U11

U10

U9

U8

U7

U6

U5

U4

U3

U2

U1

U0

U-1

U-2

U-3

U-4

U-5

U-6

U-7

U-8

U-9

U-10

U-11

U-12

U-13

U-14

U-15

U-16

U-17

U-18

U-19

U-20

U-21

U-22

U-23

U-24

U-25

U-26

U-27

U-28

U-29

U-30

U-31

U-32

U-33

U-34

U-35

U-36

U-37

U-38

U-39

U-40

U-41

U-42

U-43

U-44

U-45

U-46

U-47

U-48

U-49

U-50

U-51

U-52

U-53

U-54

U-55

U-56

U-57

U-58

U-59

U-60

U-61

U-62

U-63

U-64

U-65

U-66

U-67

U-68

U-69

U-70

U-71

U-72

U-73

U-74

U-75

U-76

U-77

U-78

U-79

U-80

U-81

U-82

U-83

U-84

U-85

U-86

U-87

U-88

U-89

U-90

U-91

U-92

U-93

U-94

U-95

U-96

U-97

U-98

U-99

U-100

U-101

U-102

U-103

U-104

U-105

U-106

U-107

U-108

U-109

U-110

U-111

U-112

U-113

U-114

U-115

U-116

U-117

U-118

U-119

U-120

U-121

U-122

U-123

U-124

U-125

U-126

U-127

U-128

U-129

U-130

U-131

U-132

U-133

U-134

U-135

U-136

U-137

U-138

U-139

U-140

U-141

U-142

U-143

U-144

U-145

U-146

U-147

U-148

U-149

U-150

U-151

U-152

U-153

U-154

U-155

U-156

U-157

U-158

U-159

U-160

U-161

U-162

U-163

U-164

U-165

U-166

U-167

U-168

U-169

U-170

U-171

U-172

U-173

U-174

U-175

U-176

U-177

U-178

U-179

U-180

U-181

U-182

U-183

U-184

U-185

U-186

U-187

U-188

U-189

U-190

U-191

U-192

U-193

U-194

U-195

U-196

U-197

U-198

U-199

U-200

U-201

U-202

U-203

U-204

U-205

U-206

U-207

U-208

U-209

U-210

U-211

U-212

U-213

U-214

U-215

U-216

U-217

U-218

U-219

U-220

U-221

U-222

U-223

U-224

U-225

U-226

U-227

U-228

U-229

U-230

U-231

U-232

U-233

U-234

U-235

U-236

U-237

U-238

U-239

U-240

U-241

U-242

U-243

U-244

U-245

U-246

U-247

U-248

U-249

U-250

U-251

U-252

U-253

U-254

U-255

U-256

U-257

U-258

U-259

U-260

U-261

U-262

U-263

U-264

U-265

U-266

U-267

U-268

U-269

U-270

U-271

U-272

U-273

U-274

U-275

U-276

U-277

U-278

U-279

U-280

U-281

U-282

U-283

U-284

U-285

U-286

U-287

U-288

U-289

U-290

U-291

U-292

U-293

U-294

U-295

U-296

U-297

U-298

U-299

U-300

U-301

U-302

U-303

U-304

U-305

U-306

U-307

U-308

U-309

U-310

U-311

U-312

U-313

U-314

U-315

U-316

U-317

U-318

U-319

U-320

U-321

U-322

U-323

U-324

U-325

U-326

U-327

U-328

U-329

U-330

U-331

U-332

U-333

U-334

U-335

U-336

U-337

U-338

U-339

U-340

U-341

U-342

U-343

U-344

U-345

U-346

U-347

U-348

U-349

U-350

U-351

U-352

U-353

U-354

U-355

U-356

U-357

U-358

U-359

U-360

U-361

U-362

U-363

U-364

U-365

U-366

U-367

U-368

U-369

U-370

U-371

U-372

U-373

U-374

U-375

U-376

U-377

U-378

U-379

U-380

U-381

U-382

U-383

U-384

U-385

U-386

U-387

U-388

U-389

U-390

U-391

U-392

U-393

U-394

U-395

U-396

U-397

U-398

U-399

U-400

U-401

U-402

U-403

U-404

U-405

U-406

U-407

U-408

U-409

U-410

U-411

U-412

U-413

U-414

U-415

U-416

U-417

U-418

U-419

U-420

U-421

U-422

U-423

U-424

U-425

U-426

U-427

U-428

U-429

U-430

U-431

U-432

U-433

U-434

U-435

U-436

U-437

U-438

U-439

U-440

U-441

U-442

U-443

U-444

U-445

U-446

U-447

U-448

U-449

U-450

U-451

U-452

U-453

U-454

U-455

U-456

U-457

U-458

U-459

U-460

U-461

U-462

U-463

U-464

U-465

U-466

U-467

U-468

U-469

U-470

U-471

U-472

U-473

U-474

U-475

U-476

U-477

U-478

U-479

U-480

U-481

U-482

U-483

U-484

U-485

U-486

U-487

U-488

U-489

U-490

U-491

U-492

U-493

U-494

U-495

U-496

U-497

U-498

U-499

U-500

U-501

U-502

U-503

U-504

U-505

U-506

U-507

U-508

U-509

U-510

U-511

U-512

U-513

U-514

U-515

U-516

U-517

U-518

U-519

U-520

U-521

U-522

U-523

U-524

U-525

U-526

U-527

U-528

U-529

U-530

U-531

U-532

U-533

U-534

U-535

U-536

U-537

U-538

U-539

U-540

U-541

U-542

U-543

U-544

U-545

U-546

U-547

U-548

U-549

U-550

U-551

U-552

U-553

U-554

U-555

U-556

U-557

U-558

U-559

U-560

U-561

U-562

U-563

U-564

U-565

U-566

U-567

U-568

U-569

U-570

U-571

U-572

U-573

U-574

U-575

U-576

U-577

U-578

U-579

U-580

U-581

U-582

U-583

U-584

U-585

U-586

U-587

U-588

U-589

U-590

U-591

U-592

U-593

U-594

U-595

U-596

U-597

U-598

U-599

U-600

U-601

U-602

U-603

U-604

U-605

U-606

U-607

U-608

U-609

U-610

U-611

U-612

U-613

U-614

U-615

U-616

U-617

U-618

U-619

U-620

U-621

U-622

U-623

U-624

U-625

U-626

U-627

U-628

U-629

U-630

U-631

U-632

U-633

U-634

U-635

U-636

U-637

U-638

U-639

U-640

U-641

U-642

U-643

U-644

U-645

U-646

U-647

U-648

U-649

U-650

U-651

U-652

U-653

U-654

U-655

U-656

U-657

U-658

U-659

U-660

U-661

U-662

U-663

U-664

U-665

U-666

U-667

U-668

U-669

U-670

U-671

U-672

U-673

U-674

U-675

U-676

U-677

U-678

U-679

U-680

U-681

U-682

U-683

U-684

U-685

U-686

U-687

U-688

U-689

U-690

U-691

U-692

U-693

U-694

U-695

U-696

U-697

U-698

U-699

U-700

U-701

U-702

U-703

U-704

U-705

U-706

U-707

U-708

U-709

U-710

U-711

U-712

U-713

U-714

U-715

U-716

U-717

U-718

U-719

U-720

U-721

U-722

U-723

U-724

U-725

U-726

U-727

U-728

U-729

U-730

U-731

U-732

U-733

U-734

U-735

U-736

U-737

U-738

U-739

U-740

U-741

U-742

U-743

U-744

U-745

U-746

U-747

U-748

U-749

U-750

U-751

U-752

U-753

U-754

U-755

U-756

U-757

U-758

U-759

U-760

U-761

U-762

U-763

U-764

U-765

U-766

U-767

U-768

U-769

U-770

U-771

U-772

U-773

U-774

U-775

U-776

U-777

U-778

U-779

U-780

U-781

U-782

U-783

U-784

U-785

U-786

U-787

U-788

U-789

U-790

U-791

U-792

U-793

U-794

U-795

U-796

U-797

U-798

U-799

U-800

U-801

U-802

U-803

U-804

U-805

U-806

U-807

U-808

U-809

U-810

U-811

U-812

U-813

U-814

U-815

U-816

U-817

U-818

U-819

U-820

U-821

U-822

U-823

U-824

U-825

U-826

U-827

U-828

U-829

U-830

U-831

U-832

U-833

U-834

U-835

U-836

U-837

U-838

U-839

U-840

U-841

U-842

U-843

U-844

U-845

U-846

U-847

U-848

U-849

U-850

U-851

U-852

U-853

U-854

U-855

U-856

U-857

U-858

U-859

U-860

U-861

U-862

U-863

U-864

U-865

U-866

U-867

U-868

U-869

U-870

U-871

U-872

U-873

U-874

U-875

U-876

U-877

U-878

U-879

U-880

U-881

U-882

U-883

U-884

U-885

U-886

U-887

U-888

U-889

U-890

U-891

U-892

U-893

U-894

U-895

U-896

U-897

U-898

U-899

U-900

U-901

U-902

U-903

U-904

U-905

U-906

U-907

U-908

U-909

U-910

U-911

U-912

U-913

U-914

U-915

U-916

U-917

U-918

U-919

U-920

U-921

U-922

U-923

U-924

U-925

U-926

U-927

U-928

U-929

U-930

U-931

U-932

U-933

U-934

U-935

U-936

U-937

U-938

U-939

U-940

U-941

U-942

U-943

U-944

U-945

U-946

U-947

U-948

U-949

U-950

U-951

U-952

U-953

U-954

U-955

U-956

U-957

U-958

U-959

U-960

U-961

U-962

U-963

U-964

U-965

U-966

U-967

U-968

U-969

U-970

U-971

U-972

U-973

U-974

U-975

U-976

U-977

U-978

U-979

U-980

U-981

U-982

U-983

U-984

U-985

U-986

U-987

U-988

U-989

U-990

U-991

U-992

U-993

U-994

U-995

U-996

U-997

U-998

U-999

U-1000

© Oak Micros, 2008 oakmicros.com  
Spartan-3 81 Connector

CLK IN

CLK OUT

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

61

62

63

64

65

66

67

68

69

70

71

72

73

74

75

76

77

78

79

80

81

82

83

84

85

86

87

88

89

90

91

92

93

94

95

96

97

98

99

100

PAULA

DATA PATH

U11

A500

K/1M RAM

RP104

RP111

JP3

U35

U36

U37

U38

U39

U40

U41

U42

U43

U44

U45

U46

U47

U48

U49

U50

U51

U52

U53

U54

U55

U56

U57

U58

U59

U60

U61

U62

U63

U64

U65

U66

U67

U68

U69

U70

U71

U72

U73

U74

U75

U76

U77

U78

U79

U80

U81

U82

U83

U84

U85

U86

U87

U88

U89

U90

U91

U92

U93

U94

U95

U96

U97

U98

U99

U100

U101

U102

U103

U104

U105

U106

U107

U108

U109

U110

U111

U112

U113

U114

U115

U116

U117

U118

U119

U120

U121

U122

U123

U124

U125

U126

U127

U128

U129

U130

U131

U132

U133

U134

U135

U136

U137

U138

U139

U140

U141

U142

U143

U144

U145

U146

U147

U148

U149

U150

U151

U152

U153

U154

U155

U156

U157

U158

U159

U160

U161

U162

U163

# Etude de l'Amiga 500

- Etude des accès mémoire
- GARY
  - Décodage « adresses hautes »
  - Arbitrage 68000
- FAT AGNUS
  - Décodage « adresses basses »
  - Contrôleur DRAM
  - Périphériques (Décodage, DMA)

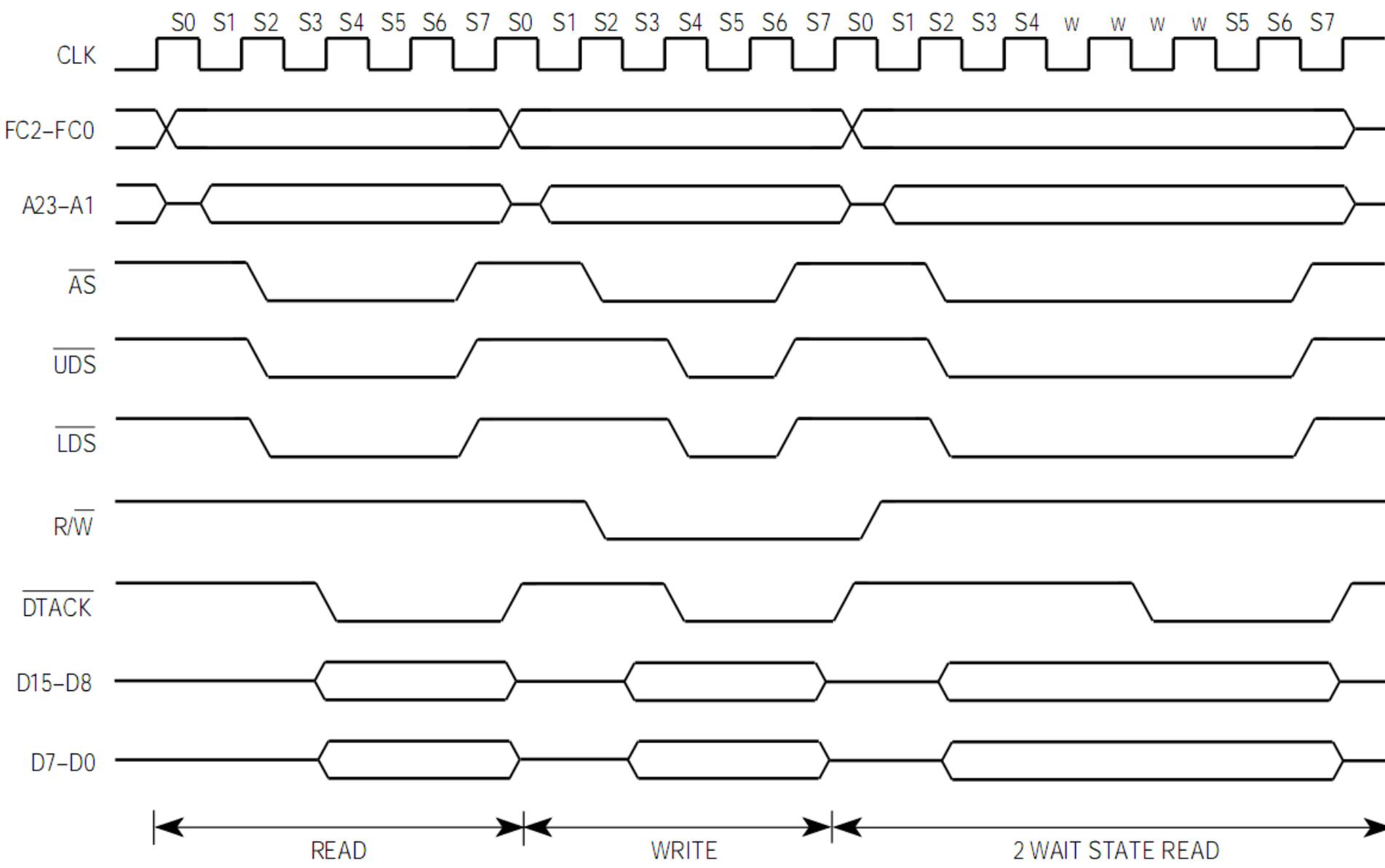
# Etude de l'Amiga 500

Analyse des schémas



# Etude de l'Amiga 500 - 68000

- ASn : Address Strobe
- RnW : Read / Write
- UDSn,LDSn : Upper,Lower Data Select
- VPAn : Valid Peripheral Address
- DTACKn : Data Transfer Acknowledge



**Figure 5-3. Read and Write-Cycle Timing Diagram**

# Etude de l'Amiga 500 - GARY

- OEBn : Enable bus write buffers
- OELn : Enable bus read latches output
- LATCHn : Enable bus read latches latch
- ROMENn : Enable ROM
- RAMENn : Enable RAM
- REGENn : Enable Amiga Registers

# Etude de l'Amiga 500 - AGNUS

- RAS0n,RAS1n : Row Address Selection
- CASLn, CASUn : Column Address Selection
- WEn : Read / Write
- DRA0..8 : DRAM Address
- RGA0..7 : Amiga Register Address Selection
- DMAL : DMA Request (PAULA)
- BLITn : Blitter (DMA) Request
- BLISSn : Blitter Slowdown

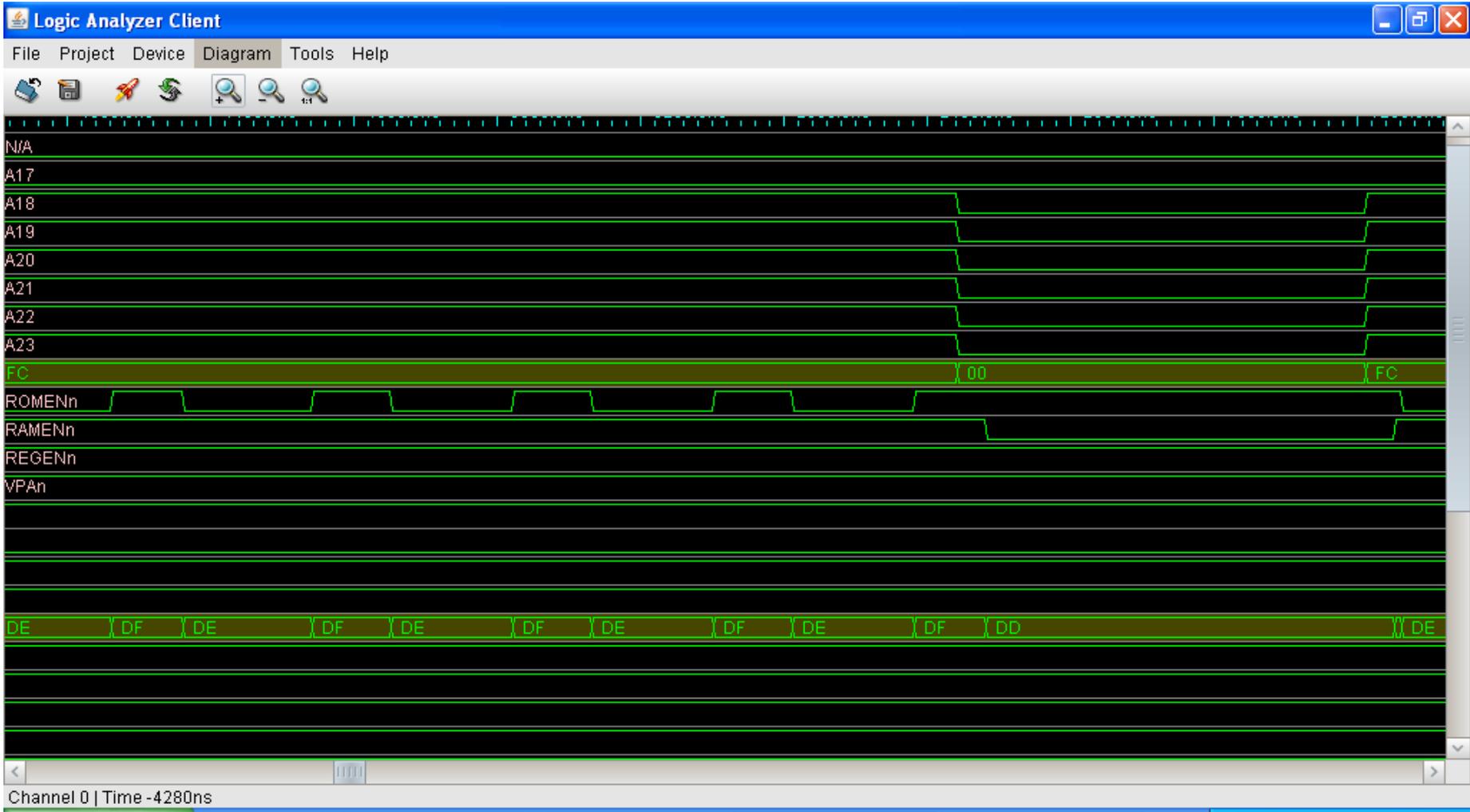
# Etude de l'Amiga 500

Décodage des Adresses  
(GARY)

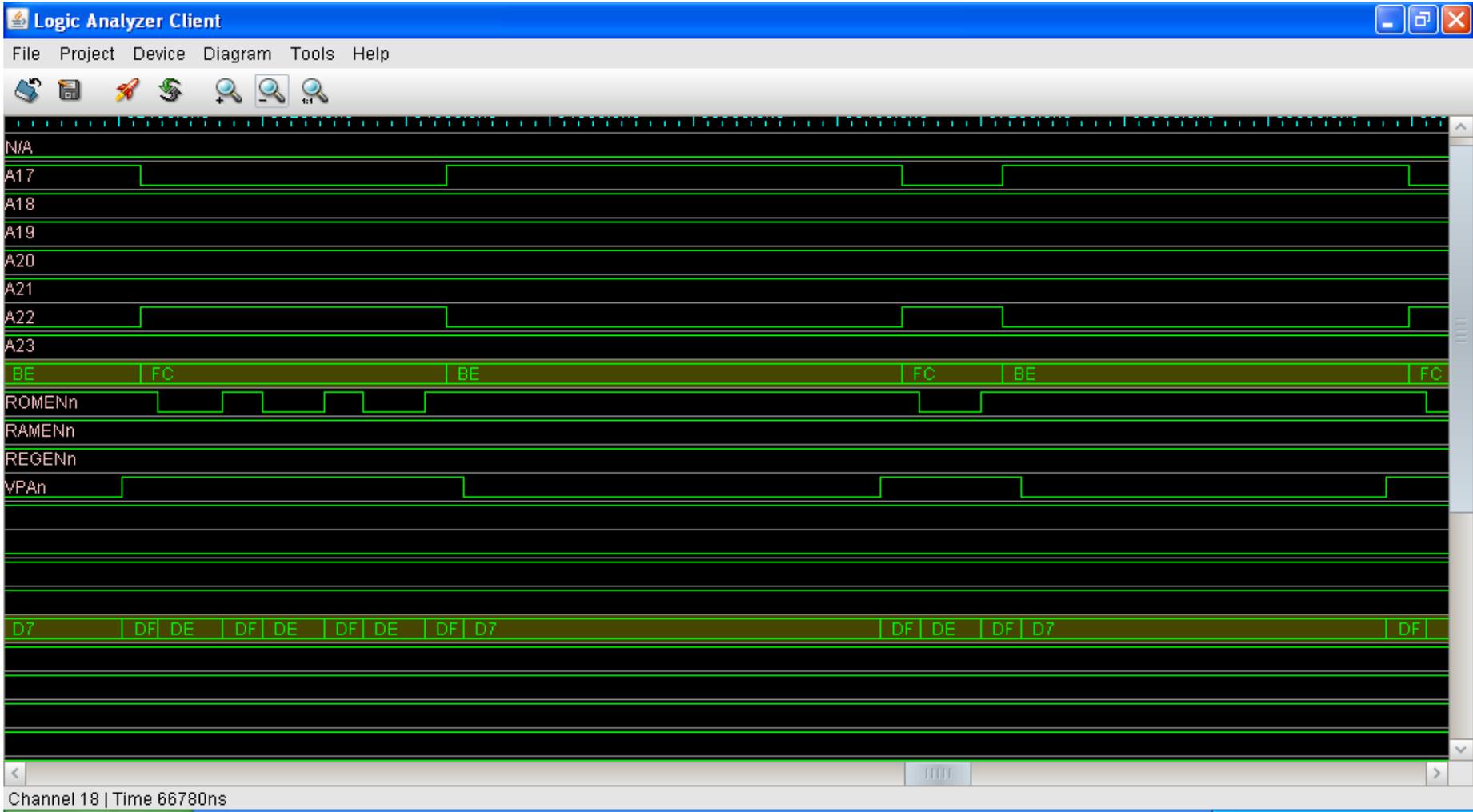
# Amiga Memory Map

Address	Size [KByte]	Description
0x0000 0000	256.0	Chip RAM
0x0004 0000	256.0	Chip RAM ( <a href="#">A1000</a> option card)
0x0008 0000	512.0	Chip RAM expansion
0x0010 0000	1024.0	Extended Chip RAM for <a href="#">ECS/AGA</a> .
0x0020 0000	8192.0	Primary auto-config space (Fast RAM)
0x00A0 0000	1984.0	Reserved
0x00BF D000	3.8	<a href="#">8520-B</a> (even-byte addresses)
0x00BF E001	3.8	<a href="#">8520-A</a> (odd-byte addresses)
0x00C0 0000	1536.0	Internal expansion memory (pseudo-fast, Slow RAM on Amiga 500)
0x00D8 0000	256.0	Reserved
0x00DC 0000	64.0	<a href="#">Real time clock</a>
0x00DD 0000	188.0	Reserved
0x00DF F000	4.0	Custom chip registers
0x00E0 0000	512.0	Reserved
0x00E8 0000	64.0	<a href="#">Zorro II</a> auto-config space (before relocation).
0x00E9 0000	448.0	Secondary auto-config space (usually 64K I/O boards)
0x00F0 0000	768.0	256K System ROM ( <a href="#">Kickstart</a> 1.4 or higher)
0x00FC 0000	256.0	256K System ROM

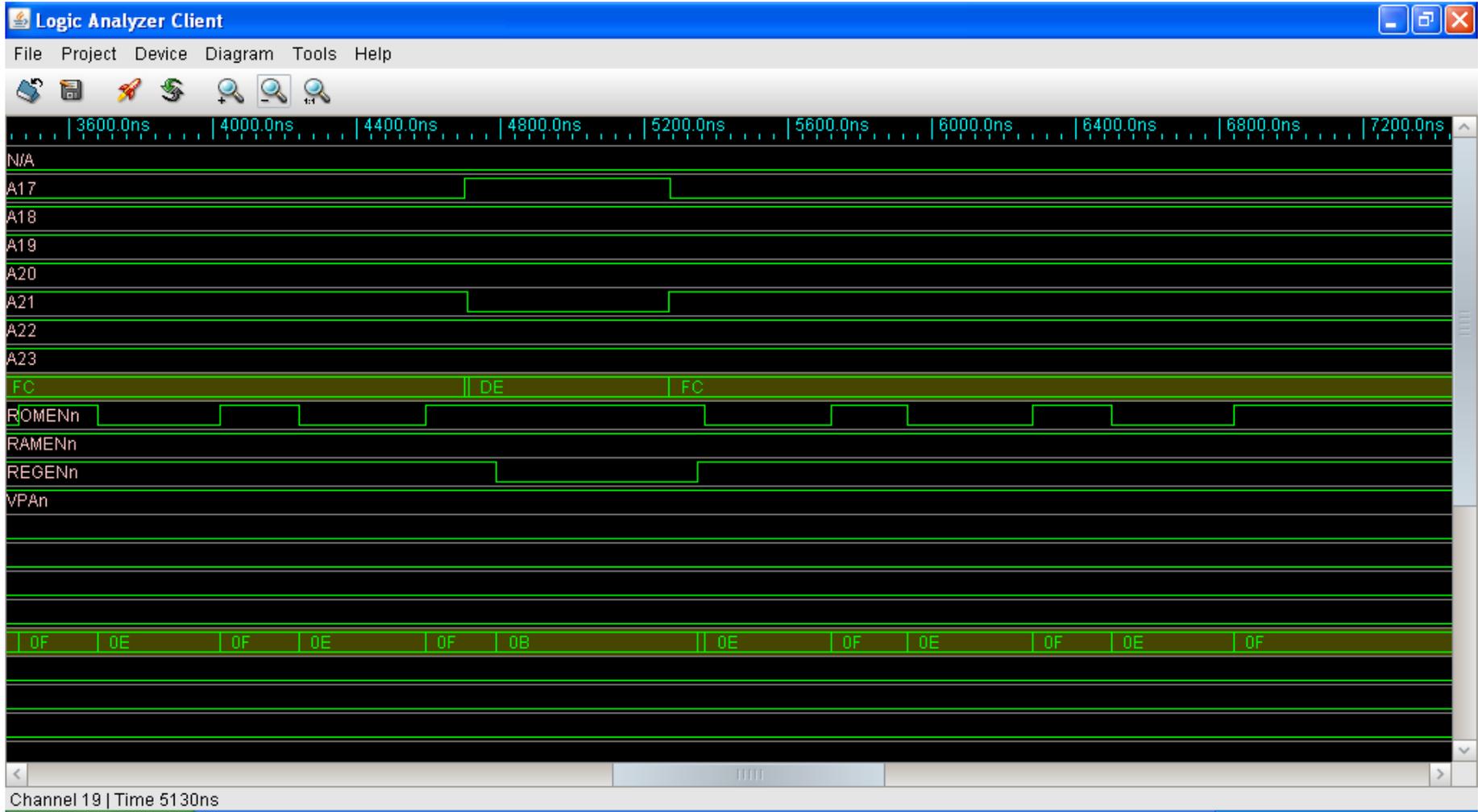
# ROM / RAM



# Périphériques (8520)



# Amiga Chipset



# Etude de l'Amiga 500

Accès mémoire  
(GARY / AGNUS)

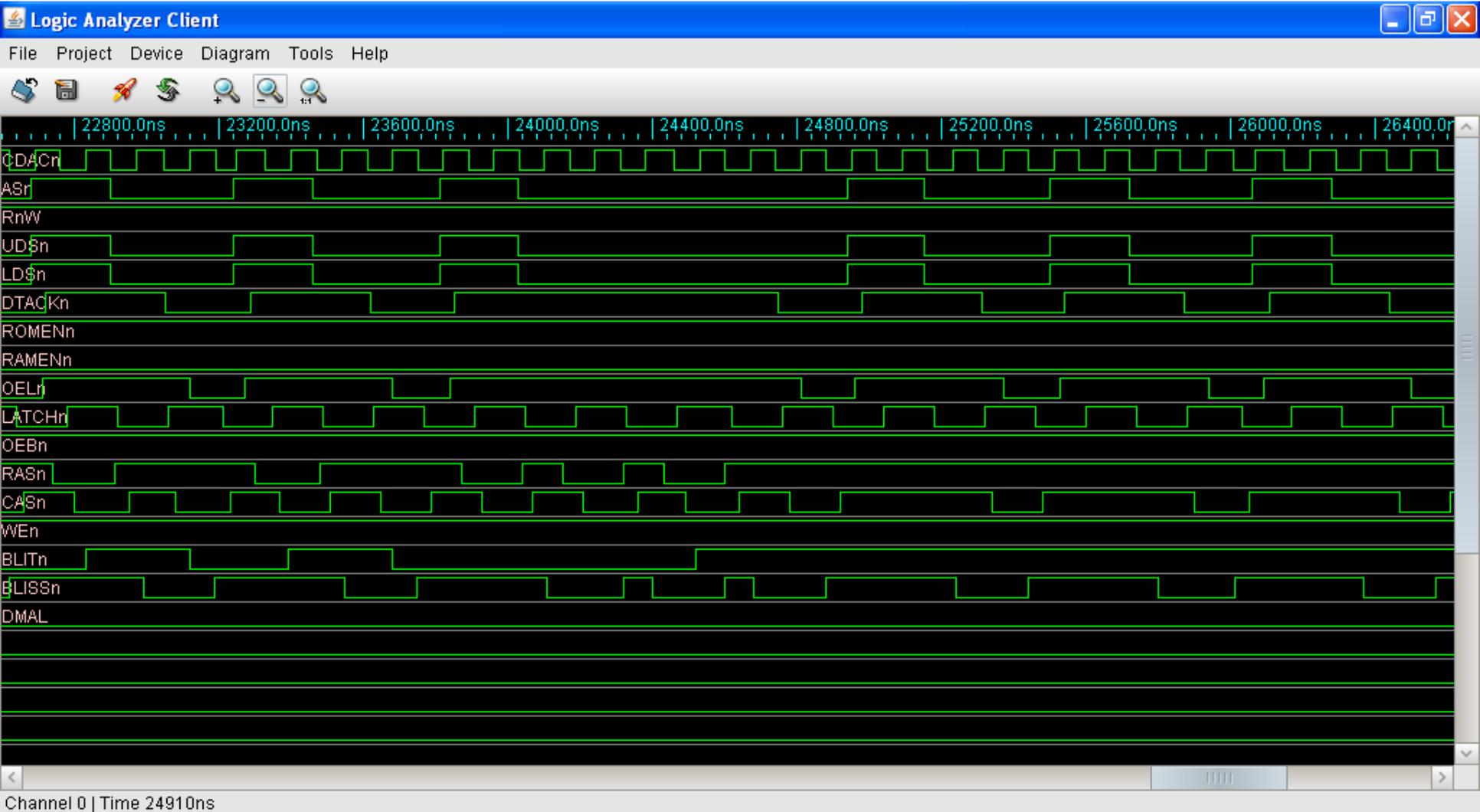
# Accès ROM / RAM (lecture)



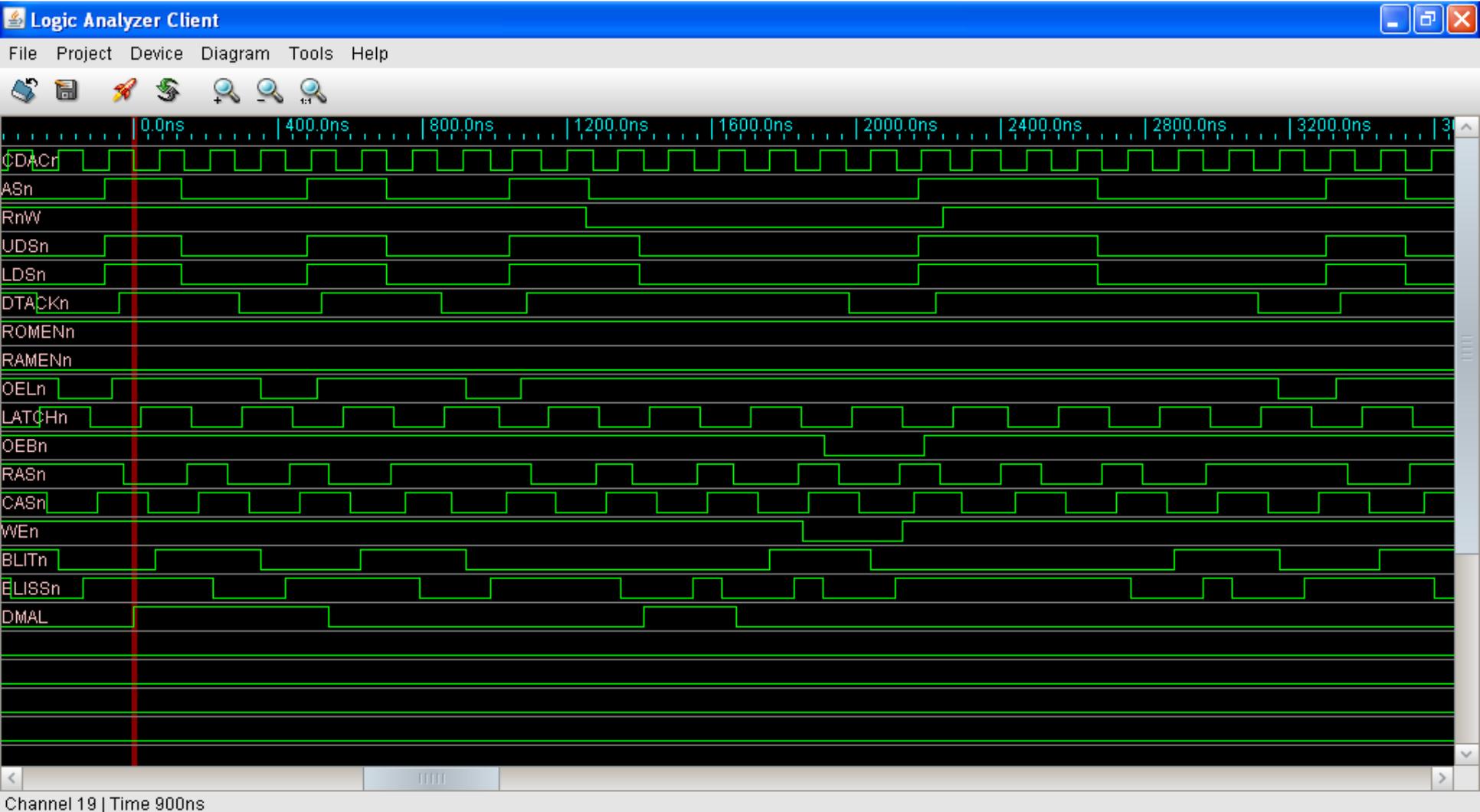
# Accès RAM (écriture)



# DMA (AGNUS)



# DMA (PAULA)



# Questions / Réponses