

INTERDEPARTMENTAL

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from the office of

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TO: J. M. Grochow
FROM: J. H. Saltzer
SUBJECT: A general strategy for equipping GIOC's with typewriter channels

It would appear that there is a fairly simple, low cost, and straightforward strategy for equipping the Multics GIOC's with typewriter channels to achieve most of the reliability available from a duplex installation, but without the cost configuring two GIOC's for the full Multics load and also without the cost of a special telephone line switch.

The general strategy is to equip each GIOC to handle the Telecommunications load of a 1 CPU, 256K Multics, and plan to use both GIOC's when running with 2 CPU's and 384K. If a GIOC fails, this scheme permits essentially the same "degraded" level of performance as when a CPU or memory controller fails. It has the further advantage that it can be achieved without the large expense required to gear up two GIOC's so that either one alone could handle the full load of a 2 CPU, 384K system (the ability to run a 2 CPU, 384K system with 1 GIOC is not quite as important as it might appear, since if one of the GIOC's fails, there is no way to test and repair it without borrowing a processor and a memory from the main system, which would lower capacity to that handleable by the one remaining GIOC.)

In detail, one would do the following:

1. Make appropriate changes to Multics GIOC software to allow it to drive two GIOC's at once, if they are both available. Since the software in question is fairly well organized, this change is not difficult, but it will require a GIOC specialist.
2. Plan an appropriate level of Telecommunications support for the small and large configurations. For the duration of 1970, it would be appropriate to prepare for 40 users on 1 CPU, 1 GIOC, and 256K. The 2 CPU, 2 GIOC configuration would then be capable of supporting 80 simultaneous dialed-up lines, probably 10 more than absolutely necessary.
3. Divide 7-level and 8-level datasets into two equal-size groups, each group to be permanently cabled to one of the GIOC's. When the full configuration is up, both GIOC's are running and all lines are being monitored. When a small configuration is to be used, the reconfiguration must include an extra step, namely busying out all telephone lines which come from levels 7 and 8 and which are cabled to the GIOC being removed. If an appropriate pattern of division is chosen, a calling party will hunt past any busy lines, and seize one of the non-busy lines attached to the still operating GIOC. (Note that this plan of usage must be taken into account when grading level 7 and 8).
4. Since the General Electric Company CISL Data lines use 103A rather than 103E datasets, they can be made busy only by taking them off-hook, which ties up CISL Telephone switching equipment. CISL may wish to increase the number of lines to 12 or 16, half to be attached to each GIOC, and give their customers two numbers to dial instead.

Figure 1 shows a recommended configuration. It is probable that this configuration is actually cheaper than the presently planned configuration of one full GIOC and one stripped down GIOC, since it makes better use of the TTY and ARDS adapters in the second GIOC.

The extension of this plan to 110 baud and 300 baud adapters is straightforward, though one might wish to try a variation in which GIOC A has the 110 baud lines and GIOC B has the 300 baud lines. Degraded service would then mean no service at all for one or the other categories of line speed.

Your comments on this plan, or suggested variations, are invited.

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Proposed GIOC/Telephone line configuration

