Declass Review, NIMA/DoD

4 January 1964

Ref: E80

STATOTHR

As agreed upon in our telephone conversation of December 31, 1963, I am sending this letter, which contains a list of questions pertaining to the interfacing of the plotter with the computer. We need the information requested herein urgently in order to proceed with the design of the plotter input/output circuits. We appreciate your assistance in helping us to obtain this information.

In the initial installation the coordinatograph will be at a location with respect to the computer such that 80 to 90 feet of cable will be required to connect the computer output buffer to the coordinatograph input buffer. STATOTHR

In accordance with the [redacted] specification entitled, "Engineering Specification for [redacted] 490 Computer Input/Output System, PX2099," and dated May 8, 1962, we will be using one computer output cable. Specifically, the operation of the coordinatograph will require the use of 30 data lines, the OUTPUT ACKNOWLEDGE line and the OUTPUT DATA REQUEST line. We will not require the EXTERNAL FUNCTION line.

It is our understanding that each of the 32 interconnection channels comprise a separate twisted pair.

In order to design the coordinatograph input/output circuits we need the following information:

1. Will the 32 separate twisted pairs be enclosed in a single cable or will there be more than one cable?

2. What is the characteristic impedance of each twisted pair? (If the cable is a standard commercially available cable, it might help us to know the manufacturer's designation, so that we could determine any other characteristics should they be required.)

STATOTHR

███████████   -2-   4 January 1964

3. Could you please provide us with the cable connector ordering information so that we may purchase the mating connector.

4. Could you please provide us with the cable connector pin assignment list.

5. What range of common mode voltages can be expected to exist between any twisted pair and house ground?

6. It is our understanding that no two wires of any of the twisted pairs are to be common at the plotter and of the cable. Is this understanding correct? And in light of this question, how is paragraph 6.15 of the specification, referred to above, to be interpreted? Paragraph 6.1.5 states that,

> "The d-c resistance of the ground return for a cable shall not exceed 0.5 ohms"

What is supposed to be grounded? And which ground is meant: computer signal ground, computer chassis ground, or house ground?

As additional information, could you tell us whether or not one wire from each of the twisted pairs is common at the computer end of the cable.

7. In the specification referred to above, we find the following paragraphs:

STATOTHR

> Paragraph 6.2.3. "In the binary 'zero' state, an output circuit (located in the ████ computer or peripheral equipment) must be capable of supplying a minimum of 3 milliamperes to any one input circuit in another equipment."
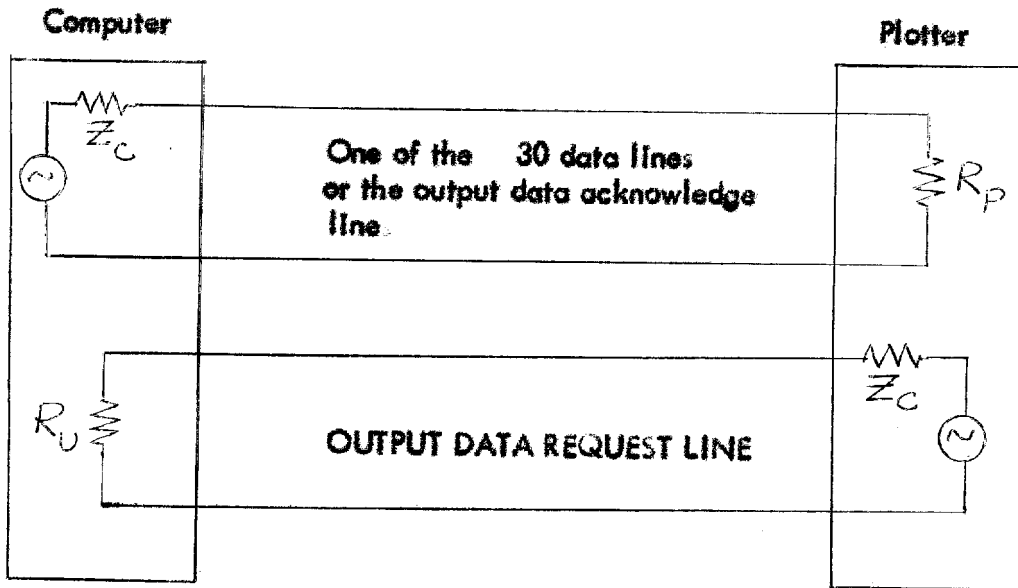
and,

> Paragraph 6.2.5. "The line must be terminated in its characteristic impedance so as to prevent reflection."

In the attempt to comply with the two requirements stated in the above paragraphs, which on the surface would seem to be contradictory, we suggest the following interconnection scheme:

Computer   Plotter

One of the   30 data lines
or the output data acknowledge
line

Z_C

R_p

R_U

OUTPUT DATA REQUEST LINE

Z_C

Z_C =   Characteristic impedance of a single twisted pair

R_p =   Input impedance of plotter input amplifier

STATOTHR

R_U =   Input impedance of ▮▮▮▮ input amplifier,
           (OUTPUT DATA REQUEST line)

It is our plan to design the input impedance of each of our 31 input data circuits (which will terminate the 30 data lines and the OUTPUT DATA ACKNOWLEDGE line), to be greater than 1,000 ohms so as to limit the current drawn from each of these 31 lines to less than 3 milliamperes. (Specifically, we intend to set R_p at approximately 3,000 ohms.)

Since the characteristic impedance of a line is undoubtedly lower than R_p there will be a reflection at the plotter end of the cable. However, if the output impedance of the computer output amplifier is matched to the line, as we are assuming that it will be, the reflection at the plotter end of the line will be of no consequence. Please indicate if this scheme is acceptable and/or if our understanding is correct.

Similarly, we would design the output impedance of our output amplifier which will excite the OUTPUT DATA REQUEST line to match the characteristic impedance of the line so that reflections from the computer terminal would be of no consequence.

In addition, we would design this amplifier so that the line-to-line impedance, i.e. the impedance from one wire to the other in a single twisted pair, would be greater than 100,000 ohms when the plotter is turned off, in accordance with paragraph 6.2.6. of the specification referred to above. Is this foregoing interpretation of paragraph 6.2.6. correct?

In connection with the scheme indicated above we have the following questions:

7.A.   What is the input impedance of the ▇▇▇ input amplifier? (i.e. the OUTPUT DATA REQUEST line input amplifier)   STATOTHR

7.B.   Are we correct in setting the line-to-line impedance at greater thab 100,000 ohms with power turned off or should we set the impedance from either line to ground at greater than 100,000 as indicated in paragraph 6.2.6., and if so, to which ground?

8.   As you indicated in a previous telephone conversation, the schematics of input and output amplifiers which are used to interface the computer and peripheral equipment to the cable are available from ▇▇▇▇▇▇ and that it is possible to purchase these amplifiers. Would you please send to us copies of these schematics along with the price and delivery information on the amplifiers.
                                                    STATOTHR

STATOTHR

                -5-   4 January 1964

STATOTHR

9. Upon receipt of the information requested above, and in particular, receipt of the schematics, we intend to send to ████ a schematic of our entire inter-connection scheme including the pertinent plotter input and output circuits. We will submit this interconnection scheme to ████ for approval so as to insure that the proposed scheme will permit satisfactory operation of the plotter with the computer.

STATOTHR

Yours very truly,

STATOTHR

JTB:P

Staff Engineer

STATOTHR

STATOTHR

STATOTHR

TRANSMITTAL SLIP | DATE 7 _w. 64_

TO: ▮▮▮▮▮▮▮

ROOM 4N

REMARKS:

We'll put ~~them~~ the interface question to the ▮▮▮ tech/rep & see what he says. Keep prodding us if you don't hear anything.

FROM ▮▮▮▮▮▮▮

ROOM N▮▮▮▮▮▮ | EXTENSION

FORM NO. 241
1 FEB 55 | REPLACES FORM 36-8 WHICH MAY BE USED. | GPO : 1957—O-439445 | (47)