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To: All S&EC Programmers

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SUBJECT: AUTOMATIC SCOPE OUTPUT REQUESTS

Abstract: The CS II output instructions for display of alphanumerical
           data on the oscilloscope are described.

The automatic output instruction SOA (iSOA), Scope Output

Alphanumerical, is now available to programmers using CS II. As adjuncts

of this instruction, the special instructions COLUMN (iCOLUMN) and FRAME

(iFRAME) have also been introduced.*

Use of SOA (iSOA)

The instructions SOA and iSOA are used in exactly the same way

as the MOA (iMOA) and TOA (iTOA) instructions. SOA causes the contents

of AC to be displayed on the scope, while iSOA is used to display the con-

tents of MRA. SOA must be used while in the WWI mode of operation; iSOA

while in the interpreted mode. The form of the display is specified with

a sample number typed immediately following the capital letters SOA (with

no intervening tabs or carriage-returns). The conventions for forming

the sample number are exactly the same as for the sample numbers used with

the typewriter output instructions. Any form obtainable with MOA (iMOA)

or TOA (iTOA) is available also with SOA (iSOA).

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*FRAME and iFRAME may be used independently of the SOA and iSOA
instructions.

Special Characters

The terminating symbols "space", "tab", and "carriage return" have been given meanings for the oscilloscope which are similar in effect to the typewriter machine functions.

When a _space_ is recorded on the 'scope, the horizontal deflection is indexed to the right by the width of one character. Nothing is displayed in the area passed over. If during the execution of "space" or during the actual display of a number, the horizontal deflection should run off the right edge of the 'scope face, an arithmetic-overflow alarm will be generated.

For the purposes of the _tab_ symbol, the 'scope face has been divided into four columns of equal width. The _tab_ causes the horizontal deflection to be moved to the right to the beginning of the next available column. If a tab should be given while characters are being displayed in the last (fourth) column, a check-register alarm is generated.

The _carriage-return_ causes the vertical deflection to be indexed downward to the next line and the horizontal deflection to be reset, in general, to the left edge of the 'scope.* If a carriage-return is given after the last available line has been used, its effect is to cause the camera to be indexed and to reset both the horizontal and vertical deflections to the upper left of the 'scope face.

The _vertical bar_, used as part of some numbers on the typewriter, is not displayed on the 'scope.

Single Characters

The following instructions may be used to obtain the display of a single character on the 'scope:

*See COLUMN instruction for exception to this rule.

SOA c	iSOA c
SOA s	iSOA s
SOA t	iSOA t
SOA .	iSOA .
SOA +	iSOA +
SOA -	iSOA -

Format

The instructions FOR and iFOR may be used unchanged with SOA and iSOA.

FRAME

The instruction FRAME (iFRAME)* causes the camera to be indexed one frame, and if SOA or iSOA is also in use, it causes the deflections to be reset to the upper left-hand corner of the 'scope. If FRAME or iFRAME is used without an SOA instruction, it simply causes the camera to be indexed.

COLUMN

The instruction COLUMN (iCOLUMN)** may be used to facilitate displaying data in columns. This instruction causes the horizontal deflection to be moved to the right to the beginning of the next available column and the vertical deflection to be restored to the top of the 'scope. It also causes subsequent carriage-returns to reset the horizontal deflection to the left edge of this column instead of to the left edge of the 'scope face. This behavior of carriage-return will continue until either

a) another COLUMN instruction is executed;

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*These may be shortened to FRA and iFRA.
**These may be shortened to COL and iCOL.

b) a FRAME instruction is executed; or

c) a carriage-return causes the camera to be indexed.

Should a COLUMN instruction be given while characters are being displayed in the last column, that COLUMN instruction will behave exactly like a FRAME instruction.

Repeated SOA Requests

It is common practice to use an output request without the sample number when exactly the same request as the preceding one is desired. For instance, in the program

```
iSOA+nl.2345c
        -
        -            no intervening
        -            output requests
        -
iSOA
```

the word iSOA will be converted to iSOA+nl.2345c. Remember, however, that this always gives exactly the same request as the immediately preceding one. In the program

```
iSOA+nl.2345c
        -
        -
        -
        -
iCOL
        -
        -
        -
iSOA
```

the word iSOA will be converted to iCOL.

Summary

SOA   require sample number, cause display

iSOA   of c(AC) or c(MRA) (as appropriate) on 'scope.

FRA   Cause camera to index, and if SOA or

iFRA   iSOA is also in use, cause deflections to be

              reset to left top of 'scope face.

COL   Set deflection to top of next available column

iCOL   and cause all succeeding carriage-returns to reset

              horizontal deflection to beginning of this column

              instead of to left of 'scope face.

No. of available columns (when using COL instruction or tab character) = 4.

No. of characters per line = 63 max.

No. of lines per frame = 36 max.