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2nd January, 1985

Declassified by ASD - 04/02/2022
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Dear ,

RE : TECHWAY DRAWINGS - COMMENTS

Electrical Drawings

Ref Drawings :

V84/347-406
V84/347-401/1
V84/374-405
V84/347-404
V84/374-407
V84/374-411

General

1. There appears to have been a misunderstanding on the on the purpose of the Manual Changeover Link Box.

The relevant factors are as follows :

- 1.1 For a Cray X-MP/1 6 column mainframe system, the normal configuration of 2 400 Hz MG sets is as shown in -

Cray Site Planning Reference Manual HR-0084,
Figure 2-3.
('Wire diagram X-MP 11,12,14' provided earlier).

Drawing UP4013 - Diagram Power Distribution
Cray X-MP/12300-2 (Techway).

- 1.2 As indicated in the above documents, a second 400 Hz MG set is installed to act as a 'Standby' machine. Interconnecting cables and controls are fitted so that the 'Standby' MG can be run in place of (not as well as) the normal MG. No more cabling than that shown in the above documents is necessary.

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- 1.3 In this configuration 400 Hz power is always routed through the normal (No. 1) MG. This means that some repair/maintenance work on the Normal MG could be inhibited when the system is running because of the presence of 400 Hz power. Such work would be conducted during scheduled maintenance periods; in the meantime the system would continue to run.
- 1.4 For a 12 column mainframe X-MP system (earlier X-MP/2 or later X-MP/4), 3 400 Hz MG sets are normally fitted; 2 sets running and the third acting as 'Standby' for either of the other two.

Typical cabling for this is shown in :

Cray Site Planning Reference Manual HR-0028 Figure 2-3.

Cray Site Planning Reference Manual HR-0025 Figure 2-5.

- 1.5 Because of lack of space on site, it was decided to run such a system with only 2 400 Hz MG's, no 'Standby' machine. In this case, any MG failure would mean 'system down'.
- 1.6 For the above system (12 column mainframe) 400 Hz power distribution requires :
- 2 400 Hz Computer Room Breaker Panels
 - (1 only required for 6 column system)
 - 2 400 Hz cable runs from MGs to Computer Room.

My understanding of the reasons for the introduction of a Manual Changeover Link Box are as follows :

- 1.7 For a 6 column mainframe system Site Operations and Maintenance Staff wished to eliminate the use of a scheduled maintenance period to repair any fault on the Normal MG set. For this reason they proposed a changeover switch to route 400 Hz power from either MG to the Computer Room Breaker Panel. (It is of course understood that the 400 Hz cables will be filtered at the secure perimeter).
- 1.8 I opposed the use of a changeover switch for the following reasons :
- 400 Hz power can produce overheating in switchgear, not seen at lower frequencies. We have experienced such problems.
 - Most manufacturers of switchgear have little experience with 400 Hz power and an untested configuration could produce unpredictable effects.
 - Any added contacts add to voltage losses (greater at 400 Hz).

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- The standard Cray system of change to 'Standby' has been tested and proven in the field.
- Remote MG control cabling would be complicated.
- We wish to maintain standard configurations for the sake of Cray Maintenance Engineer familiarity, wherever possible.
- I do not know of any case of a Cray system being 'down' because of failure of two MGs at the same time.

1.9 A compromise agreement was reached - to fit a Manual Changeover Link Box instead of a switch, as well as the standard internal changeover features and cabling. Diagram 'A' (attached) shows this.

In the case of a failure of MG 1, MG 2 would be powered on and connected to the Computer Room Breaker Panel via MG 1. At a convenient time, the connection of MG 2 could be made via the Changeover Link Box to allow work to be done on MG 1 with the system powered on.

Diagram 'B' shows this.

1.10 To allow for the possible installation of a Cray X-MP with 12 column mainframe, a second 400 Hz cable run from the Manual Changeover Link Box to a second Computer Room Breaker Panel is to be fitted - as shown in Diagram 'C'. Both MGs would normally be running.

1.11 A third option is the installation of a second X-MP/1 (6 column) after the initial X-MP/1. The same configuration as Diagram 'C' would be suitable for this.

1.12 In the case of a 12 column mainframe as in '1.10', there is the possibility of running a limited system from one MG only (for example - SSD switched off). The usefulness of this would depend on power consumptions of the installed system and the system software.

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2. Drawing V84/347-406

See notes in red on enclosed copy. Where no comment, assume agreement.

Question What is MIMS-PVC cable?
(Mineral Insulated ? at 240 sq mm ?).

3. Drawing V84/374-405

The Pirelli 7 core cable colours are red, yellow, blue and black (neutral). I do not know where the 'white' came from. (Misguided patriotism ?).

4. Drawing V84/347-401/1

Same as in Section 1 and 2 above.

5. Drawing V84/347-404

Ref. the 400 Hz Breaker Panels.

If a 12 column X-MP is installed 6 x 125A circuit breakers may be required.

I presume that the 500A Shunt Trip Circuit Breakers are for an E.P.O. circuit. In general, we try to keep components in the 400 Hz power circuits to a minimum, but I accept that these circuit breakers may be necessary (though 400 Hz power could be removed via the Cray PDU).

6. Drawing V84/374-407

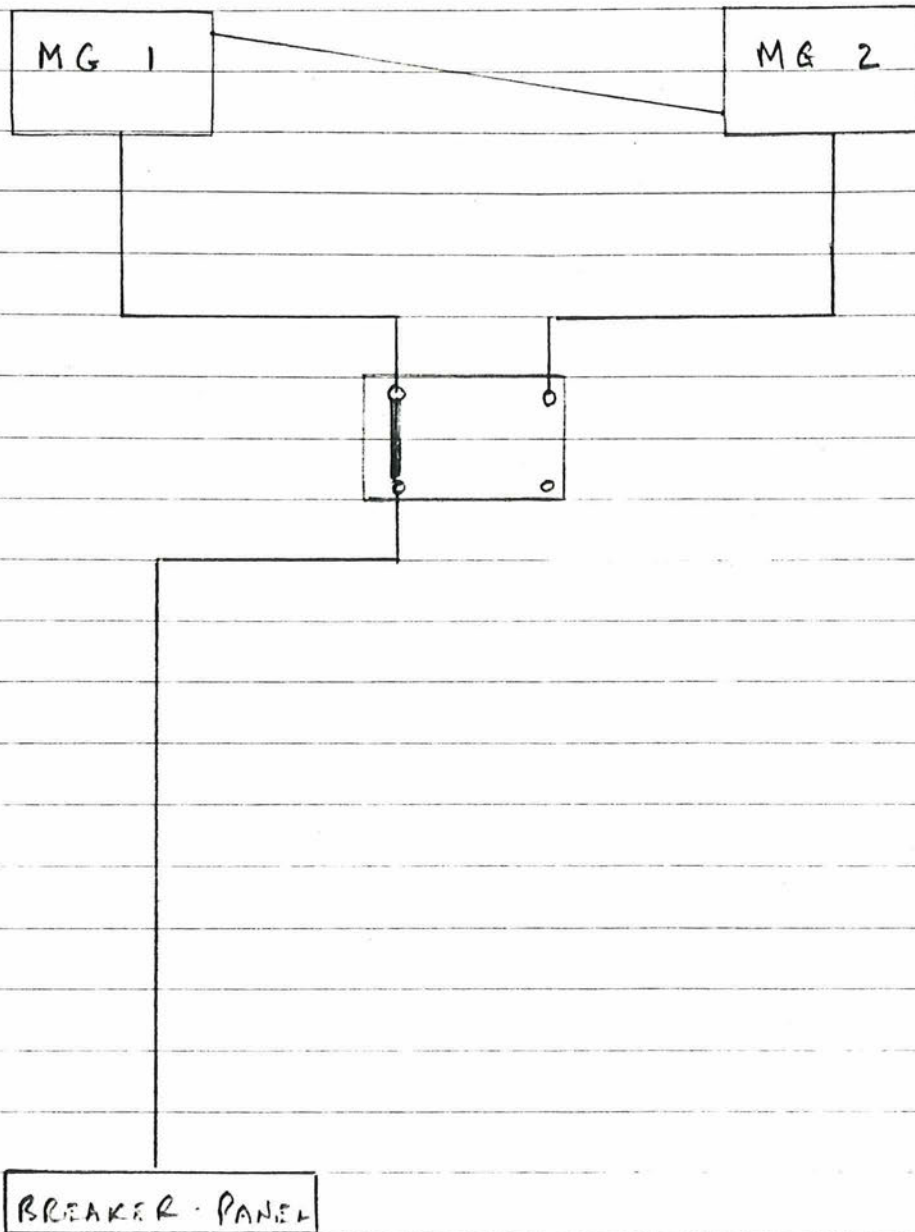
See Section 1 above.

Yours sincerely,
for CRAY RESEARCH (UK) LIMITED

INSTALLATION ENGINEER

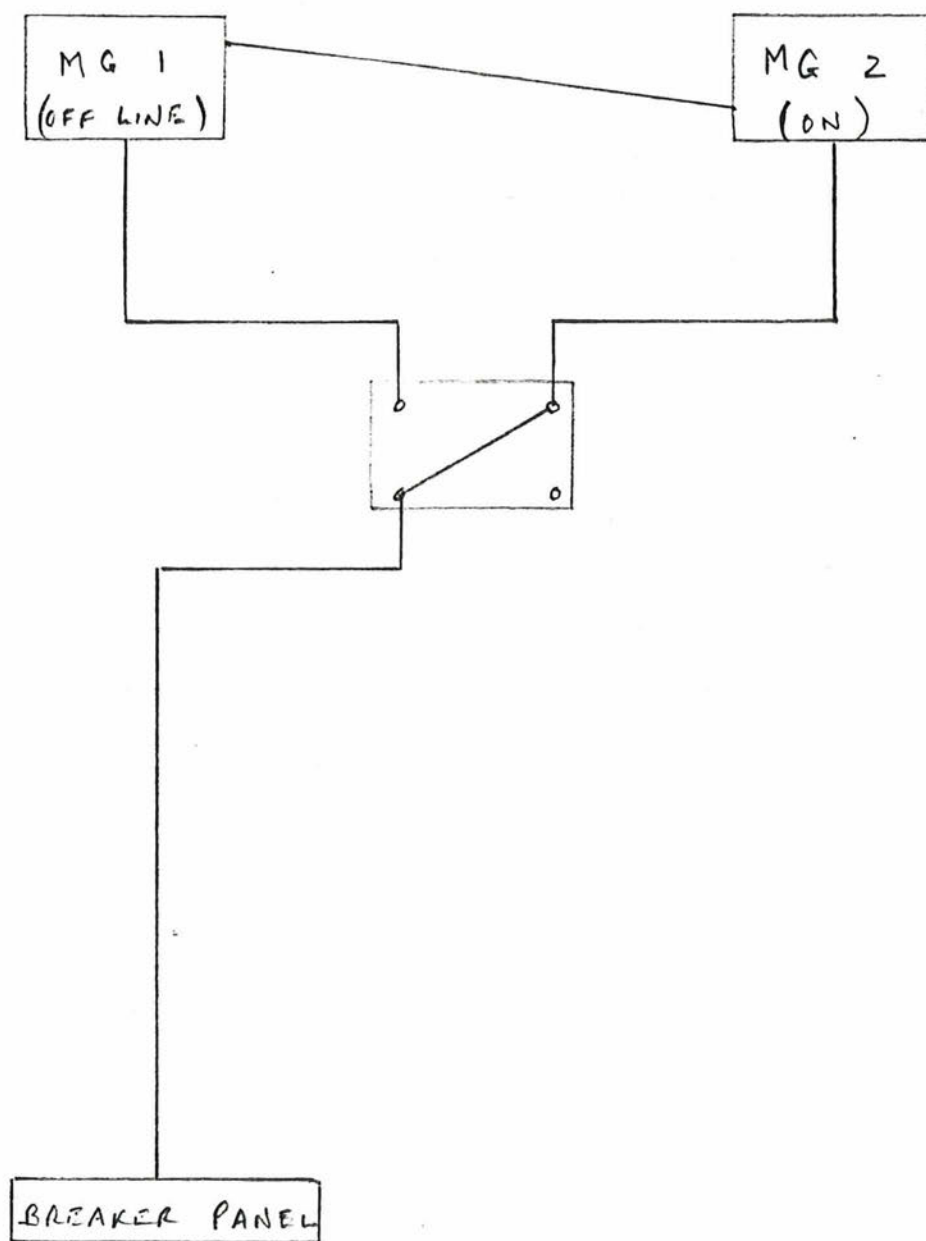
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DIAGRAM A



NOTE :

MG 1 PROVIDES POWER
OR MG 2 PROVIDES POWER VIA MG 1

DIAGRAM BNOTE :

MG 2 PROVIDES POWER
MG 1 CAN HAVE MAINTENANCE WORK DONE
AT THE SAME TIME.

DIAGRAM C

