F17.3.8 (misc.)

FORTRAN COMES TO WESTINGHOUSE-BETTIS, 1957

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It was late Friday afternoon, April 20, 1957. Ollie Swift, Lew Ondis, and I were standing in the hallway outside the 704 room, talking as usual about when we'd finally get rid of the 650, when along came the mail carrier with a box of cards from IBM.

Curious, I opened the package and found that the deck was binary, and that it just about filled the (2000 card) box. There were no identifying marks and no instructions of any kind in or with the box or in other mail received that day.

Lew estimated that the size of the deck was about the right order of magnitude to be the "late 1956" FORTRAN compiler. It occurred to me that, if we could make it work, this fact would make interesting news at SHARE. (There was to be a SHARE Meeting the following Monday, to which I was going as the WB — Westinghouse-Bettis Laboratory — representative.) Our head CE came by and agreed to let us have some maintenance time on the 704 free, if we wanted to try to make FORTRAN go.

Jim Callaghan had written a small test program in FORTRAN, using a recent report by Ollie as a basis for

4-20-57--715B

Fortran-GAMAT Code (used for initial trial of FORTRAN at Westinghouse-Bettis):

by O.F. SWIFT

Reference: WAPD-A1W(P)-82, dtd Mar. '56

Formula to be evaluated:

$$\Gamma(\tau) = \sum_{i=1}^{6} \frac{\gamma_i}{1+\lambda_i \tau}$$

Input data:
Ranges and increments of τ (8 each)
6 each values of γ_i, λ_i $(1 \le i \le 6)$

Notes on Gamma (Tau)

Figure 1. Notes on Gamma (Tau)

calculating "Gamma of Tau for the InHour Formula". (See Figure 1.) Lew commented that, if the FORTRAN group had its smarts, the compiler deck should be self-loading; why not try it and see? Ollie suggested a way to test the possibility: hang a full set of blank tapes (ten) and try to go in through the on-line reader. Of course, our 704 had the SHARE Standard Reader, Printer, and Punch Boards (remember?). IBM had started to use these and the SHARE Standard RPQ's. Incredible though it might seem today to those who were weaned on Systems, it just might be that we could fly the new compiler blind!

We mounted the blanks, saw that the on-line punch was stocked, loaded the first several inches of cards into the hopper, and pushed the commencer. The reader stuttered and a couple of tapes moved. We kept carding the hopper until all the cards had been put in. The DRUM WRITE light showed some action. After the last card had been fed, there was compute activity for several seconds, after which all of the tapes that had moved were rewound. The machine stopped, with the READY light on.

We then loaded Jim's FORTRAN source language deck, which didn't need input data other than that contained in the program, and again pushed READ CARDS. The deck chugged through. This time there was more tape motion, including a couple of tapes that hadn't moved before. The console lights came alive, and the on-line printer gave us four lines of output. (See Figure 2, which is a photograph of that output.) Below a heading, the printer had reproduced the source card containing Statement 25 followed by a startlingly explicit diagnostic, as follows:

```
05065 SOURCE PROGRAM ERROR.  THIS IS A
  TYPE -
GO TO (), I
- BUT THE RIGHT PARENTHESIS IS NOT
  FOLLOWED BY A COMMA
```

We looked. How true! We fixed Statement 25 and loaded Jim's source deck again.

This time the on-line punch muttered and its stacker grew a binary deck, which we placed in the on-line reader. Again, everything stopped with tapes rewound and READY on. Again, we pushed. Cards read. Rewound, stopped, READY on. Pushed.

We got a little whiff of computing followed by twenty-eight pages of output. (You ask: So what has changed?)

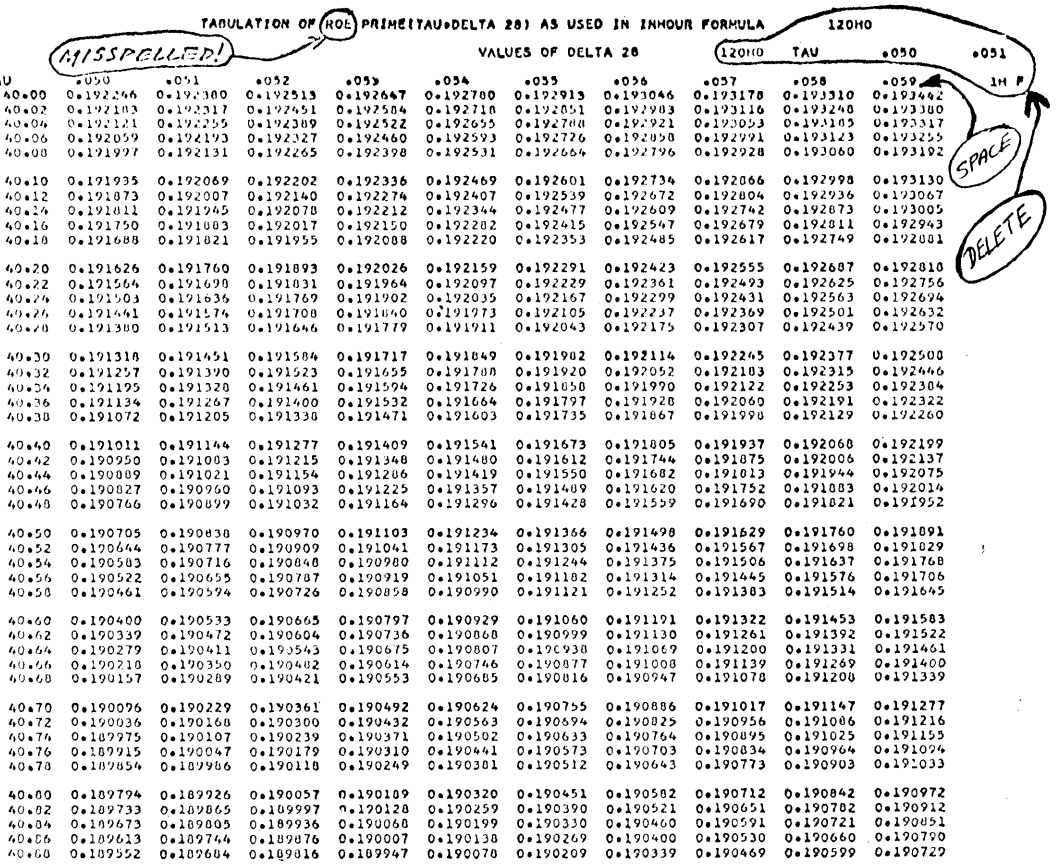
The first page of that output is reproduced here as Figure 3. You will note that it contains several FORMAT errors (no space below the column heads; the first column head displaced to the left; six items printed that should have been blind; and one word of the page heading (RHO) misspelled).

```
                    FORTRAN DIAGNOSTIC PROGRAM RESULTS

   25       GO TO (200,210,220,230,240,250,260,270,280,290,300,310,320,330)M
05065       SOURCE PROGRAM ERROR.  THIS IS A TYPE-GO TO ( ),I-BUT THE RIGHT PARENTHESIS IS NOT FOLLOWED BY A COMMA

                    END OF DIAGNOSTIC PROGRAM RESULTS
```

Figure 2. Gamma (Tau) Diagnostic Printout



TABULATION OF ROE PRIME(TAU,DELTA 28) AS USED IN INHOUR FORMULA 120HO

MISSPELLED!

VALUES OF DELTA 28

120HO TAU .050 .051

SPACE

DELETE

TAU	.050	.051	.052	.053	.054	.055	.056	.057	.058	.059	1H P
40.00	0.192246	0.192380	0.192513	0.192647	0.192780	0.192913	0.193046	0.193178	0.193310	0.193442	
40.02	0.192183	0.192317	0.192451	0.192584	0.192718	0.192851	0.192983	0.193116	0.193248	0.193380	
40.04	0.192121	0.192255	0.192389	0.192522	0.192655	0.192788	0.192921	0.193053	0.193185	0.193317	
40.06	0.192059	0.192193	0.192327	0.192460	0.192593	0.192726	0.192858	0.192991	0.193123	0.193255	
40.08	0.191997	0.192131	0.192265	0.192398	0.192531	0.192664	0.192796	0.192928	0.193060	0.193192	
40.10	0.191935	0.192069	0.192202	0.192336	0.192469	0.192601	0.192734	0.192866	0.192998	0.193130	
40.12	0.191873	0.192007	0.192140	0.192274	0.192407	0.192539	0.192672	0.192804	0.192936	0.193067	
40.14	0.191811	0.191945	0.192078	0.192212	0.192344	0.192477	0.192609	0.192742	0.192873	0.193005	
40.16	0.191750	0.191883	0.192017	0.192150	0.192282	0.192415	0.192547	0.192679	0.192811	0.192943	
40.18	0.191688	0.191821	0.191955	0.192088	0.192220	0.192353	0.192485	0.192617	0.192749	0.192881	
40.20	0.191626	0.191760	0.191893	0.192026	0.192159	0.192291	0.192423	0.192555	0.192687	0.192818	
40.22	0.191564	0.191698	0.191831	0.191964	0.192097	0.192229	0.192361	0.192493	0.192625	0.192756	
40.24	0.191503	0.191636	0.191769	0.191902	0.192035	0.192167	0.192299	0.192431	0.192563	0.192694	
40.26	0.191441	0.191574	0.191708	0.191840	0.191973	0.192105	0.192237	0.192369	0.192501	0.192632	
40.28	0.191380	0.191513	0.191646	0.191779	0.191911	0.192043	0.192175	0.192307	0.192439	0.192570	
40.30	0.191318	0.191451	0.191584	0.191717	0.191849	0.191982	0.192114	0.192245	0.192377	0.192508	
40.32	0.191257	0.191390	0.191523	0.191655	0.191788	0.191920	0.192052	0.192183	0.192315	0.192446	
40.34	0.191195	0.191328	0.191461	0.191594	0.191726	0.191858	0.191990	0.192122	0.192253	0.192384	
40.36	0.191134	0.191267	0.191400	0.191532	0.191664	0.191797	0.191928	0.192060	0.192191	0.192322	
40.38	0.191072	0.191205	0.191338	0.191471	0.191603	0.191735	0.191867	0.191998	0.192129	0.192260	
40.40	0.191011	0.191144	0.191277	0.191409	0.191541	0.191673	0.191805	0.191937	0.192068	0.192199	
40.42	0.190950	0.191083	0.191215	0.191348	0.191480	0.191612	0.191744	0.191875	0.192006	0.192137	
40.44	0.190889	0.191021	0.191154	0.191286	0.191419	0.191550	0.191682	0.191813	0.191944	0.192075	
40.46	0.190827	0.190960	0.191093	0.191225	0.191357	0.191489	0.191620	0.191752	0.191883	0.192014	
40.48	0.190766	0.190899	0.191032	0.191164	0.191296	0.191428	0.191559	0.191690	0.191821	0.191952	
40.50	0.190705	0.190838	0.190970	0.191103	0.191234	0.191366	0.191498	0.191629	0.191760	0.191891	
40.52	0.190644	0.190777	0.190909	0.191041	0.191173	0.191305	0.191436	0.191567	0.191698	0.191829	
40.54	0.190583	0.190716	0.190848	0.190980	0.191112	0.191244	0.191375	0.191506	0.191637	0.191768	
40.56	0.190522	0.190655	0.190787	0.190919	0.191051	0.191182	0.191314	0.191445	0.191576	0.191706	
40.58	0.190461	0.190594	0.190726	0.190858	0.190990	0.191121	0.191252	0.191383	0.191514	0.191645	
40.60	0.190400	0.190533	0.190665	0.190797	0.190929	0.191060	0.191191	0.191322	0.191453	0.191583	
40.62	0.190339	0.190472	0.190604	0.190736	0.190868	0.190999	0.191130	0.191261	0.191392	0.191522	
40.64	0.190279	0.190411	0.190543	0.190675	0.190807	0.190938	0.191069	0.191200	0.191331	0.191461	
40.66	0.190218	0.190350	0.190482	0.190614	0.190746	0.190877	0.191008	0.191139	0.191269	0.191400	
40.68	0.190157	0.190289	0.190421	0.190553	0.190685	0.190816	0.190947	0.191078	0.191208	0.191339	
40.70	0.190096	0.190229	0.190361	0.190492	0.190624	0.190755	0.190886	0.191017	0.191147	0.191277	
40.72	0.190036	0.190168	0.190300	0.190432	0.190563	0.190694	0.190825	0.190956	0.191086	0.191216	
40.74	0.189975	0.190107	0.190239	0.190371	0.190502	0.190633	0.190764	0.190895	0.191025	0.191155	
40.76	0.189915	0.190047	0.190179	0.190310	0.190441	0.190573	0.190703	0.190834	0.190964	0.191094	
40.78	0.189854	0.189986	0.190118	0.190249	0.190381	0.190512	0.190643	0.190773	0.190903	0.191033	
40.80	0.189794	0.189926	0.190057	0.190189	0.190320	0.190451	0.190582	0.190712	0.190842	0.190972	
40.82	0.189733	0.189865	0.189997	0.190128	0.190259	0.190390	0.190521	0.190651	0.190782	0.190912	
40.84	0.189673	0.189805	0.189936	0.190068	0.190199	0.190330	0.190460	0.190591	0.190721	0.190851	
40.86	0.189613	0.189744	0.189876	0.190007	0.190138	0.190269	0.190400	0.190530	0.190660	0.190790	
40.88	0.189552	0.189684	0.189816	0.189947	0.190078	0.190209	0.190339	0.190469	0.190599	0.190729	

Figure 3. Gamma (Tau) Output – Page 1 of 28

But the numbers were right. The numbers were right!

WB had become a FORTRAN user.

Postlude: Thanks to the hard-working Bettis photographer, who rose to the challenge and made projection slides for me over that weekend, I was able to share the above experience with SHARE. It created quite a stir. No one arose to claim precedence.

I'm sure that other SHARE installations, including especially UA (United Aircraft Research) and RL (University of California Radiation Laboratory), which had participated in the creation of the first distributable FORTRAN compiler, must have had successful FORTRAN experiences on site before WB, which was merely a user ... but it's hard for me to imagine that any of those sophisticates experienced the combination of innocence, ignorance, and exhilarating success that we felt that Friday in 1957. A couple of hundred compiler fixes down the road, it was hard to believe it had happened.

So, to John Backus and the rest of the thirteen Merry Men* of FORTRAN, thirteen years later: Thanks! Your first FORTRAN Compiler loaded, compiled, diagnosed; its object code loaded, executed (correctly!), and printed out (complete with our FORMAT errors).

Computing would never be the same.

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*R. J. Beeber, S. Best, R. Goldberg, H. L. Herrick, R. A. Hughes, L. B. Mitchell, R. A. Nelson, R. Nutt, D. Sayre, P. B. Sheridan, H. Stern, I. Ziller

F/7.3.Misc

COMPLAN

COMPUTATION PLANNING, Inc., ● 7840 Aberdeen Road Bethesda, Md. 20014 ● (301) 654-1800

February 8, 1978

Prof. John A. N. Lee
Language Research Laboratory
Department of Computer Science
VPI
Blacksburg, VA 24061

Dear JAN:

As promised, I enclose a copy of my recent letter to John Backus and of my enclosed FORTRAN yarn.

After your call I've been warming up a bit to the idea of attending that meeting. Truth to tell, it's hard to think of spending three days praying over the history of anything; but I'm beginning to think that this session may be substantive. I'd now change my odds of attending from 3:2 "no" to 3:2 "yes".

Part of my change came from a chat with Herb Grosch later yesterday. Herb explained that the contention between him and others seemed to be over the question of substance: his antagonists evidently were convinced he wanted to change a technical conference into a convention. He assures me that the meeting can and should be useful as opposed to merely entertaining, even though he'd like to see it flavored by some smatterings of personal elements of history.

I don't see how John can mention the Bettis incident without pandering to Herb's evil urge and consequently offending the scholars. The Bettis exercise was the Friday night before a SHARE meeting. I assume that many who heard my talk the next week, with the slides shown in the C&A yarn, went back from the meeting and immediately did more meaningful things with FORTRAN. Thus, mere precedence and the crazy idea of flying a strange deck blind (and ignorant!) wouldn't seem to qualify as history.

As we agreed, there may be a real message in that diagnostic slide. It was so specific and understandable, without reference to incorrect manuals, that all diagnostics since seem inadequate. I wonder whether that elegant system-to-user communication, characteristic of "FORTRAN Zero", didn't contribute to the instant acceptance of the new language and concepts: people certainly must have found that aspect of the mechanics painless. If they were thus encouraged to look at the substance of their problems rather than being distracted by difficulties with grammar and form, surely their progress must have been better than expected. Because I'm convinced that most marketing and acceptance of new ideas/methods are exercises in psychology rather than the analytical decisionmaking we profess, I feel that the message may be important.

Incidentally, if the Bettis incident does get mentioned in John's talk, I assume he'll point out that my only participation was as a kibitzer. It was Jim Callahan's program, ~~Ed~~ Law Ondis's idea to fly the the binary deck blind, and Ollie Swift's virtuosity with the 704 (with the SHARE hardware RPQ's) that did the deed. I was just the addressee for the unmarked deck and the guy they reported to.

Copy to:
John Backus (w/o encl.)
Herb Grosch (w/o encl.)
Jean Sammet (w/encl.)

Best regards,

Herb

Herbert S. Bright

Enclosures:
My 2/2/78 letter to John Backus
C&A 11/71 pp 17-18, "FORTRAN Comes to Westinghouse-Bettis"

F/7.3.Misc

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COMPUTATION PLANNING, Inc., ● 7840 Aberdeen Road Bethesda, Md. 20014 ● (301) 654-1800

February 2, 1978

Mr. John Backus
91 St. Germain Avenue
San Francisco, California 94114 415-545-3052

Dear John:

It was a pleasure to hear your voice again. In response to your telephoned request I am delighted to share with you some reminisciences about the April 20, 1957 blind flight of FORTRAN. Ollie Swift and Lew Ondis did the work on the 704, with Jim Callaghan's FORTRAN source deck performing a calculation from a report written by Ollie.

I found fascinating your remark about a disagreement with Dav Sayre about whether binary decks should be distributed. One of them worked.

Presumably no one but you and Herb Grosch would care about such trivialities as this story relates, and of course if you mention them in your talk Jean will turn off your microphone. One of the few things Herb and I would ever agree on is that human aspects of computing archeology should not be totally overlooked while we dig for architects' specifications.

I didn't mention in my C&A yarn, but you should know, that of course we had seen the results of earlier work on BACAIC (by Mandy Grems, I believe, when she worked for Randy Porter pre-704), but that was merely a distant view of what others had done. With FORTRAN Zero, it was our hands, our machine, our language!

Here's a semi-legible copy of the original story. The slides still haven't been fixed, but if you want 'em we can do it. Please let me know.

I have checked. The story is true.

Best regards,

HSB/par Herbert S. Bright

Enclosure:
Copy of story, "FORTRAN Comes to Westinghouse-Bettis, 1957", Computers & Automation November 1971 (but page footings incorrectly printed "October 1971"), pages 17-18