

*Crisp*

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TO: AGC Distribution  
FROM: Hugh-Blair Smith  
DATE: February 12, 1965  
SUBJECT: Appendices to AGC4 Memo #8

The attached appendices are an addition to AGC4 Memo #8.

AGC BLOCK 2 CONTROL PULSE LISTING

A2X                   BITS 1-16 OF A ARE READ DIRECTLY INTO X1-16.

B15X                   SETS BIT 15 OF X.

CI                    INSERT CARRY INTO BIT 1 OF THE ADDER.

CLXC                   CLEAR X CONDITIONAL ON THE OUTCOME OF TSGU. X IS  
CLEARED IF BR1 = 0. USED IN DIVIDE.

DVST                   CAUSE DIVIDE STAGING BY A SIMPLE RULE. ALSO PERMIT  
STAGING TO OCCUR AT TIME3 OF DIVIDE CYCLES.

EXT                   SETS THE EXTEND FLIP FLOP.

G2LS                 \*       COPY G4-15,16,1 INTO L1-12,16,15.

KRPT                   RESET INTERRUPT PRIORITY CELL.

L2GD                   COPY L1-14,16 INTO G2-15,16 -- ALSO MCRO INTO G1.

MONEX                   CLEAR ALL X AND THEN SET BITS 2-16.

MOUT                   NEGATIVE RATE OUTPUT PULSE.

NEACOF                   PERMIT END AROUND CARRY.

NEACON                   INHIBIT END AROUND CARRY UNTIL NEACOF.

NISQ                   NEXT INSTRUCTION IS TO BE LOADED INTO SQ. ALSO  
FREES CERTAIN RESTRICTIONS- PERMITS INCREMENTS AND  
INTERRUPTS.

PIFL                   WHEN L15 = 1, BLOCK WRITING INTO Y1 ON A WYD.

PONEX                   CLEAR ALL OF X AND THEN SET BIT 1.

POUT                   POSITIVE RATE OUTPUT PULSE.

PTWOX                   SETS BIT 2 OF X.

R15                    PLACE OCTAL 15 ON WL'S.

R1C                    PLACE OCTAL 177776 = -1 ON WL'S.

## AGC BLOCK 2 CONTROL PULSE LISTING

RA READ A1-16 TO WL1-16.

RAD READ ADDRESS OF NEXT CYCLE. THIS APPEARS AT THE END OF AN INSTRUCTION AND NORMALLY IS INTERPRETED AS RG. IF THE NEXT INSTRUCTION IS TO BE A PSEUDO CODE (INHINT, RELINT, EXTEND), IT IS INSTEAD INTERPRETED AS RZ.

RB READ B1-16 TO WL1-16.

RB1 PLACE OCTAL 1 ON THE WL'S.

RB1F PLACE OCTAL 1 ON WL'S CONDITIONAL ON THE OUTCOME OF TSGU. RB1F IF BR1=1.

RB2 PLACE OCTAL 2 ON WL'S.

RC READ THE CONTENT OF B INVERTED: C1-16 TO WL1-16.

RCH READ THE CONTENT OF THE INPUT OR OUTPUT CHANNEL SPECIFIED BY THE CURRENT CONTENT OF S: CHANNEL BITS 1-14 TO WL1-14, AND BIT 16 TO WL15,16.

RG READ G1-16 TO WL1-16.

RL READ L1-14 TO WL1-14, AND L16 TO WL15 AND 16.

RL10BB READ LOW 10 BITS OF B TO WL 1-10.

RQ READ Q1-16 TO WL1-16.

RRPA READ THE ADDRESS OF THE HIGHEST PRIORITY INTERRUPT REQUESTED.

RSC READ THE CONTENT OF CENTRAL STORE DEFINED BY THE ADDRESS CURRENTLY IN S: CENTRAL STORE BITS 1-16 ARE COPIED TO WL1-16.

RSCT READ THE ADDRESS OF HIGHEST PRIORITY COUNTER REQUEST.

RSTRT PLACE OCTAL 4000 = BLOCK 2 START ADDRESS ON WL'S.

RSTSTG RESET THE DIVIDE T03 STAGING CONDITION.

RU READ U1-16 TO WL1-16.

RUS READ U1-14 TO WL1-14, AND U15 TO WL15 AND 16.

RZ READ Z1-16 TO WL1-16.

ST1 SET STAGE1 FLIP FLOP NEXT T12.

ST2 SET STAGE2 FLIP FLOP NEXT T12.

AGC BLOCK 2 CONTROL PULSE LISTING

|       |   |  |
|-------|---|--|
| STAGE |   | EXECUTE GREY-CODED STAGE ADVANCE COMPUTED BY DVST.   |
| TL15  |   | COPY L15 INTO BR1.   |
| TMZ   |   | TEST FOR MINUS ZERO. SET BR2 IF TRUE.  |
| TOV   |   | TEST FOR OVER OR UNDERFLOW. SET BR1,2 TO 01 IF OVERFLOW. TO 10 IF UNDERFLOW.   |
| TPZG  |   | TEST CONTENT OF G FOR PLUS ZERO. IF TRUE SET BR2=1.  |
| TRSM  |   | TEST FOR THE RESUME ADDRESS ON INDEX. ST2 IF (S)=17.   |
| TSGN  |   | TEST SIGN. COPY WL16 TO BR1.   |
| TSGN2 |   | TEST SIGN. COPY WL16 TO BR2.   |
| TSGU  |   | TEST SIGN OF SUM (U). SETS BR1 TO 1 IF U16=1.  |
| WA    |   | CLEAR AND WRITE WL1-16 INTO A1-16.   |
| WALS  | * | CLEAR AND WRITE INTO A1-13,14,15,16 FROM WL3-15,16, G16, 16. ALSO CLEAR AND WRITE INTO L13, 14 FROM WL1,2.                               |
| WB    |   | CLEAR AND WRITE WL1-16 INTO B1-16.   |
| WCH   |   | CLEAR AND WRITE WL1-14,16,PARITY INTO CHANNEL BITS 1-14,16,PARITY.<br>THE CHANNEL TO BE LOADED IS SPECIFIED BY THE CURRENT CONTENT OF S. |
| WG    |   | CLEAR AND WRITE WL1-16 INTO G1-16 EXCEPT FOR ADDRESSES OCTAL 20-23.  |
| WL    |   | CLEAR AND WRITE WL1-16 INTO L1-16  |
| WOVR  |   | TEST FOR OVERFLOW DURING COUNTER INCREMENTS AND PROGRAM INITIATED INCREMENTS(INCR,AUG,DIM). RUPT IF SO.                                  |
| WQ    |   | CLEAR AND WRITE WL1-16 INTO Q1-16.   |
| WS    |   | CLEAR AND WRITE WL1-12 INTO S1-12.   |
| WSC   |   | CLEAR AND WRITE WL1-16 INTO THE CENTRAL REGISTER SPECIFIED BY THE CURRENT CONTENT OF S. BITS 1-16 INTO POSITIONS 1-16.                   |
| WSQ   | * | CLEAR AND WRITE WL10-14,16 INTO SQ10-14,16, AND COPY THE EXTEND FLIP FLOP INTO SQ15.   |

AGC BLOCK 2 CONTROL PULSE LISTING

WY CLEAR Y AND X. WRITE WL1-16 INTO Y1-16.

WY12 CLEAR X AND Y. WRITE WL1-12 INTO Y1-12.

WYD CLEAR Y AND X. WRITE WL1-14 INTO Y2-15.  
WRITE WL16 INTO Y16. WRITE WL16 INTO Y1 UNLESS  
IN SHINC SEQUENCE OR UNLESS PIFL FINDS L15 = 1.

WZ CLEAR AND WRITE WL1-16 INTO Z1-16.

Z15 SETS BIT 15 OF Z.

Z16 SETS BIT 16 OF Z.

ZAP ALWAYS IMPLIES RU, G2LS, AND WALS.

ZIP ALWAYS IMPLIES A2X AND L2GD. ALSO IF L15,2,1 ARE:

| L15 | L2 | L1 | READ | WRITE | CARRY | REMEMBER |
|-----|----|----|------|-------|-------|----------|
| 0   | 0  | 0  | -    | WY    | -     | -        |
| 0   | 0  | 1  | RB   | WY    | -     | -        |
| 0   | 1  | 0  | RB   | WYD   | -     | -        |
| 0   | 1  | 1  | RC   | WY    | CI    | MCRO     |
| 1   | 0  | 0  | RB   | WY    | -     | -        |
| 1   | 0  | 1  | RB   | WYD   | -     | -        |
| 1   | 1  | 0  | RC   | WY    | CI    | MCRO     |
| 1   | 1  | 1  | -    | WY    | -     | MCRO     |

ZOUT NO RATE OUTPUT PULSE.

\* THESE PULSES DO NOT APPEAR IN THE PULSE SEQUENCES.

# AGC BLOCK 2 PROGRAMMABLE INSTRUCTIONS

| OP CODE     | EXT | SQ16.14-10 | OPERATION                                |
|-------------|-----|------------|--|
| TC          | 0   | 000        | TRANSFER CONTROL                         |
| CCS         | 0   | 001 00     | COUNT, COMPARE, AND SKIP                 |
| TCF         | 0   | 001 01     | TRANSFER CONTROL TO FIXED                |
| TCF         | 0   | 001 10     | " " " " "                                |
| TCF         | 0   | 001 11     | " " " " "                                |
| DAS         | 0   | 010 00     | DOUBLE PRECISION ADD TO STORAGE          |
| LXCH        | 0   | 010 01     | L EXCHANGE WITH MEMORY                   |
| INCR        | 0   | 010 10     | INCREMENT MEMORY                         |
| ADS         | 0   | 010 11     | ADD TO STORAGE                           |
| CA          | 0   | 011        | CLEAR AND ADD                            |
| CS          | 0   | 100        | CLEAR AND SUBTRACT                       |
| INDEX (NDX) | 0   | 101 00     | INDEX NEXT INSTRUCTION (INDEX 17=RESUME) |
| DXCH        | 0   | 101 01     | DOUBLE PRECISION EXCHANGE WITH MEMORY    |
| TS          | 0   | 101 10     | TRANSFER TO STORAGE                      |
| XCH         | 0   | 101 11     | EXCHANGE WITH MEMORY                     |
| AD          | 0   | 110        | ADD                                      |
| MASK (MSK)  | 0   | 111        | MASK ("AND" TO A)                        |
| READ        | 1   | 000 00 0   | READ FROM CHANNEL                        |
| WRITE       | 1   | 000 00 1   | WRITE IN CHANNEL                         |
| RAND        | 1   | 000 01 0   | READ, "AND" TO A                         |
| WAND        | 1   | 000 01 1   | WRITE, "AND" TO CHANNEL                  |
| ROR         | 1   | 000 10 0   | READ, "OR" TO A                          |
| WOR         | 1   | 000 10 1   | WRITE, "OR" TO CHANNEL                   |
| RXOR        | 1   | 000 11 0   | READ, EXCLUSIVE "OR" TO A                |
| EDRUPT      | 1   | 000 11 1   | ED SMALLY'S OWN RUPT ORDER               |
| DV          | 1   | 001 00     | DIVIDE                                   |
| BZF         | 1   | 001 01     | BRANCH ON ZERO TO FIXED                  |
| BZF         | 1   | 001 10     | " " " " "                                |
| BZF         | 1   | 001 11     | " " " " "                                |
| MSU         | 1   | 010 00     | MODULAR SUBTRACT                         |
| QXCH        | 1   | 010 01     | Q EXCHANGE WITH MEMORY                   |
| AUG         | 1   | 010 10     | AUGMENT MEMORY                           |
| DIM         | 1   | 010 11     | DIMINISH MEMORY                          |
| DCA         | 1   | 011        | DOUBLE PRECISION CLEAR AND ADD           |
| DCS         | 1   | 100        | DOUBLE PRECISION CLEAR AND SUBTRACT      |
| INDEX (NDX) | 1   | 101        | INDEX NEXT EXTRACODE INSTRUCTION         |
| SU          | 1   | 110 00     | SUBTRACT                                 |
| BZMF        | 1   | 110 01     | BRANCH ON ZERO OR MINUS TO FIXED         |
| BZMF        | 1   | 110 10     | " " " " " " "                            |
| BZMF        | 1   | 110 11     | " " " " " " "                            |
| MP          | 1   | 111        | MULTIPLY                                 |

AGC BLOCK 2 PULSE SEQUENCES

|       |        |                     |
|-------|--------|---------------------|
| M 001 | TCO    |                     |
| 002   | 1.     | RB WY12 CI          |
| 003   | 2.     | RSC WG NISO         |
| 004   | 3.     | RZ WQ               |
| 005   | 6.     | RU WZ               |
| 006   | 8.     | RAD WB WS           |
| M 007 | GOJ1   |                     |
| 008   | 2.     | RSC WG              |
| 009   | 8.     | RSTRT WS WB         |
| M 010 | TCSAJ3 |                     |
| 011   | 2.     | RSC WG              |
| 012   | 8.     | WS WZ ST2           |
| M 013 | CCSO   |                     |
| 014   | 1.     | RL10BR WS           |
| 015   | 2.     | RSC WG              |
| 016   | 5.     | RG WB TSGN TMZ TPZG |
| 017   | 7. 00  | RZ WY12             |
| 018   | 7. 01  | RZ WY12 PONEX       |
| 019   | 7. 10  | RZ WY12 PTWOX       |
| 020   | 7. 11  | RZ WY12 PONEX PTWOX |
| 021   | 8.     | RU WZ WS            |
| 022   | 9.     | RB WG               |
| 023   | 10. 00 | RB WY MONEX CI ST2  |
| 024   | 10. X1 | WY ST2              |
| 025   | 10. 10 | RC WY MONEX CI ST2  |
| 026   | 11.    | RU WA               |
| M 027 | TCFO   |                     |
| 028   | 1.     | RB WY12 CI          |
| 029   | 2.     | RSC WG NISO         |
| 030   | 6.     | RU WZ               |
| 031   | 8.     | RAD WB WS           |

AGC BLOCK 2 PULSE SEQUENCES

M 032 DAS0

|     |        |                         |
|-----|--------|-------------------------|
| 033 | 1.     | RL10BB WS WY12 MONEX CI |
| 034 | 2.     | RSC WG                  |
| 035 | 3.     | RA WB                   |
| 036 | 4.     | RL WA                   |
| 037 | 5.     | RU WL                   |
| 038 | 6.     | RG WY A2X               |
| 039 | 7.     | RB WA                   |
| 040 | 8.     | RL WB                   |
| 041 | 9.     | RU WSC WG TOV           |
| 042 | 10. 00 | RA WY ST1               |
| 043 | 10. 01 | RA WY ST1 PONEX         |
| 044 | 10. 10 | RA WY ST1 MONEX         |
| 045 | 10. 11 | RA WY ST1               |
| 046 | 11.    | RU WA                   |

M 047 DAS1

|     |        |               |
|-----|--------|---------------|
| 048 | 1.     | RL10BB WS     |
| 049 | 2.     | RSC WG        |
| 050 | 5.     | RG WY A2X     |
| 051 | 6.     | RU WG WSC TOV |
| 052 | 7. 00  | WA RB1 RIC    |
| 053 | 7. 01  | WA RB1        |
| 054 | 7. 10  | WA RIC        |
| 055 | 7. 11  | WA RB1 RIC    |
| 056 | 8.     | RZ WS ST2     |
| 057 | 9.     | RC TMZ        |
| 058 | 10. X0 | WL            |
| 059 | 11. X1 | RU WA         |

M 060 LXCH0

|     |    |           |
|-----|----|-----------|
| 061 | 1. | RL10BB WS |
| 062 | 2. | RSC WG    |
| 063 | 3. | RL WB     |
| 064 | 5. | RG WL     |
| 065 | 7. | RB WSC WG |
| 066 | 8. | RZ WS ST2 |

M 067 INCRO

|     |    |                     |
|-----|----|---------------------|
| 068 | 1. | RL10BB WS           |
| 069 | 2. | RSC WG              |
| 070 | 5. | RG WY TSGN TMZ TPZG |
| 071 | 6. | PONEX               |
| 072 | 7. | RU WSC WG WQVR      |
| 073 | 8. | RZ WS ST2           |



AGC BLOCK 2 PULSE SEQUENCES

|       |       |               |
|-------|-------|---------------|
| M 074 | ADSO  |               |
| 0745  | 1.    | RL10BB WS     |
| 075   | 2.    | RSC WG        |
| 0755  | 5.    | RG WY A2X     |
| 076   | 6.    | RU WSC WG TOV |
| 0765  | 7. 00 | WA RB1 R1C    |
| 077   | 7. 01 | WA RB1        |
| 0775  | 7. 10 | WA R1C        |
| 078   | 7. 11 | WA RB1 R1C    |
| 0785  | 8.    | RZ WS ST2     |
| 079   | 9.    | RC TMZ        |
| 0795  | 11.   | RU WA         |
| M 081 | CA0   |               |
| 082   | 2.    | RSC WG        |
| 083   | 7.    | RG WB         |
| 084   | 8.    | RZ WS ST2     |
| 085   | 9.    | RB WG         |
| 086   | 10.   | RB WA         |
| M 087 | CS0   |               |
| 088   | 2.    | RSC WG        |
| 089   | 7.    | RG WB         |
| 090   | 8.    | RZ WS ST2     |
| 091   | 9.    | RB WG         |
| 092   | 10.   | RC WA         |

AGC BLOCK 2 PULSE SEQUENCES

|       |       |                         |
|-------|-------|-------------------------|
| M 093 | NDX0  |                         |
| 094   | 2.    | RSC WG                  |
| 095   | 5.    | TRSM                    |
| 096   | 7.    | RG WB                   |
| 097   | 8.    | RZ WS                   |
| 098   | 9.    | RB WG                   |
| 099   | 10.   | ST1                     |
| M 100 | NDX1  |                         |
| 101   | 1.    | RZ WY12 CI              |
| 102   | 2.    | RSC WG NISQ             |
| 103   | 3.    | RB WZ                   |
| 104   | 4.    | RA WB                   |
| 105   | 5.    | RZ WA                   |
| 106   | 6.    | RU WZ                   |
| 107   | 7.    | RG WY A2X               |
| 108   | 8.    | RU WS                   |
| 109   | 9.    | RB WA                   |
| 110   | 10.   | RU WB                   |
| M 111 | RSM3  |                         |
| 112   | 1.    | R15 WS                  |
| 113   | 2.    | RSC WG NISQ             |
| 114   | 5.    | RG WZ                   |
| 115   | 6.    | RB WG                   |
| 116   | 8.    | RAD WB WS               |
| M 117 | DXCH0 |                         |
| 118   | 1.    | RL10BB WS WY12 MONEX CI |
| 119   | 2.    | RSC WG                  |
| 120   | 3.    | RL WB                   |
| 121   | 5.    | RG WL                   |
| 122   | 7.    | RB WSC WG               |
| 123   | 8.    | RU WS WB                |
| 124   | 10.   | ST1                     |
| M 125 | DXCH1 |                         |
| 126   | 1.    | RL10BB WS               |
| 127   | 2.    | RSC WG                  |
| 128   | 3.    | RA WB                   |
| 129   | 5.    | RG WA                   |
| 130   | 7.    | RB WSC WG               |
| 131   | 8.    | RZ WS ST2               |

AGC BLOCK 2 PULSF SEQUENCES

|       |       |            |
|-------|-------|------------|
| M 132 | TSO   |            |
| 133   | 1.    | RL10BB WS  |
| 134   | 2.    | RSC WG     |
| 135   | 3.    | RA WB TOV  |
| 136   | 4. 00 | RZ WY12    |
| 137   | 4. 01 | RZ WY12 CI |
| 138   | 4. 10 | RZ WY12 CI |
| 139   | 4. 11 | RZ WY12    |
| 140   | 5. 01 | RB1 WA     |
| 141   | 5. 10 | RIC WA     |
| 142   | 6.    | RU WZ      |
| 143   | 7.    | RB WSC WG  |
| 144   | 8.    | RZ WS ST2  |
| M 145 | XCHO  |            |
| 146   | 1.    | RL10BB WS  |
| 147   | 2.    | RSC WG     |
| 148   | 3.    | RA WB      |
| 149   | 5.    | RG WA      |
| 150   | 7.    | RB WSC WG  |
| 151   | 8.    | RZ WS ST2  |
| M 152 | ADO   |            |
| 153   | 2.    | RSC WG     |
| 154   | 7.    | RG WB      |
| 155   | 8.    | RZ WS ST2  |
| 156   | 9.    | RB WG      |
| 157   | 10.   | RB WY A2X  |
| 158   | 11.   | RU WA      |
| M 159 | MSKO  |            |
| 160   | 2.    | RSC WG     |
| 161   | 3.    | RA WB      |
| 162   | 4.    | RC WA      |
| 163   | 7.    | RG WB      |
| 164   | 8.    | RZ WS ST2  |
| 165   | 9.    | RC RA WY   |
| 166   | 10.   | RU WB      |
| 167   | 11.   | RC WA      |

AGC BLOCK 2 PULSE SEQUENCES

M 168 READO

|     |    |           |
|-----|----|-----------|
| 169 | 1. | RL10BB WS |
| 170 | 2. | RA WB     |
| 171 | 3. | WY        |
| 172 | 4. | RCH WB    |
| 173 | 5. | RB WA     |
| 174 | 6. | RA WB     |
| 175 | 8. | RZ WS ST2 |

M 176 WRITEO

|     |    |           |
|-----|----|-----------|
| 177 | 1. | RL10BB WS |
| 178 | 2. | RA WB WG  |
| 179 | 3. | WY        |
| 180 | 4. | RCH WB    |
| 181 | 5. | RA WCH    |
| 182 | 6. | RA WB     |
| 183 | 8. | RZ WS ST2 |

M 184 RANDO

|     |    |           |
|-----|----|-----------|
| 185 | 1. | RL10BB WS |
| 186 | 2. | RA WB     |
| 187 | 3. | RC WY     |
| 188 | 4. | RCH WB    |
| 189 | 5. | RC RU WA  |
| 190 | 6. | RA WB     |
| 191 | 7. | RC WA     |
| 192 | 8. | RZ WS ST2 |

M 193 WANDO

|     |    |           |
|-----|----|-----------|
| 194 | 1. | RL10BB WS |
| 195 | 2. | RA WB     |
| 196 | 3. | RC WY     |
| 197 | 4. | RCH WB    |
| 198 | 5. | RC RU WA  |
| 199 | 6. | RA WB     |
| 200 | 7. | RC WA WCH |
| 201 | 8. | RZ WS ST2 |

AGC BLOCK 2 PULSE SEQUENCES

|       |       |              |
|-------|-------|--------------|
| M 202 | RORO  |              |
| 203   | 1.    | RL10BB WS    |
| 204   | 2.    | RA WB        |
| 205   | 3.    | RB WY        |
| 206   | 4.    | RCH WB       |
| 207   | 5.    | RB RU WA     |
| 208   | 6.    | RA WB        |
| 209   | 8.    | RZ WS ST2    |
| M 210 | WORD  |              |
| 211   | 1.    | RL10BB WS    |
| 212   | 2.    | RA WB        |
| 213   | 3.    | RB WY        |
| 214   | 4.    | RCH WB       |
| 215   | 5.    | RB RU WA WCH |
| 216   | 6.    | RA WB        |
| 217   | 8.    | RZ WS ST2    |
| M 218 | RXORO |              |
| 219   | 1.    | RL10BB WS    |
| 220   | 2.    | RA WB        |
| 221   | 3.    | RC RCH WY    |
| 222   | 4.    | RCH WB       |
| 223   | 5.    | RA RC WG     |
| 224   | 7.    | RG WB        |
| 225   | 8.    | RZ WS ST2    |
| 226   | 9.    | RC WG        |
| 227   | 10.   | RU WB        |
| 228   | 11.   | RC RG WA     |
| M 229 | RUPT0 |              |
| 230   | 1.    | R15 WS       |
| 231   | 2.    | RSC WG       |
| 232   | 9.    | RZ WG        |
| 233   | 10.   | ST1          |
| M 234 | RUPT1 |              |
| 235   | 1.    | R15 RB2 WS   |
| 236   | 2.    | RSC WG       |
| 237   | 3.    | RRPA WZ      |
| 239   | 8.    | RZ WS ST2    |
| 240   | 9.    | RB WG KRPT   |

AGC BLOCK 2 PULSE SEQUENCES

|       |     |    |                      |
|-------|-----|----|----------------------|
| M 241 | DV0 |    |                      |
| 242   | 1.  |    | RA WB TSGN TMZ       |
| 243   | 2.  | OX | RC WA TMZ DVST       |
| 244   | 2.  | 1X | DVST                 |
| 245   | 3.  |    | RU WB STAGE          |
| M 246 | DV1 |    |                      |
| 251   | 4.  | X0 | RL WB                |
| 252   | 4.  | X1 | RL WB TSGN           |
| 253   | 5.  | OX | RB WY B15X           |
| 254   | 5.  | 1X | RC WY B15X Z16       |
| 255   | 6.  |    | RU WL TOV            |
| 256   | 7.  |    | RG RSC WB TSGN       |
| 257   | 8.  | X0 | RA WY PONEX          |
| 258   | 8.  | X1 | RA WY                |
| 259   | 9.  | OX | RB WA                |
| 260   | 9.  | 1X | RC WA Z15            |
| 261   | 10. |    | RU WB                |
| 262   | 11. |    | RL WYD               |
| 263   | 12. |    | RU WL                |
| 247   | 1.  |    | L2GD RB WYD A2X PIFL |
| 248   | 2.  | OX | RG WL TSGU DVST CLXC |
| 249   | 2.  | 1X | RG WL TSGU DVST RB1F |
| 250   | 3.  |    | RU WB STAGE          |
| M 264 | DV3 |    |                      |
| 269   | 4.  |    | L2GD RB WYD A2X PIFL |
| 270   | 5.  | OX | RG WL TSGU CLXC      |
| 271   | 5.  | 1X | RG WL TSGU RB1F      |
| 272   | 6.  |    | RU WB                |
| 273   | 7.  |    | L2GD RB WYD A2X PIFL |
| 274   | 8.  | OX | RG WL TSGU CLXC      |
| 275   | 8.  | 1X | RG WL TSGU RB1F      |
| 276   | 9.  |    | RU WB                |
| 277   | 10. |    | L2GD RB WYD A2X PIFL |
| 278   | 11. | OX | RG WL TSGU CLXC      |
| 279   | 11. | 1X | RG WL TSGU RB1F      |
| 280   | 12. |    | RU WB                |
| 265   | 1.  |    | L2GD RB WYD A2X PIFL |
| 266   | 2.  | OX | RG WL TSGU DVST CLXC |
| 267   | 2.  | 1X | RG WL TSGU DVST RB1F |
| 268   | 3.  |    | RU WB STAGE          |

AGC BLOCK 2 PULSE SEQUENCES

M 281 DV7

|     |     |    |                      |
|-----|-----|----|----------------------|
| 286 | 4.  |    | L2GD RB WYD A2X PIFL |
| 287 | 5.  | 0X | RG WL TSGU CLXC      |
| 288 | 5.  | 1X | RG WL TSGU RB1F      |
| 289 | 6.  |    | RU WB                |
| 290 | 7.  |    | L2GD RB WYD A2X PIFL |
| 291 | 8.  | 0X | RG WL TSGU CLXC      |
| 292 | 8.  | 1X | RG WL TSGU RB1F      |
| 293 | 9.  |    | RU WB                |
| 294 | 10. |    | L2GD RB WYD A2X PIFL |
| 295 | 11. | 0X | RG WL TSGU CLXC      |
| 296 | 11. | 1X | RG WL TSGU RB1F      |
| 297 | 12. |    | RU WB                |
| 282 | 1.  |    | L2GD RB WYD A2X PIFL |
| 283 | 2.  | 0X | RG WL TSGU DVST CLXC |
| 284 | 2.  | 1X | RG WL TSGU DVST RB1F |
| 285 | 3.  |    | RU WB STAGE          |

M 298 DV6

|     |     |    |                      |
|-----|-----|----|----------------------|
| 303 | 4.  |    | L2GD RB WYD A2X PIFL |
| 304 | 5.  | 0X | RG WL TSGU CLXC      |
| 305 | 5.  | 1X | RG WL TSGU RB1F      |
| 306 | 6.  |    | RU WB                |
| 307 | 7.  |    | L2GD RB WYD A2X PIFL |
| 308 | 8.  | 0X | RG WL TSGU CLXC      |
| 309 | 8.  | 1X | RG WL TSGU RB1F      |
| 310 | 9.  |    | RU WB                |
| 311 | 10. |    | L2GD RB WYD A2X PIFL |
| 312 | 11. | 0X | RG WL TSGU CLXC      |
| 313 | 11. | 1X | RG WL TSGU RB1F      |
| 314 | 12. |    | RU WB                |
| 299 | 1.  |    | L2GD RB WYD A2X PIFL |
| 300 | 2.  | 0X | RG WL TSGU DVST CLXC |
| 301 | 2.  | 1X | RG WL TSGU DVST RB1F |
| 302 | 3.  |    | RU WB STAGE          |

M 315 DV4

|     |     |    |                       |
|-----|-----|----|-----------------------|
| 316 | 3.  |    | RU WB STAGE           |
| 317 | 4.  |    | L2GD RB WYD A2X PIFL  |
| 318 | 5.  | 0X | RG WB WA TSGU CLXC    |
| 319 | 5.  | 1X | RG WB WA TSGU RB1F    |
| 320 | 6.  |    | RZ TOV                |
| 321 | 7.  | 01 | RC WA                 |
| 322 | 7.  | 1X | RC WA                 |
| 323 | 8.  |    | RZ WS ST2 TSGN RSTSTG |
| 324 | 9.  |    | RU WB WL              |
| 325 | 10. | 0X | RC WL                 |

AGC BLOCK 2 PULSE SEQUENCES

M 3251 BZFO

|      |       |                |
|------|-------|----------------|
| 3252 | 2.    | RSC WG         |
| 3253 | 3.    | RA WG TSGN TMZ |
| 3254 | 4.    | TPZG           |
| 3255 | 5. X0 | RZ WY12 CI     |
| 3256 | 5. X1 | RB WY12 CI     |
| 3257 | 6.    | RU WZ          |
| 3258 | 8. X0 | RZ WS ST2      |
| 3259 | 8. X1 | RAD WB WS NISO |

M 326 MSUO

|     |        |              |
|-----|--------|--------------|
| 327 | 1.     | RL10BB WS    |
| 328 | 2.     | RSC WG       |
| 329 | 5.     | RG WB        |
| 330 | 6.     | RC WY CI A2X |
| 331 | 7.     | RUS WA TSGN  |
| 332 | 8.     | RZ WS ST2    |
| 333 | 9.     | RB WG        |
| 334 | 10. 1X | RA WY MONEX  |
| 335 | 11.    | RUS WA       |

M 336 QXCHD

|     |    |           |
|-----|----|-----------|
| 337 | 1. | RL10BB WS |
| 338 | 2. | RSC WG    |
| 339 | 3. | RQ WB     |
| 340 | 5. | RG WQ     |
| 341 | 7. | RB WSC WG |
| 342 | 8. | RZ WS ST2 |

M 343 AUGO

|     |       |                     |
|-----|-------|---------------------|
| 344 | 1.    | RL10BB WS           |
| 345 | 2.    | RSC WG              |
| 346 | 5.    | RG WY TSGN TMZ TPZG |
| 347 | 6. OX | PONEX               |
| 348 | 6. 1X | MONEX               |
| 349 | 7.    | RU WSC WG WOVR      |
| 350 | 8.    | RZ WS ST2           |

M 351 DIMO

|     |       |                     |
|-----|-------|---------------------|
| 352 | 1.    | RL10BB WS           |
| 353 | 2.    | RSC WG              |
| 354 | 5.    | RG WY TSGN TMZ TPZG |
| 355 | 6. 00 | MONEX               |
| 356 | 6. 10 | PONEX               |
| 357 | 7.    | RU WSC WG WOVR      |
| 358 | 8.    | RZ WS ST2           |



AGC BLOCK 2 PULSE SEQUENCES

|       |      |                  |
|-------|------|------------------|
| M 359 | DCA0 |                  |
| 360   | 1.   | RB WY12 MONEX CI |
| 361   | 2.   | RSC WG           |
| 362   | 7.   | RG WB            |
| 363   | 8.   | RU WS            |
| 364   | 9.   | RB WG            |
| 365   | 10.  | RB WL ST1        |
| M 366 | DCA1 |                  |
| 367   | 2.   | RSC WG           |
| 368   | 7.   | RG WB            |
| 369   | 8.   | RZ WS ST2        |
| 370   | 9.   | RB WG            |
| 371   | 10.  | RB WA            |
| M 372 | DCS0 |                  |
| 373   | 1.   | RB WY12 MONEX CI |
| 374   | 2.   | RSC WG           |
| 375   | 7.   | RG WB            |
| 376   | 8.   | RU WS            |
| 377   | 9.   | RB WG            |
| 378   | 10.  | RC WL ST1        |
| M 379 | DCS1 |                  |
| 380   | 2.   | RSC WG           |
| 381   | 7.   | RG WB            |
| 382   | 8.   | RZ WS ST2        |
| 383   | 9.   | RB WG            |
| 384   | 10.  | RC WA            |

AGC BLOCK 2 PULSE SEQUENCES

|         |       |                |
|---------|-------|----------------|
| M 385   | NDXXQ |                |
| 386     | 2.    | RSC WG         |
| 387     | 7.    | RG WB          |
| 388     | 8.    | RZ WS          |
| 389     | 9.    | RB WG          |
| 390     | 10.   | ST1            |
| M 391   | NDXX1 |                |
| 392     | 1.    | RZ WY12 CI     |
| 393     | 2.    | RSC WG NISQ    |
| 394     | 3.    | RB WZ          |
| 395     | 4.    | RA WB          |
| 396     | 5.    | RZ WA          |
| 397     | 6.    | RU WZ          |
| 398     | 7.    | RG WY A2X      |
| 399     | 8.    | RU WS          |
| 400     | 9.    | RB WA          |
| 401     | 10.   | RU WB EXT      |
| M 402   | SU0   |                |
| 403     | 2.    | RSC WG         |
| 404     | 7.    | RG WB          |
| 405     | 8.    | RZ WS ST2      |
| 406     | 9.    | RB WG          |
| 407     | 10.   | RC WY A2X      |
| 408     | 11.   | RU WA          |
| M 40805 | BZMF0 |                |
| 4081    | 2.    | PSC WG         |
| 40815   | 3.    | RA WG TSGN TMZ |
| 4082    | 4.    | TPZG           |
| 40825   | 5. 00 | RZ WY12 CI     |
| 4083    | 5. 01 | RB WY12 CI     |
| 40835   | 5. 10 | RB WY12 CI     |
| 4084    | 5. 11 | RB WY12 CI     |
| 40845   | 6.    | RU WZ          |
| 4085    | 8. 00 | RZ WS ST2      |
| 40855   | 8. 01 | RAD WB WS NISQ |
| 4086    | 8. 10 | RAD WB WS NISQ |
| 40865   | 8. 11 | RAD WB WS NISQ |

AGC BLOCK 2 PULSE SEQUENCES

|       |        |                       |
|-------|--------|-----------------------|
| M 409 | MP0    |                       |
| 410   | 2.     | RSC WG                |
| 411   | 3.     | RA WB TSGN            |
| 412   | 4. OX  | RB WL                 |
| 413   | 4. 1X  | RC WL                 |
| 414   | 7.     | RG WB TSGN2           |
| 415   | 8.     | RZ WS                 |
| 416   | 9. 00  | RB WY                 |
| 417   | 9. 01  | RB WY CI              |
| 418   | 9. 10  | RC WY CI              |
| 419   | 9. 11  | RC WY                 |
| 420   | 10.    | RU WB TSGN ST1 NEACON |
| 421   | 11. OX | WA                    |
| 422   | 11. 1X | WA RB1 RIC            |

|       |     |             |
|-------|-----|-------------|
| M 423 | MP1 |             |
| 424   | 1.  | ZIP         |
| 425   | 2.  | ZAP         |
| 426   | 3.  | ZIP         |
| 427   | 4.  | ZAP         |
| 428   | 5.  | ZIP         |
| 429   | 6.  | ZAP         |
| 430   | 7.  | ZIP         |
| 431   | 8.  | ZAP         |
| 432   | 9.  | ZIP         |
| 433   | 10. | ZAP ST1 ST2 |
| 434   | 11. | ZIP         |

|       |        |                   |
|-------|--------|-------------------|
| M 435 | MP3    |                   |
| 436   | 1.     | ZAP               |
| 437   | 2.     | ZIP NISQ          |
| 438   | 3.     | ZAP               |
| 439   | 4.     | RSC WG            |
| 440   | 5.     | RZ WY12 CI        |
| 441   | 6.     | RU WZ TL15 NEACOF |
| 4415  | 7. 1X  | RB WY A2X         |
| 442   | 8.     | RAD WB WS         |
| 443   | 9.     | RA                |
| 4431  | 10.    | RL                |
| 444   | 11. 1X | RU WA             |

|       |      |             |
|-------|------|-------------|
| M 445 | STD2 |             |
| 446   | 1.   | RZ WY12 CI  |
| 447   | 2.   | RSC WG NISQ |
| 448   | 6.   | RU WZ       |
| 449   | 8.   | RAD WB WS   |

AGC BLOCK 2 PULSE SEQUENCES

|       |      |    |                     |
|-------|------|----|---------------------|
| M 450 | PINC |    |                     |
| 451   | 1.   |    | RSCT WS             |
| 452   | 2.   |    | RSC WG              |
| 453   | 5.   |    | RG WY TSGN TMZ TPZG |
| 454   | 6.   |    | PONEX               |
| 455   | 7.   |    | RU WSC WG WOVR      |
| 456   | 8.   |    | RB WS               |
| M 457 | PCDU |    |                     |
| 458   | 1.   |    | RSCT WS             |
| 459   | 2.   |    | RSC WG              |
| 460   | 5.   |    | RG WY TSGN TMZ TPZG |
| 461   | 6.   |    | CI                  |
| 462   | 7.   |    | RUS WSC WG WOVR     |
| 463   | 8.   |    | RB WS               |
| M 464 | MINC |    |                     |
| 465   | 1.   |    | RSCT WS             |
| 466   | 2.   |    | RSC WG              |
| 467   | 5.   |    | RG WY TSGN TMZ TPZG |
| 468   | 6.   |    | MONEX               |
| 469   | 7.   |    | RU WSC WG WOVR      |
| 470   | 8.   |    | RB WS               |
| M 471 | MCDU |    |                     |
| 472   | 1.   |    | RSCT WS             |
| 473   | 2.   |    | RSC WG              |
| 474   | 5.   |    | RG WY TSGN TMZ TPZG |
| 475   | 6.   |    | MONEX CI            |
| 476   | 7.   |    | RUS WSC WG WOVR     |
| 477   | 8.   |    | RB WS               |
| M 478 | DINC |    |                     |
| 479   | 1.   |    | RSCT WS             |
| 480   | 2.   |    | RSC WG              |
| 481   | 5.   |    | RG WY TSGN TMZ TPZG |
| 482   | 6.   | 00 | MONEX POUT          |
| 483   | 6.   | 10 | PONEX MOUT          |
| 484   | 6.   | X1 | ZOUT                |
| 485   | 7.   |    | RU WSC WG WOVR      |
| 486   | 8.   |    | RB WS               |

AGC BLOCK 2 PULSE SEQUENCES

M 487 SHINC

|     |    |                 |
|-----|----|-----------------|
| 488 | 1. | RSCT WS         |
| 489 | 2. | RSC WG          |
| 490 | 5. | RG WYD TSGN     |
| 491 | 7. | RUS WSC WG WOVR |
| 492 | 8. | RB WS           |

M 493 SHANC

|     |    |                 |
|-----|----|-----------------|
| 494 | 1. | RSCT WS         |
| 495 | 2. | RSC WG          |
| 496 | 5. | RG WYD TSGN CI  |
| 497 | 7. | RUS WSC WG WOVR |
| 498 | 8. | RB WS           |

M 499 OINC

|     |    |                     |
|-----|----|---------------------|
| 500 | 1. | WS                  |
| 501 | 2. | RSC WG              |
| 502 | 5. | RG WY TSGN TMZ TPZG |
| 503 | 7. | RU WSC WG WOVR      |
| 504 | 8. | RB WS               |

M 505 LINC

|     |    |                     |
|-----|----|---------------------|
| 506 | 1. | WS                  |
| 507 | 2. | RSC WG              |
| 508 | 5. | RG WY TSGN TMZ TPZG |
| 509 | 7. | WG WSC WOVR         |
| 510 | 8. | RB WS               |

M 511 INOTRD

|     |    |        |
|-----|----|--------|
| 512 | 1. | WS     |
| 513 | 2. | RSC WG |
| 514 | 5. | RCH    |
| 515 | 8. | RB WS  |

M 516 INOTLD

|     |    |        |
|-----|----|--------|
| 517 | 1. | WS     |
| 518 | 2. | RSC WG |
| 519 | 5. | RCH    |
| 520 | 7. | WCH    |
| 521 | 8. | RB WS  |