

STANDARDS BULLETIN No. : S1-046

SUBJECT : HV EDO FUSE FAULT RATING

INTRODUCTION

With applications involving higher than 6 kA fault levels in Urban areas, a need has arisen to review the use of EDO's (expulsion dropout fuses) in these cases. Up until now any application involving areas of higher 6 kA fault level required the use of powder filled fuse (drawing S1-1-6-6 items, 4, 5, and 6) which are much more expensive than EDO's and reasonably difficult to operate due to their large mass. In future the store will hold stock of the new V series EDO assembly together with arc shortening rods which are fully rated up to 8 kA and rated for one shot up to 12 kA. The arc shortening rod is a feature of the fuse which enables the interruption of the fault to be carried out in a different part of the tube. The internal diameter of the EDO tube varies twice along its length. The arc shortening rod has the effect of pushing the fuse element further down into the tube ensuring that any arcing and gas production resulting from a fault interruption is carried out in the larger diameter region of the tube. This allows the fuse to be capable of handling fault levels up to 12 kA.

The new V series fuse assemblies will be rated at 22 kV with a 150 kV basic impulse level.

In addition to the purchase of the new V series EDO with arc-shortening rod, the standard of fuse element has been upgraded to specify sparkless, type AK1 in accordance with AS 1033.1-1990. The sparkless fuse element is surrounded by its own independent expulsion tube there by allowing low fault levels to be cleared quite successfully without discharging arc products.

MAJOR CENTRES:- 11KV

In the 6 kA to 12 kA range the new V series EDO with arc shortening rod must be used. The V series EDO with arc shortening rod can only be used with a sparkless fuse element. In the 8 kA to 12 kA range it is essential that a full inspection of the fuse tube and contacts and the EDO assembly in general is made to ascertain if parts need replacing before returning the assembly to service. By introducing the arc shortening rod feature, which will cater for up to 12 kA fault level, there will be very few cases requiring the use of powder filled fuses, which was the original intended usage for this type of fuse.

It will be necessary to identify all existing locations where the prospective fault level is from 8 kA to 12 kA and retro fit the existing EDO assemblies with the new V series with arc shortening rods.

The current stocks of fuse elements which are non-sparkless will not be re-ordered in future. However to use up existing stock the non-sparkless fuse element is still to be used in applications of fault levels between 0-6 kA and in the Urban areas only ie Darwin, Alice Springs, Katherine & Tennant Creek. The **non-sparkless fuse elements** can only be used in EDO assemblies that do not have an arc shortening rod incorporated.

MINOR CENTRES

In remote communities the use of the non-sparkless fuse elements is to be discontinued and **all** existing stocks of spare non-sparkless fuse elements are to be replaced with the new sparkless fuse elements. These non-sparkless fuse elements can be used in Urban areas up to 6 kA. All new and replacement installations in remote communities must incorporate the new sparkless fuse elements.

For any new installations the V series fuse assembly with arc shortening rod must be used. The new standard fuse element, ie sparkless, type AK1 is the only element that can be used with arc shortening rod, as it has a removable button head incorporated to enable the element to be screwed into the bottom of the arc shortening rod. The old type of fuse element, non-sparkless, cannot be used with arc shortening rod as the button head is not removable.

22KV AREAS

In all new and replacement 22 kV rural applications only the new sparkless fuse element is to be used regardless of the type of EDO assembly installed. In 22 kV Urban areas (Alice Springs and Tennant Creek townships) where the fire risk would be small, stocks of existing non-sparkless fuse elements should be used up. For all new installations the new V series EDO assembly with arc shortening rods can only be used requiring the use of sparkless fuse elements only.

As a summary to what has been discussed above and to enable the correct choice of fuse element and fuse assembly to use refer to the attached flow chart which should cover all applications in the Northern Territory. If you require further assistance then do not hesitate to contact the Standards Branch for an interpretation of your particular case.

FAULT LEVELS

The attached curves developed by the Protection Engineer will provide the fault level of a particular installation. These curves are based on system normal conditions and will be updated as necessary. As can be seen there are very few cases of above 12 kA fault level on our overhead line feeders exiting zone substations, and hence the use of powder filled fuses will be rare. It is also worth bearing in mind that the majority of faults seen by the fuses protecting distribution transformers will be at a level less than the system fault level calculated for that particular site. This is because most of the faults will be for internal transformer faults or low voltage faults where considerable impedance will be added to the source impedance to reduce the fault level markedly. However in the event of a surge arrester failure the full system fault level may be seen by the HV fuse. This is considered to be a rare incident.

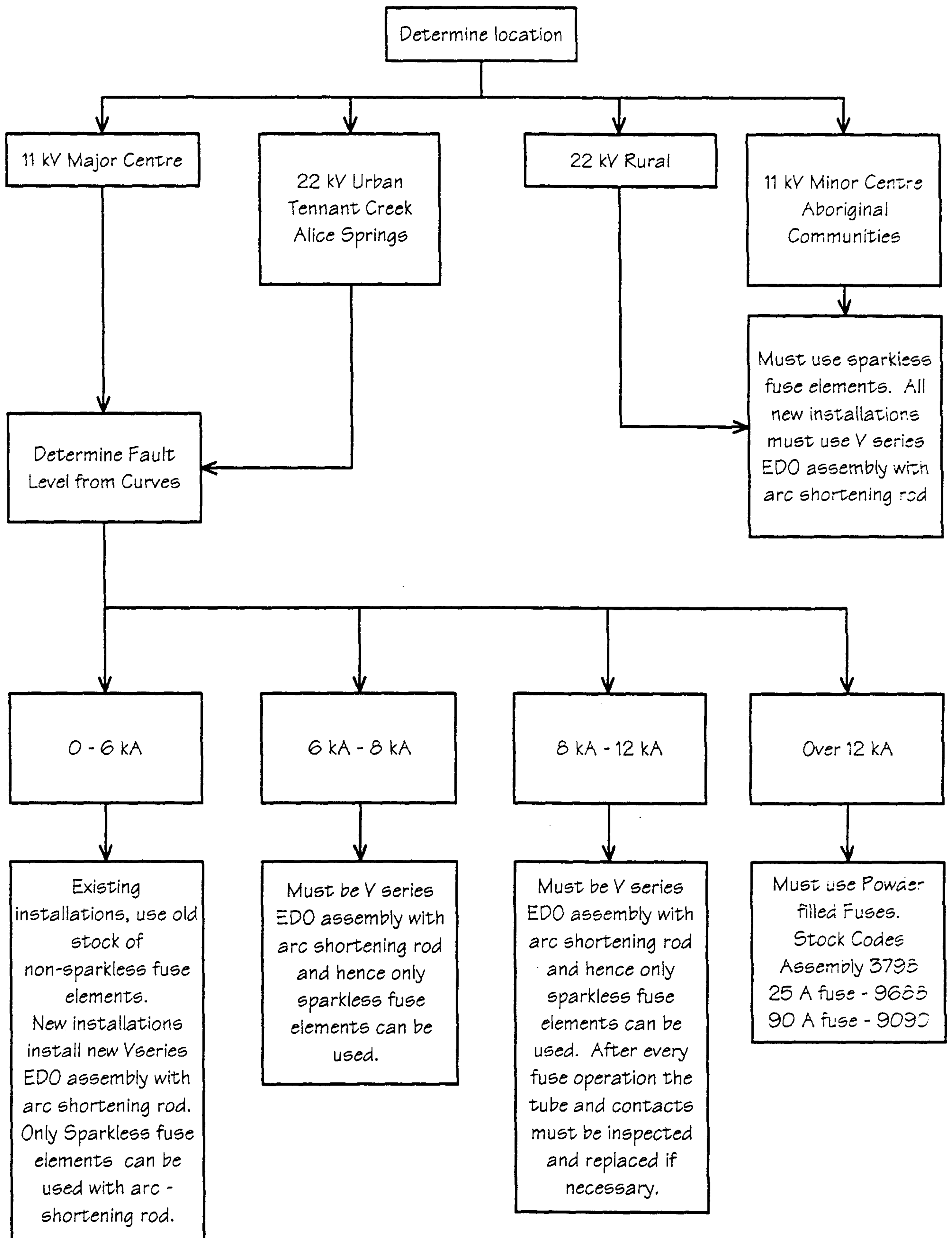
STOCK CODES

Stock Codes for sparkless fuse elements are as follows:-

Rating	Stock Code
5	187765
8	187773
10	187781
15	255810
20	255828
25	255836
31.5	255844
40	255851
50	255869
63	255877
80	255885

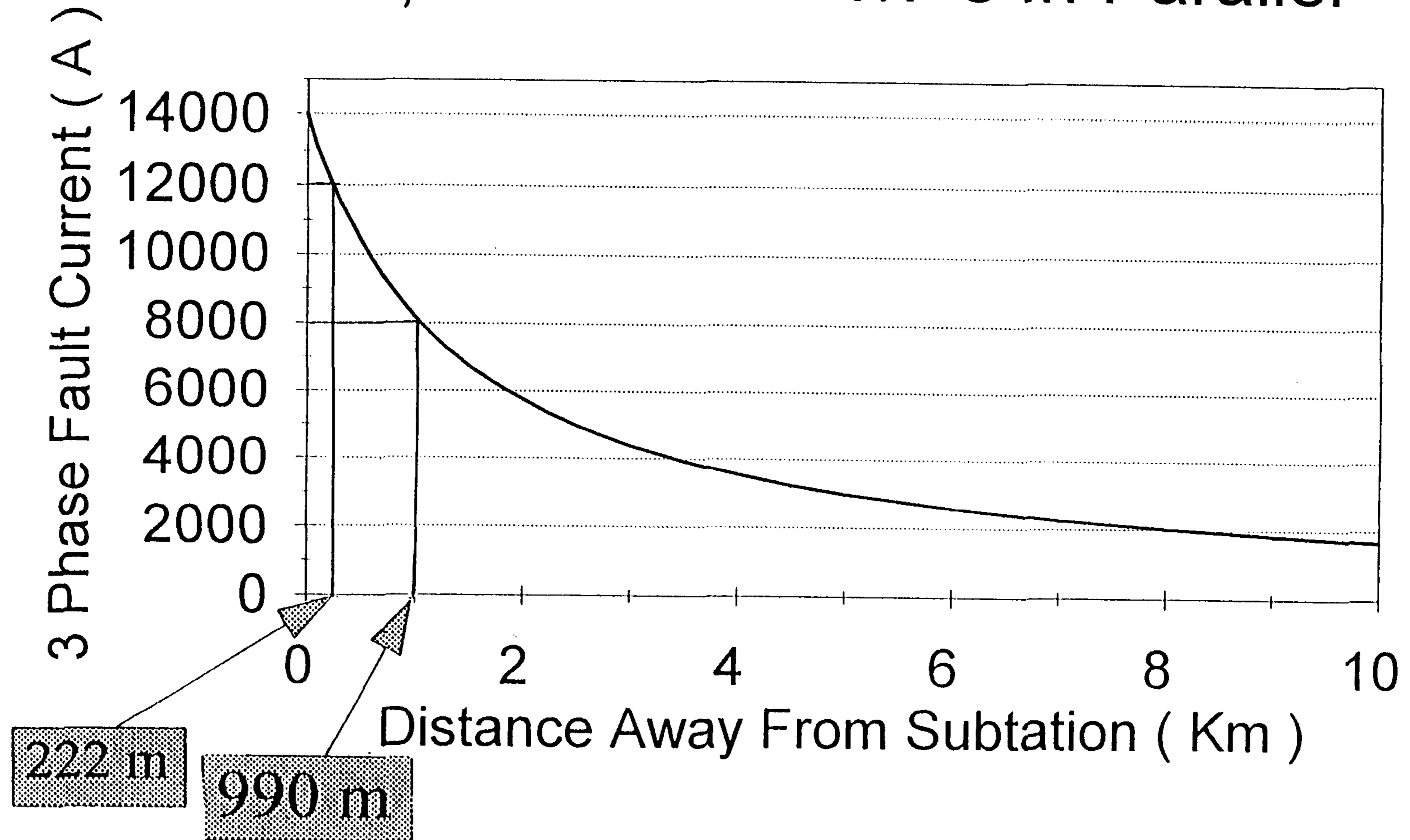


BRIAN KENT
STANDARDS MANAGER POWER



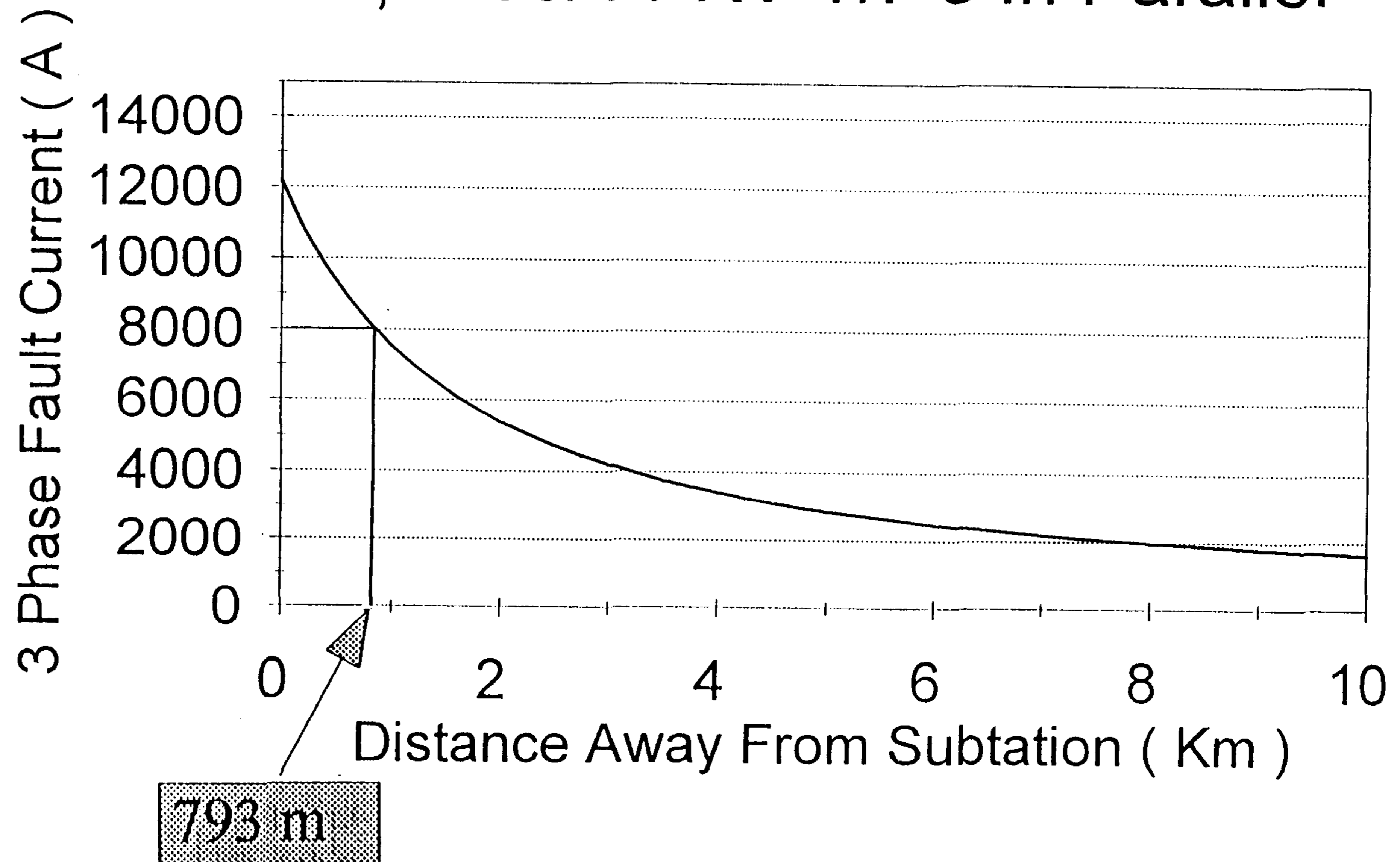
City Zone 11 KV Substation

Max.Gen, 2*66/11 KV T/F's In Parallel



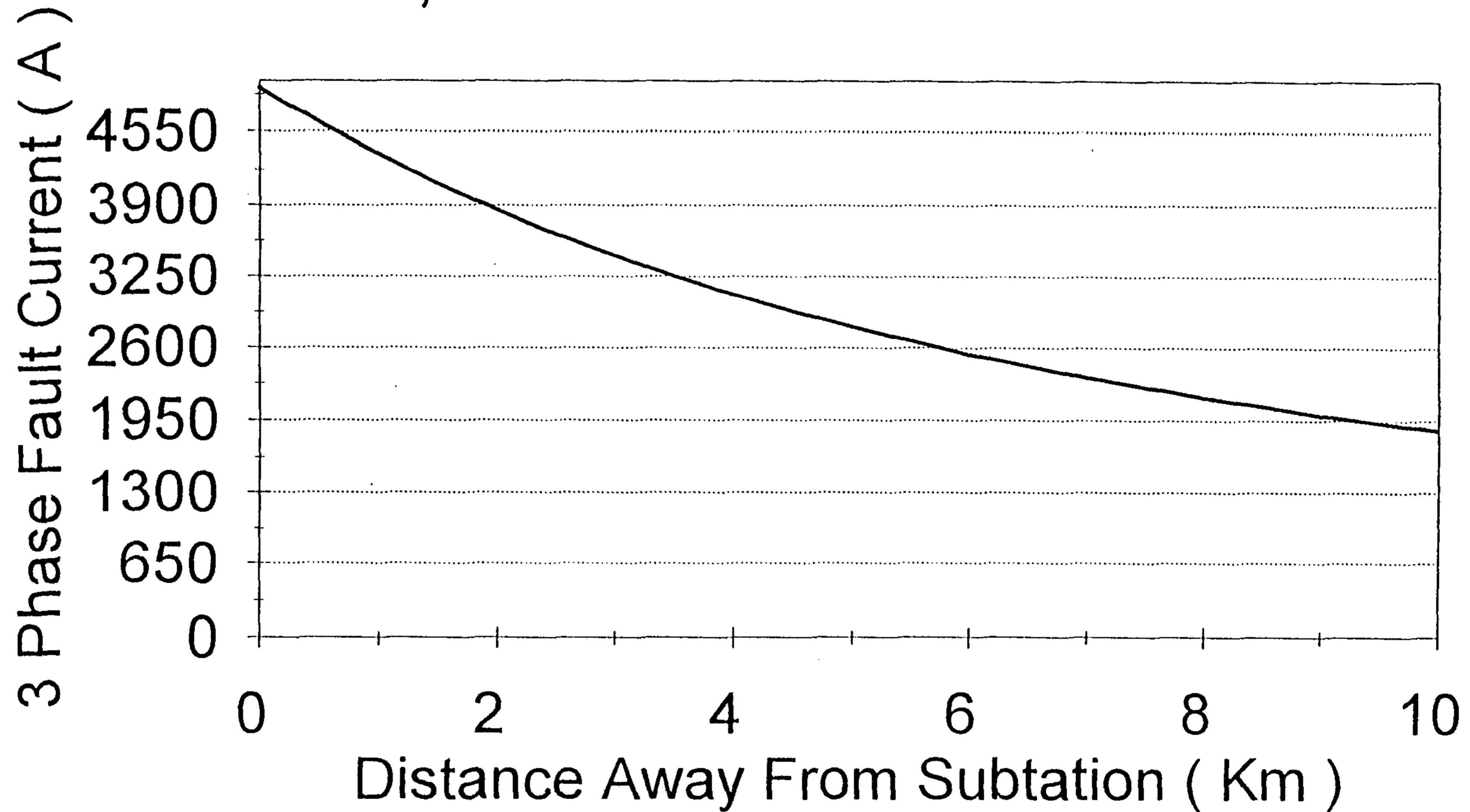
Snell ST 11 KV Substation

Max.Gen, 3*66/11 KV T/F's In Parallel



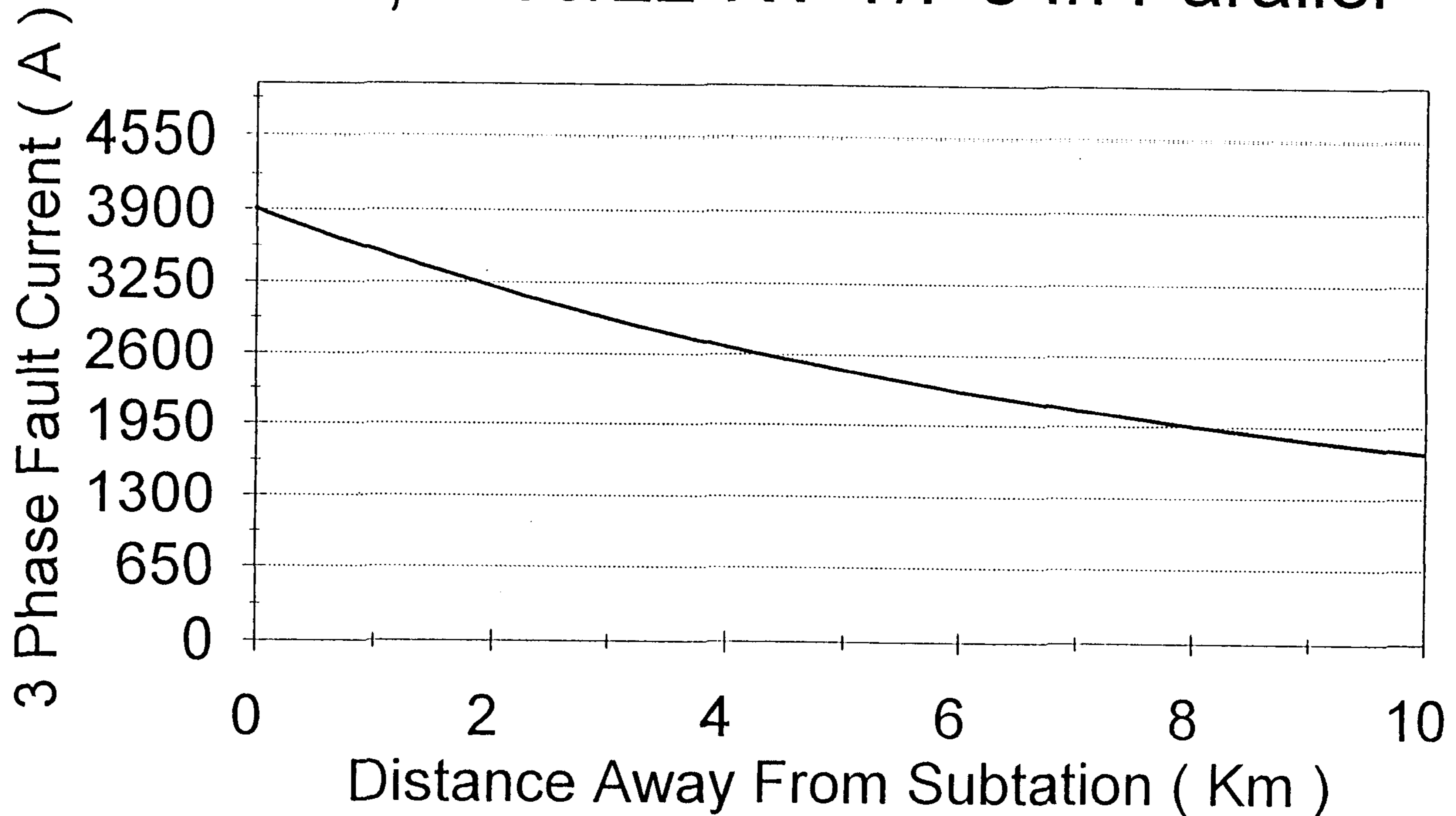
Manton 22 KV Substation

Max.Gen, 1*66/22 KV T/F In Parallel



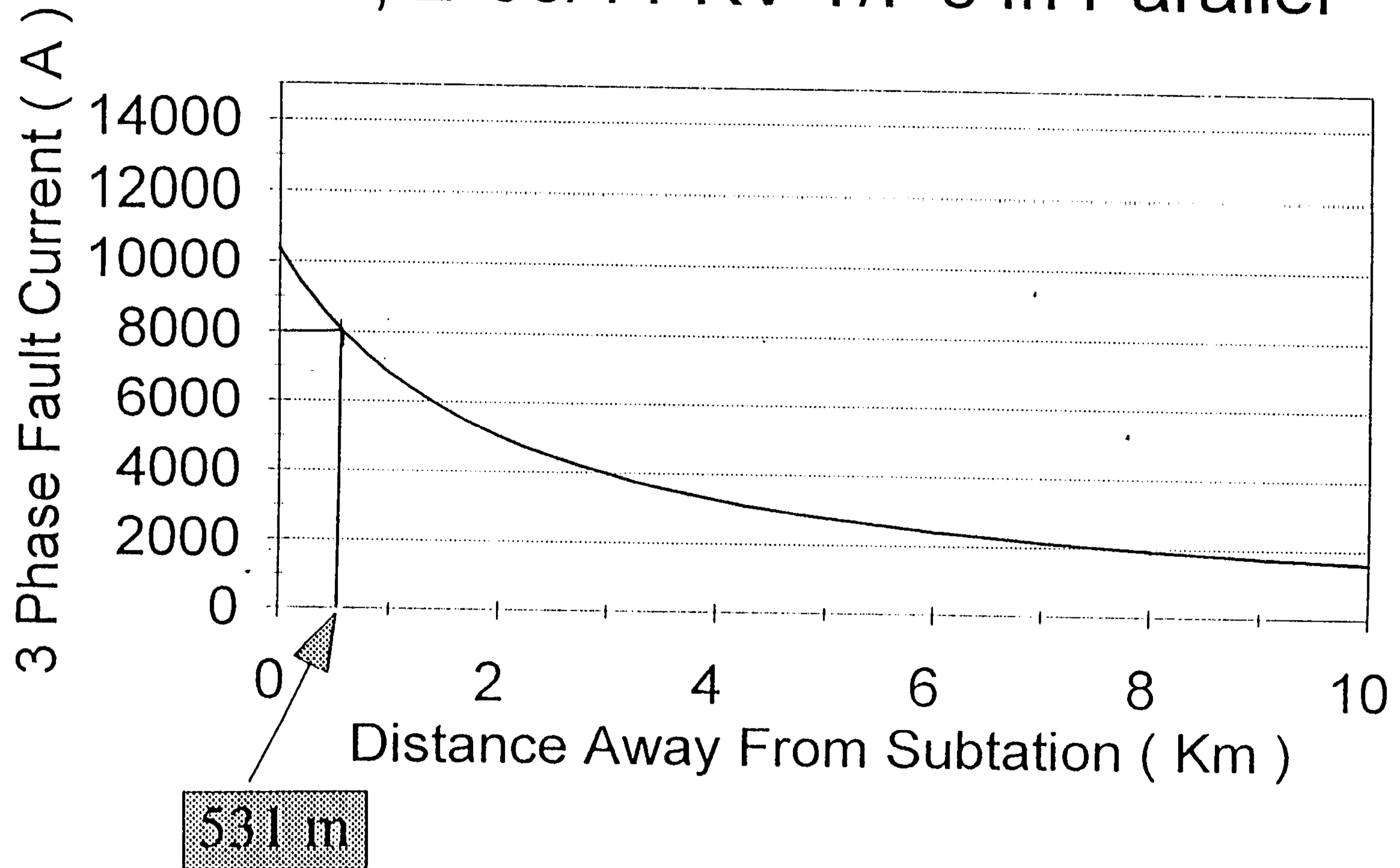
McMinns 22 KV Substation

Max.Gen, 2*66/22 KV T/F's In Parallel



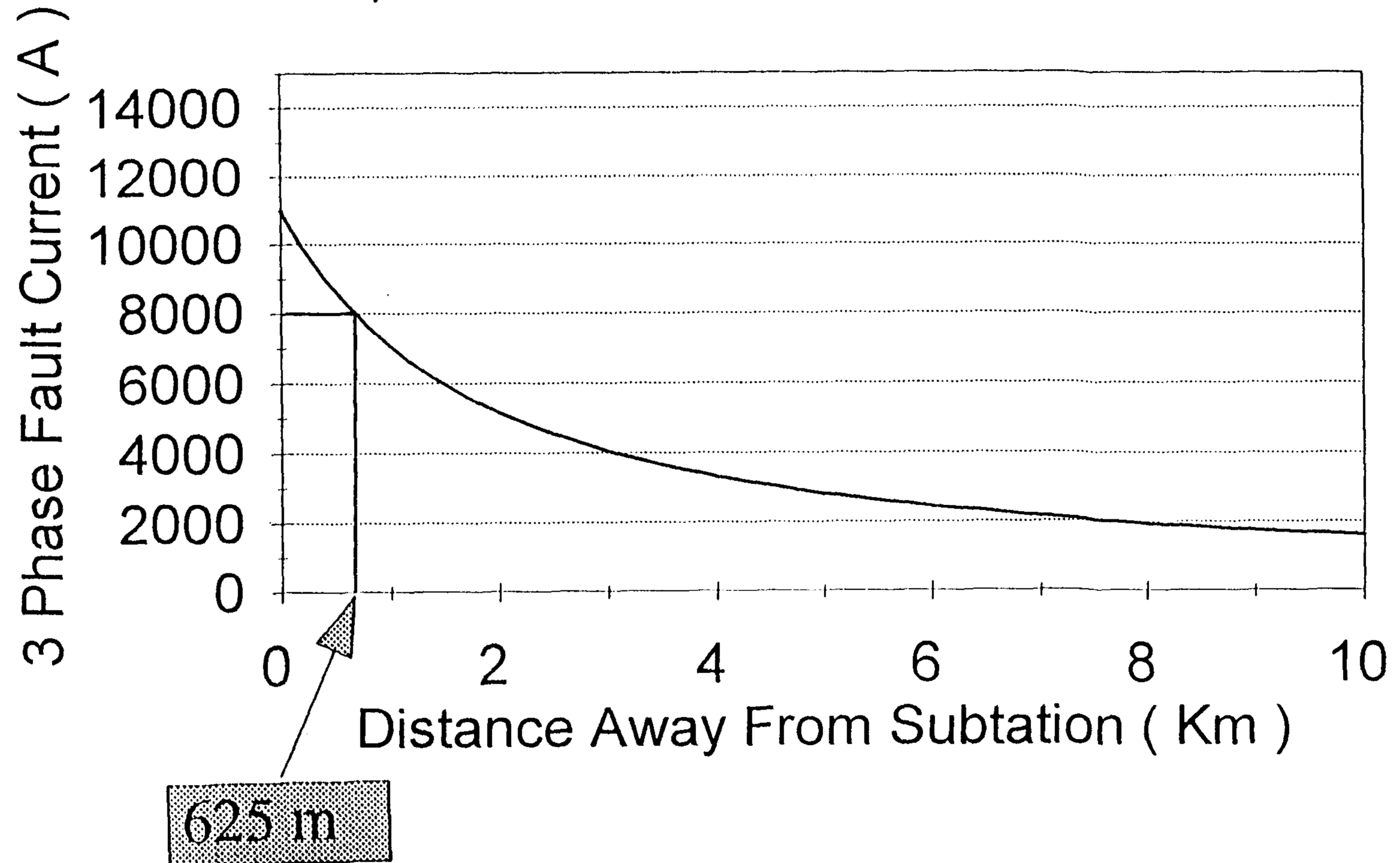
Palmerston 11 KV Substation

Max.Gen, 2*66/11 KV T/F's In Parallel



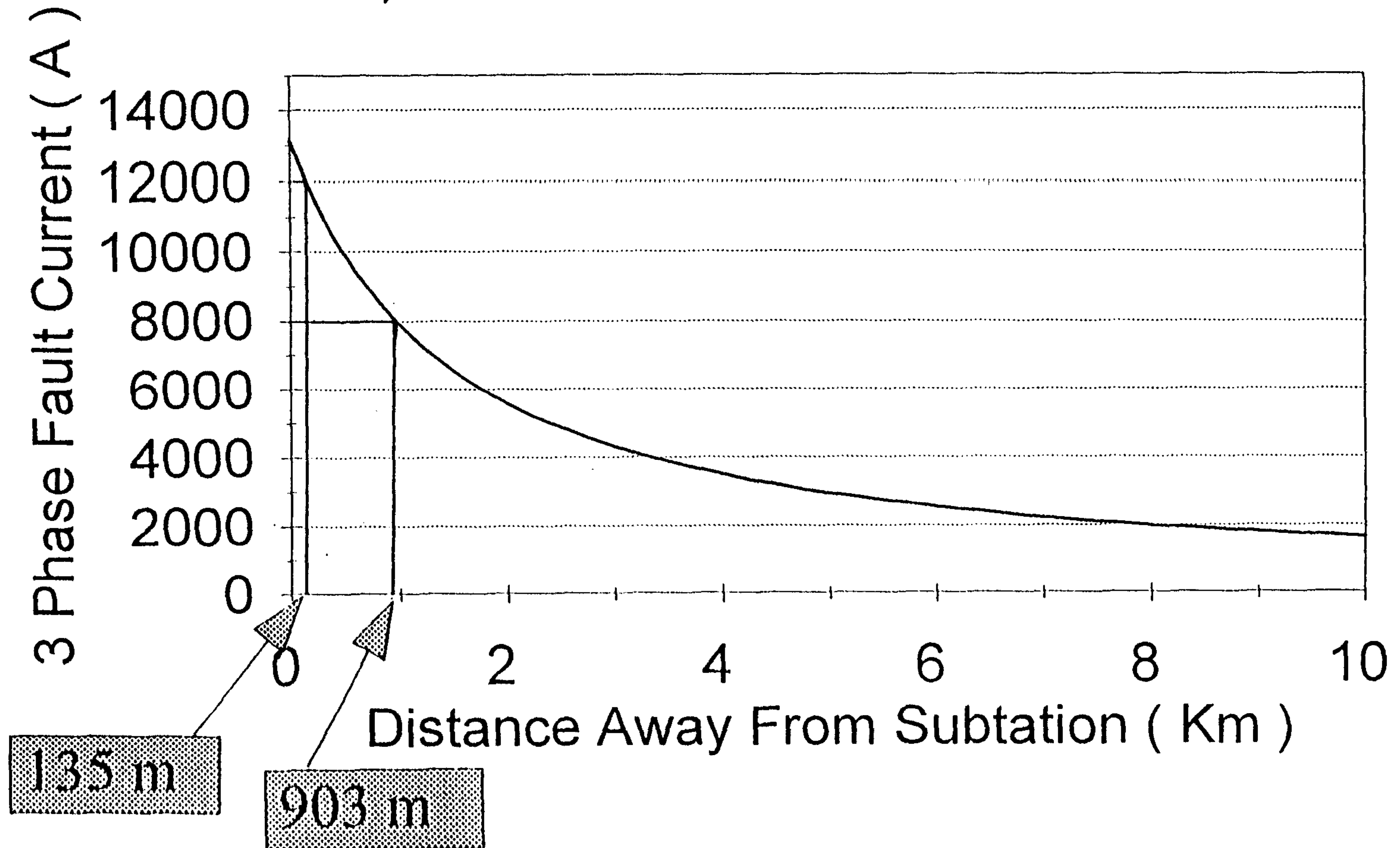
Berrimah 11 KV Substation

Max.Gen, 2*66/11 KV T/F's In Parallel



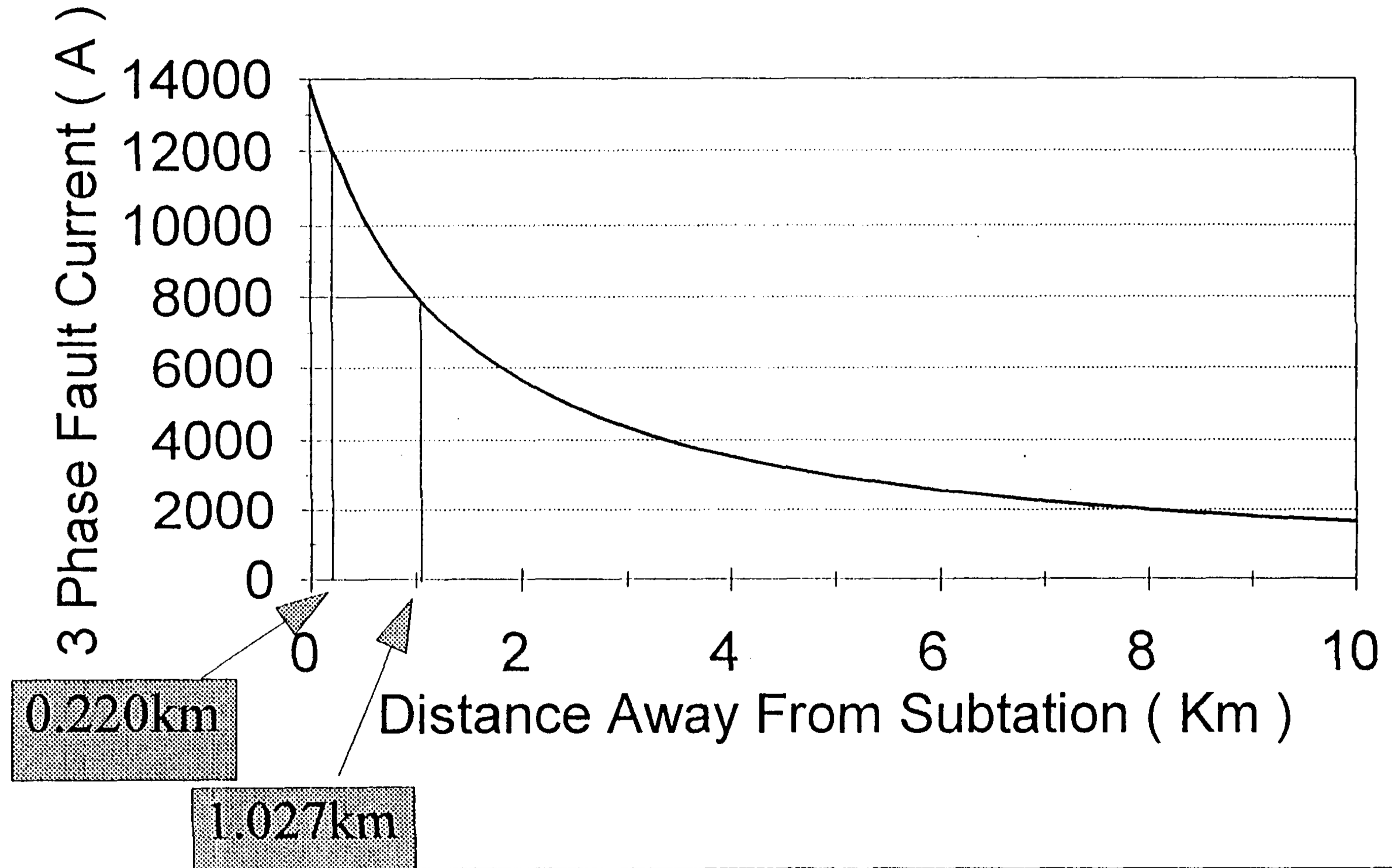
Casuarina 11 KV Substation

Max.Gen, 3*66/11 KV T/F's In Parallel



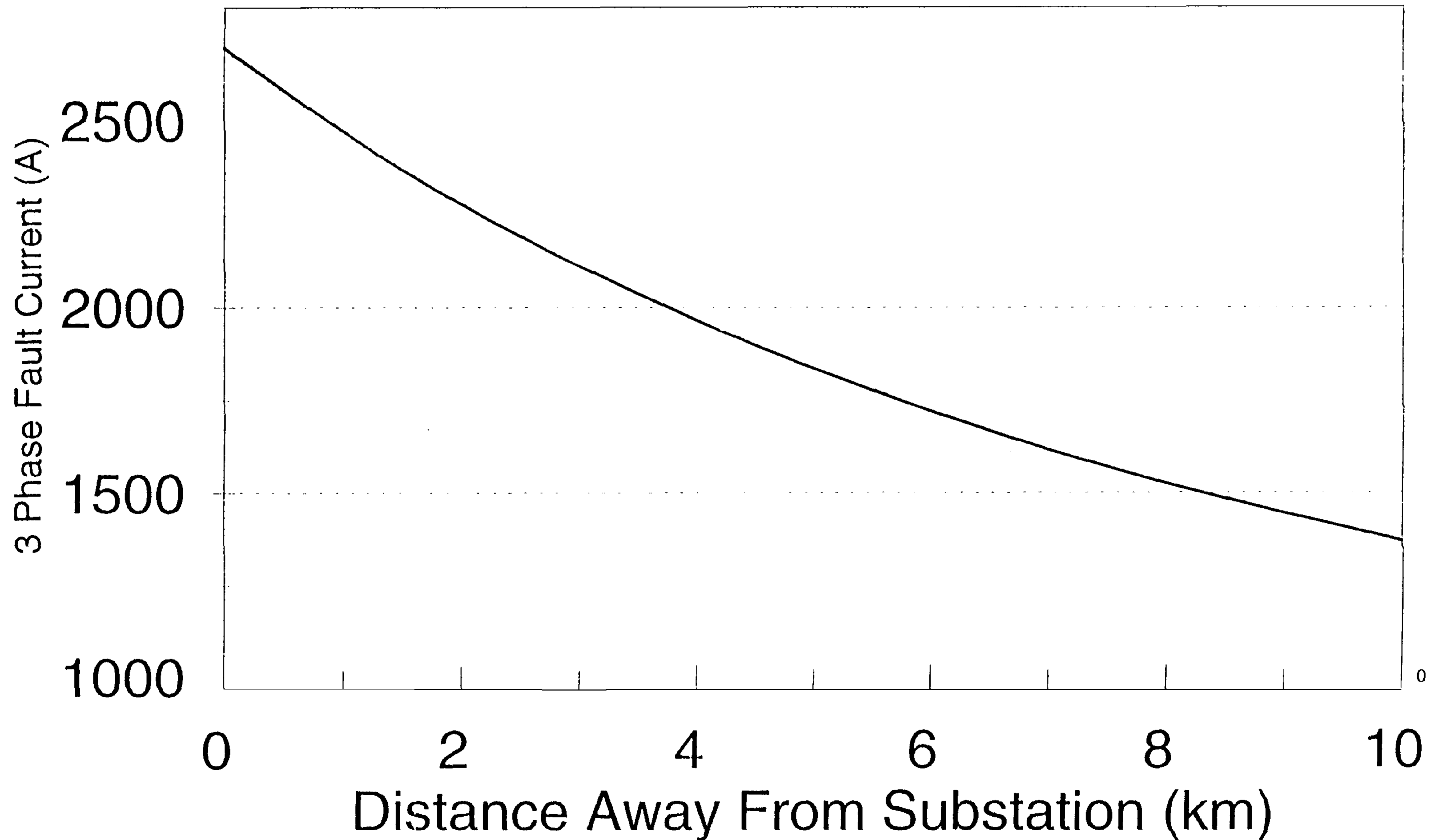
RonGoodin 11KV Station

Max.Gen. - GT9 + Sets 5 to 8



Katherine New Power Station (22kV)

Max Gen (CIPS x 6, KPS x 3)



Tennant Creek Power Station (22kV)

Units 6, 7, 8 & 9 on line

