SECTION A

INSTRUCTIONS TO PERSONS TENDERING

1. The Tender must be made on the accompanying Form of Tender **with all blanks therein and all the Schedule of Rates dully filled in ink and signed.** Tender rates must include all incidental and contingency expenses.

2. The tender is an **Bonafide** – Tenderer.

3. The cost of this tender document is **RM 750.00** per set.

4. No alteration is to be made in the Form of Tender or in the Schedules thereto except in filling up the blanks as directed. **If any such alteration be made or if these instruction be not fully complied with, the Tender may be rejected.**

5. The rates offered in the Tender should be without consideration of the details/departures. If there is addition of deduction of the Tender rates by virtue of the Company adopting those details/departures then such additional/reduced sum should be stated in the annexed documents.

6. The Company will not be responsible for or pay for expenses or losses, which may be incurred by any Tenderer in the preparation of his Tender.

7. Bumiputra Tenderers are required to submit certified copies of Trade Registration showing the proportion of Bumiputra participation in the companies and the names of the directors of the companies.

8. **The Tenderer should show evidence of competence of the erecting organisation to undertake installation, testing and commissioning of 275kV Protective Relay of the type of construction specified together with details of specialised staff and testing personnel**.

9. **The Tenderers will be deemed to have visited and examined the site before tendering to ascertain local conditions under which the works are to be executed.** The Tender amount or rates will be held to include the completion of all the Works indicated in the drawings or in the Specification. **No claim will be entertained on lack of knowledge of the site conditions or any difficulty that may arise in respect with the entirely of the works specified.**

10. The Tender is to be submitted in a sealed cover which should be clearly marked ***"CONFIDENTIAL – Tender For The Supply, Delivery, Installation, Testing and Commissioning of Current Differential Protection for 275 kV S/S"*** but should bear no writing on the cover which would enable the Tenderer to be identified.

    The sealed cover should then be despatched and reached:

    Chief Executive Officer
    C/O Procurement & Contracts Division
    Level 8, Wisma SEB
    No. 1, The Isthmus
    93050 Kuching
    Sarawak

    Or shall be hand delivered to:

    The Officer-In-Charge
    Tender Box
    Level 8, Wisma SEB
    No. 1, The Isthmus
    93050 Kuching
    Sarawak

    and to reach him on or before **3:00 p.m. on 26th March 2014.**

11. Prior to dropping into the Tender Box, the tender must be stamped by the Company's representative with the date and time of submission.

12. The Company does not bind itself to accept the lowest or any Tender, in part or in whole nor to assign any reason for the rejection of any Tender.

13. The Tender or any Tenderer who has not conformed to the foregoing instructions may not be considered.

14. The official currency for this Contract shall be the Malaysian Ringgit and all rates and prices shall be quoted in this currency.

15. Tenderers requiring clarification of the Tender Documents may contact the Company through:

Senior Manager,
Protection, Control & Instrumentation Division
Transmission Department
Level 5, Menara SEB
No. 1, The Isthmus,
93050 Kuching,
Sarawak

and noted for the attention of **Electrical Engineer** at telephone no.**082-388388 ext. 8527.**

16. As part of the process of verifying the ability, capability and financial background of the tenderers and in order to avoid any possible problems that will have an effect on the project in the future, the company profile of the tenderer must be provided and included in tender submission. **A copy of the standard form – Appendix – "Company Profile" as attached must be included as part of your tender submission.**

17. Tenderer must comprehend and comply the **"Instruction to Tenderer for Supply of Material and Services".**

SECTION B

GENERAL CONDITION OF CONTRACT

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

a. *"ACCEPTANCE TEST"* means all tests to be conducted pursuant to the Specifications of these Contract Documents including performance tests.

b. *"AGENT"* means the person for the time being or from time to time appointed by the Contractor.

c. *"APPROVED"* means approved in writing including subsequent written confirmation of previous oral approval by the Employer and/or Engineer and "APPROVAL" means approval in writing. Such approval, when applied by the Engineer to the Contractor's drawings or documents, shall mean that the drawings or documents are satisfactory from the standpoint of interfacing with all Employer-finished components (when applicable) for the installation, and/or that the Engineer has not observe any statement or failure that appears to deviate from the Specification requirements. Except for the interfacing with all Employer-finished components, the Contractor shall retain the entire responsibility for complete conformance with the Specifications.

d. *"AUTHORITY"* means any Governmental Agency of Financing Institution excluding the Employer.

e. *"AS BUILT DRAWING"* means any drawing, plan or document prepared by the Contractor after completion of the Work and which represent the Works as they are actually performed and/or erected.

f. *"BID or TENDER"* means the proposal submitted by the Tenderer in accordance with the Tender Documents.

g. *"BID or TENDER DOCUMENTS"* refer to the Employer's documents prepared and issued for the purpose of bidding and complemented by the Tenderer as required.

h. *"BIDDER OR TENDERER"* means any company or person which/who has presented a bid.

i. *"BID OR TENDER DRAWINGS"* means the drawings furnished by the Employer for bidding purposes.

j. *"BID OR TENDER PRICE"* means the sum quoted by the Bidder as filled in the Bid Documents.

k. *"CALENDAR DAYS"* means all days of Gregorian Calendar including all holidays, Sundays, etc.

l. *"COMMERCIAL OPERATION"* means the operation of the equipment under the responsibility of the Employer (under the Employer's risk) after completion of the last specified or agreed test and after the Provisional Acceptance by the Employer/Engineer.

m. *"COMPLETION TIME or COMPLETION RECORD"* shall mean the period of completion of the Work or any section or portion thereof from the Effective Date of the Contract or from any other date or period stated in the Contract, being complete and ready for Commercial Operation and all conditions for issue of the Provisional Acceptance Certificate (PAC) being fulfilled.

n. *"CONSRUCTUAL PLANT"* means all appliances or things of whatsoever nature required in or the execution, completion or maintenance of the Works or Temporary Works, but does not

include materials or other things intended to form or forming part of the Permanent Work.

o. *"CONTRACT"* means the Contract Agreement concluded between the Employer and the Contractor including the Contract Documents. It includes the tender, letter of acceptance, the Official Order or Agreement together with any correspondence modifying the terms thereof, the General Conditions, the Specifications and Schedules thereto, annexed, the Drawings annexed hereto or to be provided under the provisions of the Contract respectively.

p. *"CONTRACT AGREEMENT"* the Contractor shall, when called upon, enter into and execute a contract agreement in the form annexed to these specifications with such modifications as may be necessary and all amendments as may be from time to time
   i. agreed upon between the Contractor and the Employer.

q. *"CONTRACT DOCUMENTS"* means the documents forming the Contract and any amendment(s) as may from time to time agreed upon between the Contractor and the Employer.

r. *"CONTRACT PRICE"* shall mean a portion of a Contract Sum which is properly apportionable to the Plant or Work in question having regard to the state, condition and topographical location of the Plant, the amount of work done, and all other relevant circumstances adjusted to such additions thereto or deductions therefrom as may be made under the provisions of the Contract. If the CONTRACT PRICE consist of various amounts in different currencies, any stipulation in the Contract referring to the CONTARCT PRICE shall be applied to each of the various amounts of the said price if and explicitly mentioned otherwise.

s. *"CONTRACT SUM"* means the sum named in the contract as the CONTRACT SUM and represents the sum of all Contract Prices.

t. *"CONTRACTOR"* means the persons, firm or company, who's Bid has been accepted by the employer and includes the Contractor's personal representatives, successors and permitted assignees.

u. *"CONTARCTOR'S EQUIPMENT"* means all appliances or things of whatever nature required for the purpose of the Work but does not includes plant, materials or other things intended to form or forming Part of the Works.

v. *"CONSTRUCTION DRAWINGS"* means the drawing of the structures; equipments and site layout, etc. furnished which detail the works to be done under the Contract.

w. *"COSTS"* shall be deemed to include any and all overhead costs whether incurred on or off the Site.

x. *"CURRENCY OF THE CONTRACT"* shall mean the currency in which the Contract Price is expressed.

y. *"COST, INSURANCE AND FREIGHT (CIF) PRICE*" shall include all items of design, design approvals by the Engineer and where appropriate by the relevant authorities, type, sample and routine testing, manufacture, transport to dockside and the point of importation and insurance.

z. *"DRAWINGS OR PLANS"* means the drawings or plans referred to in the specification and any modification of work drawings approved in writing by the Engineer and such other drawings may from time to time be furnished or approved by the Engineer.

aa. *"EFFECTIVE DATE OF CONTRACT"* means the date from which the works are to be commenced as specified in the Letter of Contract Award.

bb. *"EMPLOYER or PURCHASER"* means the SYARIKAT SESCO BERHAD, and includes the EMPLOYER'S personnel representatives, successors and permitted assignees.

cc. *"ENGINEER"* shall mean the person for the time being or from time to time notified in writing by the Purchaser to the Contractor as the Engineer for the Contract, or in default of any notification the Purchaser.

dd. *"ENGINEER'S REPRESENTATIVES"* means any Resident Engineer or Assistant of the Engineer, or by the Employer with agreement with the Engineer to perform the duties set forth hereof whose authority shall be certified in writing to the Contractor by the Engineer.

ee. *"ENGINEER IN CHARGE"* means the engineer appointed from time to time by the Project Manager (representative of the Employer) to be in charge of the Works or of specified parts of the works under the Contract for the purpose of liaison, co-ordination and supervision or such other assistant or subordinates to whom the ENGINEER IN CHARGE may have delegated certain duties, acting separately within the scope of the particular duties entrusted to them.

ff. *"GUARANTEE PERIOD"* represents the "Defects Liability Period" and is counted from the date of the first Provisional Acceptance until the Final Acceptance.

gg. *"INSPECTOR"* shall mean the representative of or the person duly authorized by the Purchaser to act as its Inspector under this Contract.

hh. *"LOCAL TRANSPORT AND ERECTION (LTE) PRICE"* shall include all items of local transportation to site, local insurance, duties and where appropriate visas, permits, geotechnical investigation and works, erection, site testing etc, so that the CIF and LTE prices represents the complete cost of the contract. Where appropriate the currency used shall be clearly indicated in every price column.

ii. *"LIQUIDATED DAMAGES or PENALTIES"* means the sum or sums which the Contractor shall become liable to pay the Employer in full and final settlement of Contractor's liability for failure to meet the guaranteed completion date(s) and/or performance as stated in the Contract irrespective of the fact that the Employer has suffered a loss or not.

jj. *"MONTH"* shall mean calendar month.

kk. *"PENALTIES"* see *"LIQUIDATED DAMAGES"*.

ll. *"PLANT"* shall mean all or any part of the machinery, apparatus, materials, articles and things of all kinds to be provided by the Contractor, other than Contractor's erection equipment.

mm. *"PERMANENT WORK or WORK"* means all Plant and mechanical and/or electrical installations which may form a permanent part of the work.

nn. *"PROVISIONAL SUM"* shall mean any sum provided in the Contract for expenditure on a particular service which is foreseen but not specified in detail.

oo. *"PORTION OF WORK"* means a part of the Works or of the Section of the Works.

pp. *"SCHEDULES"* shall mean and include the Schedule of Guarantees, the Schedule of Technical Particulars, the Schedule of Prices and any other Schedule attached to the Specification.

qq. *"SPECIFICATION"* shall mean the specification annexed to or issued with these General Conditions.

rr. *"SITE"* means the lands and other places through which the Works are to be executed or carried out, and any other lands and places provided by the Employer for the purpose of the Contract.

ss. *"SUB-CONTRACTOR"* means any nominated Sub-contractor or any other person (other than the Contractor) named in the Contract for any parts of the Works or any person to whom any part of the Contract has been sub-let with the consent in writing of the Engineer, and the Sub-Contractor's legal representatives, successors and permitted assignees.

tt. *"TAKING OVER and TAKING OVER CERTIFICATE"* mean the *"PROVISIONAL ACCEPTANCE, PROVISIONAL ACCEPTANCE CERTIFICATE (PAC)"* respectively.

uu. *"TEST ON COMPLETION"* shall mean such tests to be made before the Plant is taken over by the Purchaser as provided for, in the Contract or otherwise agreed between the Purchaser and Contractor.

vv. *"WEEK(S)"* means seven (7) consecutive days.

ww. *"WRITING"* shall include any manuscript, type-written, or printed statement, under seal or hand as the case may be.

i. Words importing persons shall include firms and company.

ii. Words importing the singular only shall also include the plural, and vice versa.

2. CONTRACTOR TO INFORM HIMSELF FULLY

The Contractor when making his tender shall be deemed to have examined the General Conditions and Specification, with such schedules, drawings and plans as are annexed thereto or referred to therein and to have obtained on his own responsibility and at his own expense any additional information which he considers necessary for the completion of his tender.

3. DRAWING

(i) The Contractor shall submit to the Purchaser for approval within the times named in the specifications such drawing, patterns and models as may be called for therein or as the Purchaser may reasonable require, provide that the Contractor shall not be under any obligation to supplies copies of shop drawings. Within a reasonable period after receiving such drawings, samples, patterns and models, the Purchaser shall signify its approval or otherwise. Copies of all drawings which require to be approved by the Purchaser shall be provided in duplicate by the Contractor. One of the copies so approved and signed by the Purchaser shall be retained by the Purchaser and the other copy by the Contractor.

(ii) Drawings signed as above described shall not be departed from except as provided in Clause 9 (Variation and Omissions).

(iii) The Contractor shall furnish to the Purchaser **four (4) complete sets** of information, manuals and drawings (for each plant) as being necessary to enable the Purchaser to operate, maintain, dismantle, reassemble and adjust all parts of the Plants after receiving the Plant. The Contractor shall submit the **four (4) complete sets within one month from the commissioning date**.

(iv) The Engineer shall have the right at all reasonable times to inspect at the premises of the Contractor all Drawings of any Portion of the Works.

4. MISTAKES IN INFORMATION

(i) Contractor shall be responsible for and shall pay for any such alteration of the Plant due to any discrepancies, errors, or omissions in the drawings and information supplied by him, whether they have been approved by the Purchaser or not, provided that such discrepancies, errors, or omissions be not due to inaccurate drawings or information furnished in writing to the Contractor by the Purchaser or the Engineer.

(ii) The Purchaser shall be responsible for drawings and information supplied in writing by the Purchaser or the Engineer and for the details of special work specified by either of them. The Purchaser shall pay the extra cost reasonable incurred by the Contractor due to alterations of the work necessitated by reason of inaccurate drawings or information so supplied to the Contractor.

5. ASSIGNMENT AND SUB-LETTING OF THE CONTRACT

(i) The Contractor shall not, without the consent in writing of the Purchaser which shall not be unreasonable withheld, assign or transfer the Contract of the benefits of obligation thereof or any part thereof to any other person, provided that this shall not affect any right of the Contractor to assign, either absolutely or by way of charge, any moneys due or to become due to him, or which may become payable to him under the Contract.

(ii) The Contractor shall not, without the consent in writing of the Engineer, which shall not be reasonably withheld, sub-let the Contract or any part thereof, or make any sub-contract with any person or persons for the execution of any part of the Contract by the restriction contained in this clause shall not apply to sub-contracts for materials, for minor details, or for any part of the Plant of which the makers are named in the Contract. Any such consent shall not relieve the Contractor from his obligations under the Contract.

6. PATENTS RIGHTS, ETC

(i) The Contractor shall indemnify the Purchaser against all actions, claims, demands, costs, chargers and expenses arising from or incurred from or incurred by reason of any infringement or alleged infringement of letters patent, design, or copyright protected in the country in which the Plant is to be erected by the use of any Plant supplied by the Contractor, but such indemnify shall not cover any use of the Works otherwise than for the purpose indicated by or reasonable to be inferred from the Specifications.

(ii) In the event of any claim being made or action brought against the Purchaser arising out of the matters referred to in the clause, the Contractor shall be promptly notified thereof and may at his own expense conduct all negotiations for the settlement of the same, and any litigation that may arise therefrom. The Purchaser shall not, unless and until the Contractor shall have failed to take over the conduct of the negotiations or litigation make any admission which might be prejudicial thereto.

The conduct by the Contractor of such negotiations or litigation shall be conditional upon the Contractor having first given to the Purchaser such reasonable security as shall from time to time be required by the Purchaser to cover the amount ascertained or agreed or estimated, as the case may be, of any compensation, damages, expenses, and costs for which the Purchaser may become liable. The Purchaser shall, at the request of the Contractor, afford all available assistance for the purpose of contesting any such claim or action, and shall be repaid all reasonable expenses incurred in so doing.

(iii) The Purchaser on his part warrants that any design or instructions furnished or given by him shall not be such as will cause the Contractor in the performance of the Contract to infringe any letters patent, registered design, trade mark, or copyright in the country in the performance of the Contract.

7. MANNER OF EXECUTION

All Plant to be supplied and all work to be done under the Contract shall be manufactured and executed in the manner set out in the Specification or, where not so set out, to the reasonable satisfaction of the Purchaser.

8. VARIATIONS AND OMISSIONS

(i) The Contractor shall not alter any of the Plant except as directed in writing by the Purchaser, but the Purchaser shall have full power, subject to the proviso hereinafter contained, from time to time during the execution of the Contract by notice in writing to direct the Contractor to alter, amend, add to, or otherwise vary any of the Plant and the Contractor shall carry out such variation, and be bound by the same conditions, so far as applicable, as though the said variations were stated in the Specification; provided that no such variation shall, except with the consent in writing of the Contractor, be such as will, with any variations already directed to be made, involve a net addition to or deduction from the Contract Price of more than 15 per cent thereof, disregarding for this purpose any addition or deduction previously made pursuant to this clause. In any case in which the Contractor has received any such direction from the Engineer which either then or later will, in the opinion of the Contractor, involve an addition to or deduction from the Contract Price, the Contractor shall, as soon as reasonable possible, advise the Engineer in writing to the effect.

The amount to be added to or the rates specified in the schedules or prices, so far as the same may be applicable, and where rates are not contained in the said schedules or are not applicable, such amount as shall be agreed between the Purchaser and the Contractor.

(ii) If the Purchaser shall make such variation in any part of the Plant such reasonable notice in writing shall be given to the Contractor as will enable him to make his arrangements accordingly, and in cases where Plant is already manufactured or in course of manufacture, or any matter done or drawing or patterns made that require to be alter, a reasonable sum in respect thereof shall be allowed by the Purchaser. If in opinion of the Contractor any such variation is likely to prevent or prejudice the Contractor from or in fulfilling any of his obligations under the Contract, he shall notify the Purchaser thereof in writing, and the Purchaser shall decide forthwith whether or not the same shall be carried out. If the Purchaser confirms its instructions in writing, the said obligations shall be modified to such an extent as may be justified. Until the Purchaser so confirms its instructions they shall be deemed not to have given.

9. CONTRACTOR'S DEFAULT

(i) Should the Plant or any portion thereof not be delivered within the time or times specified in the Contract, the Purchaser shall be liberty, without prejudice to any other remedy for breach of contract, to determine the Contract either wholly or to the extent of such default.

(ii) If the Contractor shall fail to produce the Plant with due diligence and expedition or shall refuse or neglect to comply with any reasonable orders given to him by the Purchaser in respect of the Contract or shall contravene any provisions of the Contract, the Purchaser may give notice to the Contractor requiring him to make good the said failure, neglect or contravention. Should the Contractor fail to comply with the notice within one calendar month from the date of service thereof, the Purchaser shall be at liberty, without prejudice to any other remedy for breach of contract to determine the Contract either wholly or in part of to the extent of such default.

(iii) The Purchaser shall be at liberty in any such case to procure elsewhere other items of Plant of the same or similar description in such numbers as shall make good any default, whether the Contract be determined in whole or in part. If the cost to the Purchaser of making good such default shall exceed the Contract value of the Plant conceived in such, the Contractor shall pay to the Purchaser the amount of such excess.

10. PROCEDURE AND METHOD

After submission to and approval by the Engineer of such programme the Contractor shall adhere to the order of procedure and method stated therein unless he obtains the written permission of the Engineer to vary such order or method.

11. PROGRESS OF WORKS

If at any time it should appear to the Engineer that the actual progress of the Works does not conform to the programme, the Contractor shall produce, at request of the Engineer, a revised programme showing the necessary modifications to the approved programme to ensure completion of the Works within the Completion time.

12. BANKRUPTCY

If the Contractor shall become bankrupt or insolvent, or have a receiving order made against him, or compound with his creditors, or, being a corporation, commence to be wound up, not being a member's voluntary winding up for the purpose of amalgamation or reconstruction, or carry on its business under a receiver for the benefit of its creditors or any of them, the Purchaser shall be at liberty to terminate the Contract forthwith by notice in writing to the Contractor or to the receiver or liquidator, or to any person in whom the Contractor may become vested without any compensation whatsoever, provided always that such determination of the Contract shall not prejudice or affect any right or remedy which shall have accrued or shall accrue thereafter to the Purchaser.

13. INSPECTION, TESTING AND REJECTION

The quality, workmanship and performance of all items of the Work or equipment shall, where reasonably practicable, be subject to inspections and tests by the Contractor at each stage of manufacture/installation (i.e. materials, components, intermediate assemblies and end products).

13.1 Inspection

The Employer's Personnel shall at all reasonable times:

a. Have full access to all parts of the Site and to all places from which natural Materials are being obtained, and

b. During production, manufacture and construction be entitled to examine, inspect, measure and test the material and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

The Contractor shall give the Employer's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility. The Contractor shall give notice to the Engineer whenever any work is ready and before it is covered up, put out of sight or packaged for storage or transport. The Engineer shall then either carry out the examination inspection, measurement and testing without unreasonable delay, promptly give notice to the Contractor that the Engineer does not required doing so. If the Contractor fails to give the notice, he shall, if when required by the Engineer, uncover the work and thereafter reinstate and make good, all at the Contractor's cost.

The Engineer shall be entitled at all reasonable times during manufacture to inspect, examine, and test on the Contractor's premises the materials and workmanship and performances of all Plant to be supplied under the Contract, and if part of the said Plant is being manufactured on other premises the Contractor shall obtain for the Engineer permission to inspect, examine, and test as if the Plant were being manufactured on the Contractor's premises. Such inspection, examination, or testing, shall not release the Contractor from any obligation under the Contract.

13.2 Testing

Where the Contract provides for tests of the Plant or any part thereof when completely manufactured such tests shall, in the absence of any arrangements to the contrary, take place on the premises of the Contractor.

The Contractor shall, after consulting the Purchaser, give the Purchaser 30 days' notice in writing of the date on and the place at which any Plant will be ready for testing as provided in the Contract and unless the Engineer shall attend at the place so named on the date which the Contractor has stated in his notice to the Contractor may proceed with the test, which shall be deemed to have been made in the Engineer's presence, and shall forthwith forward to the Purchaser duly certified copies of the test readings. The Purchaser shall give the Contractor at least 7 days' notice in writing of his intention to attend the tests.

Where the Contract provides for tests on the premises of the Contractor or of any sub-contractor the Contractor, except where otherwise specified, shall provide free of charge such assistance, labour, materials, electricity, fuel, stores, apparatus, and instruments as may be requisite and as may be reasonably demanded to carry out such tests efficiently.

As and when the Engineer is satisfied that any Plant shall have passed the tests referred to in this Clause he shall notify the Contractor in writing to that effect.

If after inspecting, examining or testing any Plant the Engineer shall decide that such Plant or any part thereof is defective or not in accordance with the Contract, he may reject the said Plant or part thereof by giving to the Contractor within a reasonable time notice in writing of such rejection, stating therein the grounds upon which the said decision is based.

The provisions of Clause 17 (Tests on Completion and Taking Over) shall relate also to inspections, examinations, and test carried out under the clause.

13.3 Rejection

If any of the items of Plant, whether completed or in course of production is rejected by the Engineer, it shall be marked or segregated in such a manner satisfactory to the Engineer as to ensure its subsequent identification as rejected work.

When independent test and analysis in addition to those made by the Engineer on the Contractor's or sub-contractor's premises, are considered necessary, such tests or analysis will be made by persons appointed by the Purchaser. The costs of such additional tests and analyses will be borne by the Purchaser if such tests or analysis show the material to be in accordance with the Specification; otherwise, such costs shall be borne by the Contractor.

The Contractor shall not send any of the items of Plant forward for shipment until the Engineer shall have given his consent and such consent shall not release the Contractor from any of his liabilities under Clause 27 (Packing) to make good any defect or to replace any part that may fail.

14. <u>DELIVERY</u>

(i) Delivery of the Plant shall be made by the Contractor in the manner specified in the Contract. The freight for the conveyance of the Plant and Insurance of the Plant to the destination stated by the Purchaser shall be paid by the Contractor and the cost thereof shall be included in the Contract Price. The Plant should be insured for its full value, should cover against all risks, including those of War, Riots, Civil Commotions and Malicious damage. The term *"insured for its full value"* shall be deemed to mean insurance cover to the aggregate value of the replacement cost of the Plant as at the date of shipment or on the date at which becomes the property of the Purchaser as the case may be and the cost of the freight.

(ii) It shall appear at any time to the Contractor during the performance of the Contract that he will be unable to deliver the Plant within the time or times specified in the Contract, the Contractor shall at once give notice of the delay in writing to the Purchaser with an explanation of the thereof. The submission and acceptance of such notice shall in any way prejudice the right of the Purchaser under Clause 10 (Contractor's Default).

(iii) If by delay or failure on the part of the Purchaser to give any necessary instructions or from any case for which the Purchaser or some other contractor employed by him is responsible, the Contractor shall be prevented, or at the request of the Purchaser refrains, from delivering any Plant at the time specified for delivery thereof or, if no times is specified, within a reasonable time, and shall have given notice in writing to the Purchaser that such Plant (hereinafter referred to as *"the delayed plant"*) is ready for delivery, and shall have suitably and sufficiently marked the delayed Plant as appropriated to the Contract, and shall have given to the Engineer an opportunity of inspection the delayed Plant, then in any such case the following provisions shall have effect:

(a) There shall be added to the Contract Price the reasonable additional expense incurred in storing and taking reasonable measures to protect and preserve the delayed Plant from, and insuring it against, loss, deterioration, and damage however caused from the time when but for the said delay, failure, or other cause the delayed Plant would have been delivered (hereinafter referred to as *"the normal delivery date"*) until the Contractor shall no longer be prevented from delivering it or shall be relieved of responsibility thereof under paragraph (b) of this clause, whichever shall first happen.

(b) If at the expiration to two months from the normal delivery date the Contractor shall still be prevented as aforesaid from delivering the delayed Plant as he still be entitled to be paid the Contract Value of the delayed Plant and he may by notice in writing expiring 30 days after receipt thereof by the Purchaser require the Purchaser to assume responsibility for storing, protecting, and preserving the delayed Plant.

Upon the expiration of the last-mentioned notice the Contractor shall be relieved of any responsibility for the delayed Plant either until the expiration of 30 days after receipt of notice in writing from the Engineer that the delayed Plant may be delivered (hereinafter referred to as *" the notice to deliver"*) or until the Contractor, having received the notice to deliver, has proceed to fulfil the obligation imposed by him by paragraph (c) of this clause, whichever shall first occur provided always that if the notice to deliver shall be given within 30 days after the receipt of the last-mentioned notice given by the Contractor that notice shall not have effect

(c) After the receipt of the notice to deliver, the Contractor, if he has been relieved of responsibility under the last proceeding paragraph of this clause, shall (and in any other case may) examine the delayed Plant and make good any deterioration or defect therein that may have developed or loss thereof that may have occurred after the normal delivery date.

(d) There shall be added to the Contract Price any reasonable expense to which the Contractor may be put in making the examination referred to in paragraph (c) in this clause and in making good any deterioration, defect, or loss as therein mentioned, except so far as the same was caused by faulty workmanship or materials or by the Contractor's failure to take the measures

(e) Referred to in paragraph (a) of this clause. Any expense to which the Contractor may be put in delivering the delayed Plant or in performing his obligations under Clause 18 (Defects after Delivery) which would not have been incurred had the delivery of the delayed Plant not been prevented as aforesaid shall also be added to the Contract Price.

(f) Without prejudice to the provisions of Sub-Clause (viii) of Clause 18 (Defects after Delivery), the obligations of the Contractor under that Clause with respect to delayed Plant shall not apply to any defect that may develop therein after the expiration of three years from the normal delivery date.

15. TESTING OF PLANT/DAMAGED BEFORE ERECTION

(i) On delivery of the Plant the same shall become the property of the Purchaser and save as provided in these General Conditions the Contractor shall thereupon cease to be liable for loss thereof if damage thereto from whatever cause arising.

(ii) If for any cause for which the Contractor is not responsible the Plant after delivery and before erection shall suffer deterioration, damage, or loss, the Contractor shall be relieved of his further obligation until the Plant has been put into a satisfactory condition or replaced at the cost of the Purchaser.

16. CONTRACTOR'S NEGLIGENCE

(i) The Contractor shall, subject to Sub-Clause (iii) and (iv) of this Clause and Clause 16 (Limitations on Contractor's Liability), indemnify the Purchaser in respect of all damaged or injury occurring before all the Plant shall have been taken over under Clause 17 (Tests on Completion and Taking Over) to any property or to any person and against all actions, suits, claims, demands, costs, chargers, and expenses arising in connections therewith which shall be occasioned by the negligence of or breach of statutory duty by the Contractor or any Sub-contractor, or by defective design (other than a design made, furnished, or specified by the Purchaser and for which the Contractor has disclaimed responsibility in writing within a reasonable time after the receipt of the Purchaser's instructions), materials, or workmanship in the manufacture of the Plant, but not otherwise.

Provided that the Contractor shall not be liable by virtue of this Sub-clause in respect of damage or injury attributable to defects in any section or portion of the Plant taken over under Clause 17 (Test on Completion and Taking Over).

(ii) If there shall occur any loss or damage to any property or injury to any person while the Contractor is on the site for the purpose of making good a defect in any section or portion of the Plant pursuant to Clause 18 (Defects after Delivery) the Contractor shall be liable, subject to the provisions of Sub-clause (iii) and (iv) of this Clause and Clause 16 (Limitations on Contractor's Liability) as follows:

(a) In respect of loss or damage to the said section or portion the Contractor's liability shall be as defined in Clause 18 (Defects after Delivery).

(b) In respect of damage or injury to any other property or to any person of any actions, claims, demands, costs, charges and expenses arising in connection therewith the Contractor shall be

(c) liable to the extent that such damaged or injury was caused by the negligence or breach of statutory duty of the Contractor of a Sub-contractor while on the site as aforesaid or by defective materials or workmanship used in making good the said defect but not otherwise.

The said section or portion of the Plant shall be defined by reference to the taking over certificate issued in respect thereof pursuant of Clause 17 (Tests on Completion and Taking Over)

(iii) The Contractor shall not be liable to the Purchase for:

(a) any loss, damage or injury to the extent that it is caused by or arises from the acts or omission of the Purchaser or of others (not being the Contractor's servant or Sub-contractor).

(b) any loss, damage or injury in circumstances over which the Contractor has no control.

(iv) Except in respect of personal injury or damage to property conferring on a person other than the Purchaser a good cause of action against the Contractor, the liability of the Contractor for any one act or default shall not exceed the Contract Price.

(v) In the event of any claim being made against the Purchaser arising out of the matters referred to in and in respect of which the Contractor may be liable under this Clause, the Contractor shall be promptly notified thereof, and may at his own expense conduct all negotiations for the settlement of the same and any litigation that may arise therefrom. The Purchaser shall not, unless until the Contractor, shall have failed to take over the conduct of the negotiations or litigation, make any admission which might be prejudicial thereto. The conduct by the Contractor or such negotiations or litigation shall be conditional upon the Contractor having first given to the Purchaser to cover the amount ascertained or agreed or estimated, as the case may be, of any compensation, damages, expenses, and costs for which the Purchaser may become liable. The Purchaser shall, at the request of the Contractor, afford all available assistance for any purpose, and shall be repaid all reasonable expenses incurred in so doing.

17. LIMITATIONS ON CONTRACTOR'S LIABILITY

Subject as provided for the deduction of liquidated damages, the Contractor shall not be liable to the Purchaser by way of indemnify or be reason of any breach of the Contract for loss of use (whether complete of partial) of the Plant or of profit or of any contract that may be suffered by the Purchaser.

18. TESTS ON COMPLETION AND TAKING OVER

(i) Where the Contract provides for Tests on Completion, they shall be carried out the Purchaser in the presence of the Contractor as and if required, who shall be given reasonable notice thereof.

(ii) The Tests on Completion (if any) shall be carried out promptly after the erection of the Plant has been completed (except in minor respects that do not affect the use of the Plant for the purpose for which it is intended).

(iii) If for any reason for which the Contractor is responsible any portion of the Plant fails to pass the Tests on Completion, tests of the said portion shall, if required by the Purchaser or by the Contractor, be repeated within a reasonable time upon the same terms and conditions, save that all reasonable expenses to which the Purchaser may be put by the repetition of the tests shall be deducted from the Contract Price.

(iv) As soon as the erection of the Plant has been completed (except as aforesaid) and the Plant has passed the Tests on Completion (if any), the Purchaser shall issue a certificate (herein called a *"taking-over certificate"*) in which he shall certify the date on which the erection of the Plant has been so completed and on which the Plant has passed the said tests and the Purchaser shall be deemed to have taken over the Plant on the date so certified.

(v) If the Plant is divided into two or more sections, Sub-clause (iv) hereof shall apply to each section as it applies to the entire Plant. If by agreement between the Purchaser and the Contractor any portion of the Plant (other than a section or sections) shall be taken over before he remainder of the Plant, the Purchaser shall issue a taking-over certificate in respect of that portion.

(vi) If by reason of any default on the part of the Contractor the issue of a taking-over certificate in respect of any portion of the Plant has been delayed and such portion is reasonably capable of being used without endangering the safety of the Plant or persons, then the Purchaser shall be at liberty to use such portion of the Plant, provided that the Contractor shall afforded reasonable opportunity of taking such steps as may be necessary to permit the issue of the taking-over certificate.

(vii) If for any reason for which the Purchaser is responsible the Tests on Completion (if any) have not been carried out promptly after the erection of the Plant has been completed as provided in

Sub-Clause (ii) of this Clause, or has not been carried out successfully within three months after erection has been so completed, then the Purchaser shall be deemed to have taken over the Plant. Any additional expense to which the Contractor may be put in attending any tests delayed in circumstances to which this sub-clause applies, shall be added to the Contract Price, and such allowances shall be made from the performances required to be attained in the said tests as may be reasonable having regard to any use of the Plant by the Purchaser prior to the Test.

19. DEFECTS AFTER DELIVERY

(i) The Contractor shall be responsible for making good with all possible speed any defect in or damage to any portion of the Plant which may appear or occur during a **period of 18 months after the date of commissioning and of 5 years of protection warranty from manufacturer.**

(a) from defective materials, workmanship or design (other than a design made, furnished or specified by the Purchaser and for which the Contractor has disclaimed responsibility in writing within a reasonable time after receipt or the Purchaser's instructions), or

(b) from any act or omission of the Contractor done or omitted during that said period of 18 months as the case may be provided always that the said period of 18 months shall be extended by the length of period not exceeding 6 months, as and if required in writing by the Purchaser.

(ii) If any such defect shall appear or damages occur, the Purchaser shall inform the Contractor thereof stating in writing the nature of the defect or damage. If the Contractor replaces or renews any part of the Plant, the provisions of this clause shall apply to the part of the Plant so replaced or renewed, except that the period during which the Contractor's responsibility pursuant to Sub-clause (i) of this clause shall subsist shall be 5 years from the date of replacement or renewal.

(iii) The periods mentioned in Sub-Clause (i) and (ii) of this Clause shall be extended by a period equal to the period during which the Plant or portion thereof in which a defect to which this clause applies has appeared cannot be used by reason of that defect.

(iv) The supply to the Purchaser carriage paid of a defective or damaged part or the Plant properly repaired or of a part in replacement thereof shall constitute fulfilment by the Contractor of his obligation under Sub-Clause (i) of this clause in respect of that defective or damaged part. If it is reasonably practicable for a defective or damaged part to be returned to the Contractor and the Contractor shall call for its return the Purchaser shall cause it to be returned to the Contractor at the Contractor's expense.

(v) Where pursuant to this clause the Contractor supplies a part in replacement of a defective or damaged part the defective or damaged part shall become the property of the Contractor.

(vi) If any such defect or damage be not remedied within a reasonable time, the Purchaser may proceed to do the work at the Contractor's risk and expense.

(vii) In respect of any part of the Plant specified by the Contractor in his tender as not manufactures by him and in respect of which it is not practicable to procure that the supplier or such part shall be under the same liability to the Contractor as the liability undertaken by the Contractor in this clause the Contractor shall notify the Purchaser to that effect and the foregoing provisions of this clause shall apply subject to the proviso that the liability of the Contractor in respect of such part shall not exceed a liability in the same terms as the liability of the supplier to him.

(viii) The Contractor's liability under this clause shall be in lieu of any conditions or warranty implied by law as to the quality or fitness for any particular purpose of any portion of the Plant delivered and save as in this clause expressed neither the Contractor nor his Sub-contractors,

servant or agents shall be liable, whether in contract, tort or otherwise in respect of defects in or damage to such portion, or for any injury, damage or loss of whatsoever kind attributable to such defects or damage. For the purposes of this sub-clause the Contractor contracts on his own behalf and on behalf of and as trustee for his contractors, servants and agents.

20. PAYMENT DUE FROM THE CONTRACTOR

Without prejudice to any other remedy which the Purchaser may have he shall be entitled to deduct from any moneys due, or becoming due to the Contractor under the Contract, all Costs, damages or expenses for which under the Contract the Contractor is liable to the Purchaser.

21. PAYMENT

Unless otherwise agree upon in the Contract Agreement, the payments shall be made in accordance with the terms specified herein currencies mentioned in the Contract.

The full amount of invoice based on rates quoted in the schedule for each shipment will be paid within 45 days after the receipt of the Plant in good condition, at the store designated, provided that the validity period of the performance bond required under Clause 23 is sufficient to cover the contractor's obligation under Clause 18 of the General Condition of Contract.

Damaged Plant upon receipt shall be assessed by the Purchaser. Part payment of the invoice amount may be released of damages on plant are not substantial to impair functioning of the said Plant, otherwise full payment of the damaged plant shall be withheld.

All costs, penalties, damages or expenses for which the Contractor is liable to the Employer under the Contract may be deducted by the Employer from any payment due or becoming due to the Contractor. Payment deduction(s) as stated above can also be made by invoking the Performance Bond. Any payments made shall not be considered as conclusive evidence of satisfactory performance of the Work covered by the Contract, nor shall any payment be construed as Acceptance of defective Work or as relieving the Contractor from his responsibilities under this Contract.

22. ARBITRATION

If at any time any question, dispute, or difference shall arise between the Purchaser and the Contractor, either party shall, as soon as reasonably practicable, give to the other notice in writing of the existence of such question, dispute, or difference specifying its nature and the point at issue, and the same shall be referred to the arbitration of a person to be agreed upon, or failing such agreement within six weeks, to some person appointed on the application of either of the parties hereto by the President for the time being of the Institution of Engineers of Malaysia. The award of the Arbitrator shall be final and binding on the parties. Upon every or any such reference, the costs of and incidental to the reference and award respectively shall be in the discretion of the Arbitrator, who may determine the amount thereof or the basis upon which the same shall be ascertained.

Any such reference shall be deemed to be submission to arbitration under the provisions of the Arbitration Committal Ordinance, 1950 of Sarawak and/or any statutory modifications or re-enactment thereof for the time being in force.

23. LAW GOVERNING CONTRACT

(i) Notwithstanding that the Contract and correspondence in connection with the Contract shall be in English Language, the Contract shall be and be deemed to be a Contract of the State of Sarawak and shall accordingly be governed by and construed according to the laws for the time being in force in the State of Sarawak and the Courts of Sarawak shall have exclusive jurisdiction to hear and determine all actions and proceedings arising out of the Contract and the Contractor shall submit to the jurisdiction of the Courts in the State of Sarawak, for the purpose of all such actions and proceedings.

(ii) The Contractor shall bind himself to acknowledge and accept as final in all respects within the country of domicile of the Contractor or elsewhere any decision or award of an arbitrator or judgement in any court in the State of Sarawak in relation to any dispute between the parties under the Contract whether in respect of payments to be made hereunder or in other matters. This undertaking shall be valid in all respects in case any such decision, award or judgement is to be enforced in the court of the country of domicile of the Contractor or elsewhere in any manner.

24. PERFORMANCE BOND

The Company does not bind himself to accept the lowest or any Tender, in part or in whole, nor to assign any reason for the rejection of any Tender and reserve the right award the Contract to one or more Tenderers.

Any expenses or losses incurred in the preparation of the Tender shall be borne by the Tenderer. The Tenderer shall be deemed to have read, inspected and fully understood the Conditions of Contract, the Company's Requirement and any other documents relating thereto and have obtained at its own expenses any additional information which it considers necessary for the submission of its tender / offer.

25. WITHHOLDING TAX

(i) Under Section 107A (Deduction of Tax from contract payment) of the Income Tax Act 1967, all contract payments in respect of services provided by non-resident contractor under a contract are subject to Withholding Tax.

The rate of Withholding Tax is:

a. 10% of the service portion of the contract payments to a non-resident contractor, in respect of tax of the non-resident contractor, and
b. 3% of the service portion of the contract payments in respect of tax of employees of the non-resident contractor.

The total rate of withholding tax is, therefore, 13% of the service portion of the contract payments made to a non-resident contractor.

The Contactor shall determine the service portion of a Contract. Where necessary the Inland Revenue Board may require clarification on the basis of determination of the service portion.

(ii) Refund of and/or exemption from the above taxes may be obtained on submission of satisfactory evidence of taxes having been paid to the Inland Revenue Board.

Application for this shall be forwarded to:

Lembaga Hasil Dalam Negeri Malaysia
Cawangan Tidak Bermastautin
Tingkat 10 Blok 11, Kompleks Banguna Kerajaan,
Jalan Duta,
50600 Kuala Lumpur.
Fax. Number: 03-6201 9745/ 03-6201 2417

In addition to the above, the duties of an employer in respect of his employees as embodied in the Income Tax Act, 1967, must be carried out.

(iii) The Contractor is responsible to inform himself fully on all regulations, conditions and laws with respect to taxation prior to Submission of Bid.

26. MAINTENANCE PERIOD (include relay)

(i) The Contractor is required to carry out any adjustment or maintenance as deemed necessary by the Company's representative for a **period of 18 months** after the official taking over which shall be given in writing by the Company or the Company's representative and of **5 years of protection warranty from manufacturer**. All materials and labour costs for this adjustment and maintenance shall be borne by the Contractor.

27. PRICE STRUCTURE

The prices quoted should be firm in Malaysian currency.

28. PACKING

The Contractor shall be held responsible that the items of Plant are packed so as to ensure as far as possible that they reach their destination intact and undamaged. The packing shall comply strictly with any such special requirements as shall be expressly specified in the Contract. Subject thereto, the Contractor shall protect the items of Plant in packages which will withstand rough handling in transit and which will be further suitable for export to and for storage in the tropics. The Contractor shall provide and include in the Contract Price the cost of all necessary packing cases (which shall be considered as non-returnable), material and labour.

29. CUSTOMS IMPORT DUTIES

The Contract Price shall include all duties, and taxes imposed by the Government of Malaysia.

30. TOOLS, APPLIANCES & TESTING EQUIPMENT

All necessary tools, appliances and testing equipment shall be supplied under this Contract and the cost of these is deemed to be included in the Contract Price.

31. COMPLIANCE WITH SPECIFICATIONS

Notwithstanding any descriptions, drawing or illustration which may have been submitted with the Tender, all details other than those shown on the Schedule of Departures will be deemed to be in accordance with the Specification and the standard specifications and codes referred to therein. Any case of doubts should be referred to the Engineer for his decision.

32. PROGRAMME OF WORK

The Contractor shall forward a copy of a chart detailing erection programme for the complete contract work to the Engineer for his comment or approval. The Contractor must take into account and make provision to anticipate of the weather conditions such as raining days. No excuse will be granted for any extension of the completion time for any or such reasons.

33. SAFETY REGULATIONS

The Contractor shall be in respect of all his employees in site conform to a standard of safety as high as, or higher than, the adopted by the Employer in respect of employees engaged in similar work.

The Contractor shall observe and comply with any Safety Regulations enforced by the Employer who is responsible for operation of the existing electrical system.

Where a shutdown of existing system is required to enable work to proceed, reasonable notice shall be given to the Engineer and the Employer and a programme agreed. Before works commence, a Permit to Work shall be issued by the Employer to a representative of the Contractor, such person to be agreed with the Engineer as being a responsible person. The recipient of a Permit to Work shall be satisfy himself that the Employer has made the equipment to be worked on dead, locked off any isolators, switches, or circuits breakers from which such equipment may be energised, posted any necessary warning notices and earthed the equipment in an approval manner.

The Contractor shall also be responsible for staffs under control observing the limitations of access stated on the Permit and shall ensure that such staffs are fully informed of the areas covered by the permit. He shall also be responsible for informing all staff (including Employer's and Engineer's staff) employed on work covered by Permit, when the Permit has been cancelled. Any equipment or section or line not included in the Permit shall be considered to be live and be roped off and Danger Notices posted in prominent positions. Access to the work zone shall along and only along.

34. INSPECTION AND TESTING

34.1 GENERAL REQUIREMENT

The whole of the plant and equipment provided under the Contract shall be subjected to inspection and test by the Employer during erection and on completion. The approval of the results of any such inspection or test shall not prejudice the right of the Employer to reject the Plant if it fails to comply with the Specification when erected or to give complete satisfaction in service. The costs of all tests including the provision of the necessary test equipment whether on site shall be borne by the Contractor and shall be deemed to be included in the Contract Price and Rates.

34.2 SITE TESTS AND COMMISSIONING TEST

The Contractor shall be responsible for the submission of all plant for site inspection and tests as required by the Engineer. During the course of erection, the Engineer shall have full access for inspection of the progress of the work and checking workmanship and accuracy as may be required. On completion of the work, prior to commissioning, all equipment shall be tested to the satisfaction of the Engineer to demonstrate that it is entirely suitable for commercial operation.

The Contractor shall provide all equipment necessary to carry out site tests and the cost providing this equipment shall be deemed to have been included in the Contract Price. During the course of testing, the Contractor shall be responsible for the safe keeping of the set and also to ensure that the set is in good condition.

Site test and commissioning test shall be carried out by the manufacturer's competent personnel.

Before commissioning, all electrical equipment shall be subjected to site tests as deemed necessary by the Engineer.

34.3 REJECTION OF PLANT

Any item of plant or component which fails to comply with the requirements of this Specification in any respect whatsoever at any stage, erection or on completion at site may be rejected by the Engineer either in whole or in part as he considers necessary.

After adjustment or modification if so directed by the Engineer, the Contractor shall submit the item for further inspection and/or tests.

Plant or components with defects of such nature that the requirements of this Specification cannot be fulfilled by adjustment or modification shall be replaced by the Contractor at his own expense and to the satisfaction of the Engineer.

34.4 GENERAL TEST REQUIREMENT

A programme of tests shall be agreed between the Contractor and the Engineer, and a test programme for all sites agreed in conjunction with the erection and commissioning programme prepared by the Engineer.

Testing shall be carried out during normal working hours as far as is practicable. Tests which involve existing apparatus and outages may be carried out outside normal working hours. The contractor shall give sufficient notice to allow for the necessary outage arrangements to make in conformity with the testing programme.

The contractor shall provide the requisite experienced test personnel and all relevant test equipment, unless otherwise agreed by the Engineer or stated in the Scheduled.

The Contractor shall record the results of the tests clearly, in an approved form and with clear reference to the equipment and items to which they refer, so that the record can be used as the basis for maintenance tests during the working life of the equipment. The required number of site test result records shall be provided by the Contractor to the Engineer as soon as possible after completion of the tests.

34.4.1 Standard and Methods

The methods of testing, unless otherwise specified in the Schedules, shall be agreed with the Engineer.

Details of the test equipment and instrument used shall be noted in the test sheets in cases where the instrument or equipment characteristics can have a bearing on the test results.

35. DOCUMENTATION

35.1 Tender Submission

Tender submission shall be accompanied by the following documents:

a. Modification control drawings for approval
b. Site Visitation Form duly signed by a SESCO representative
c. List of Past Experience

35.2 Final Document

The successful tenderer shall bind all information, manuals, and drawings into a booklet to form a final document. Four copies of this final document shall be provided by the tenderer.

36. LANGUAGE

The Contract Documents shall be drawn up in English Language which language for the purposes of the Contract shall be “Ruling Language”.

SECTION C

GENERAL SPECIFICATIONS

Supply, Delivery, Installation, Testing and Commissioning of Current Differential Protection Relays for 275kV S/S

1.1 GENERAL

This specification defines SESCO technical requirements for replacement of existing THR distance protection (Main 2) to numerical type of the current differential protection of transmission line linking Engkilili 275kV S/S and Kemantan 275kV S/S and T-off Betong 33kV S/S.

The protection shall be sufficiently sensitive to cater for certain combination of generating and system outage conditions, when the 275kV fault level reduces to a minimum of 1800 A. The protection shall also be suitable for a system fault level equal to the switchgear rating of 31.50 kA. All relays shall operate correctly within system frequency limits of 47 Hz to 51 Hz.

The Tenderer may propose for the Engineer's approval, an alternative arrangement using proven protection relays to fulfil the specification below with all the necessary functions and requirement on redundancy and zone overlapping. In this case, the protection system shall include but not be limited to the functions specified in this tender.

This contract will involve study, design, manufacture, supply, delivery to site, complete relay configuration, installation, testing & commissioning of current differential protection including updating existing substation drawing, dismantle of existing distance relay and supply all the associated blanking plate. This contract also to include all necessary patch cord, flexible pvc conduit, cable ladder/tray, blank plates, tripping relays, terminal blocks, auxiliary relays, miniature circuit breakers, pvc trunking, panel/equipment earthing and others accessories required for the completion of the installation of current differential protection relay.

Any additional cables required between Relay panel & Control panel; Relay panel & SCADA Interface panel; Transformer to the Control Panel and Relay Panel & Disturbance Recorder Panel for the alarm and trip signals are deemed to be included in the Contract Cost. All modification works on the control panels for alarm and trip signals shall be included. This shall include modification of the annunciator.

The following civil works are included in the scope of this contract and the cost of these is deemed to be included in the contract price:-

- Cut and hack of the lean concrete for the cable entry from the basement to the communication panels for the converter panels.
- Remedial works to buildings, foundations etc. as a result of damage caused during installation under this contract.

1.2 FAULT CLEARANCE TIMES

275 kV overall fault clearance times, i.e. relaying time plus circuit breaker time, shall not exceed the following:

i) 125 ms for substation and transformer faults.

ii) 125 ms for all 275kV line faults.

The above clearance times shall be achieved under the minimum generating conditions, as well as for a system fault level equal to the switchgear rating. They shall include any increase of operating time due to maximum d.c. current offset and any time delay caused by the use of capacitive voltage transformers.

It is generally intended that primary faults within the substation and on overhead lines up to zone 1 setting be cleared within 80 ms, and faults on overhead lines outside zone 1 setting be cleared within 100 ms.

33kV system fault clearance times shall not exceed 150ms for operation of differential protection and associated circuit breakers. Overcurrent protection system shall be capable of operating within 300ms at the 33 kV side.

1.3 ARRANGEMENT OF FACILITIES

Relay equipment shall be mounted on existing panels and cubicles as specified.

Control and relay equipment shall be mounted on panels and cubicles as specified and shall be installed in permanent buildings on the Substation Site, except where otherwise specified, control panels shall be segregated from metering and protection panels. Two or more protection shall be provided as necessary for feeder circuits and the Main 1 and Main 2 protections shall be installed in separate panels. The order of the panels shall follow the sequence shown on the drawings.

Control panels shall incorporate all necessary control and indication facilities for the operation of the plant and equipment at the associated substation. In addition, the plant may be remotely controlled from Load Despatch Centres at Kuching and Sibu.

The Contractor shall be responsible under this Contract for the provision of terminal blocks with isolating facilities where required for connection to relay and its accessories under this contract. All circuits provided under this Contract whether or not they are subject to the system control requirements at the present time, shall be designed and constructed so that the standard facilities specified can be readily provided as required in the future.

1.4 MULTICORE CABLE DIAGRAMS

Diagrams of communication arrangements will be made available to the Contractor who will be required to co-ordinate the provision of necessary multi-core cabling. This Contract includes the preparation of cabling diagrams, showing the approved routing of cores in the various cables, and detailed cable schedules and connection diagrams for all the cables associated with each item of equipment.

1.5 RELAYS

1.5.1 General

Relays shall be of approved types complying with all relevant parts of the current IEC 60255 Standards, (British Standards BS EN 60255 and 5992), shall have approved characteristics, be rack mounted on hinged frames with glass door covers or flush mounted in dust and moisture proof cases, and shall comply with BS 2011 test classification 20/40/04.

Relays shall be of numerical design with extensive self-supervision and minimal maintenance demand, functionality like event recording and service value history, and support IEC 61850 protocol communication interface.

Relays shall be of approved construction and shall be arranged so that adjustments, testing and replacement can be effected with the minimum of time and labour. Relays of the hand reset type shall be capable of being reset without opening the case.

Relay contacts shall be suitable for making and breaking the maximum currents which they may be required to control in normal service but where contacts of the protective relays are unable to deal directly with the tripping currents, approved auxiliary contactors, relays or auxiliary switches shall be provided. In such cases the number of auxiliary contactors or tripping relays operating in tandem shall be kept to a minimum in order to achieve fast fault clearance times. Separate contacts shall be

provided for alarm and tripping functions. Relay contacts shall make firmly without bounce and the whole of the relay mechanisms shall be as far as possible unaffected by vibration or external magnetic fields.

Relay, where appropriate, shall be provided with flag indicators, phase coloured where applicable. Flag indicators shall be of the hand reset pattern and shall be capable of being reset without opening the case. Where two or more phase elements are included in one case, separate indicators shall be provided for each element.

Relay settings shall be visible and readable without having to remove the relay front cover. It shall not be possible to amend relay settings with the front cover in place; other than over a serial link.

If a connector for local use is provided this shall be accessible only after removing the front cover. Where a port is provided for permanent connection to a modem or other peripheral equipment, remote access shall be password protected.

Relays which rely for their operation on an external DC supply shall utilise for this purpose the trip supply of the associated circuit-breaker. This supply shall be monitored and an alarm provided in event of failure.

Any auxiliary supplies necessary to power electronic circuits shall be derived from the main station battery and not from batteries internal to the protection.

Relays, whether mounted in panels or not, shall be provided with clearly inscribed labels describing their application and rating in addition to the general purpose labels.

Attention is particularly drawn to the tropical climate and relay designs should be entirely suitable for duty under these conditions.

To minimise the effect of electrolysis, relay coils operating on DC shall be so connected that the coils are not continuously energised from the positive pole of the battery.

Relays shall be suitable for operation on a 110 V nominal, 120 V float dc system without the use of the voltage dropping resistors or diodes.

1.5.2 Electromagnetic Compatibility

In many cases, e.g. distance protection, current differential etc., electronic relays, or devices utilising microprocessors are specified and electromagnetic devices will not be accepted.

Where such devices are required, they and the ancillary circuits connected to them, such as power supplies, current and voltage transformer secondaries, status or tripping or alarm circuits shall be designed to ensure that they are compatible for use in the hostile electrical environment found in an EHV substation.

Adequate steps, by means of suitable design, shall be taken to prevent Electromagnetic Interference (EMI) (generated by sources such as circuit breakers, disconnectors, lightning, radio or radar emissions, switching contactors in dc circuits etc.) or Electrostatic Discharges (ESD) from affecting relay performance or causing damage to components.

All relays offered must therefore have been type tested to meet the current requirements of IEC 60255 with respect to High Frequency disturbance, Fast Transients, Electrostatic Discharge, Radio Frequency Interference testing etc.

1.6 LINE PROTECTION

1.6.1 275kV Overhead Line Protection

The existing main protection at Engkilili and Kemantan Substation for the line between the two substations comprises:

Main 1: Distance protection (RAFZE) supplemented with SOTF and directional earth fault protection operating in conjunction with teleprotection channels over power line carrier circuits in a blocking scheme.

Main 2: Distance protection (THR) relay supplemented with backup distance, SOTF and carrier-assisted directional earth fault protection.

The Main 2 protection relays at these substations are to be replaced under this Contract for Engkilili-Kemantan and Kemantan- Engkilili 275kV and installing a new current differential protection at T-off Betong 33kV Overhead Line Circuits. The current differential shall be equipped supplemented with backup distance, SOTF and directional earth fault protection with all optional features available on the existing protection at Engkilili and Kemantan.

For Main 2, existing Zone 2 elements are set to approximately 120% of the protected line impedance. Zone 2 is set to overreach the remote substation. Zone 2 sends a permissive transfer trip signal to the remote end in a permissive overreach scheme.

Existing duplicated Directional Earth Fault Protection at both Engkilili and Kemantan operates in conjunction with tele-protection channels to form a blocking scheme. This contract included to convert the blocking scheme to permissive overreach scheme.

Teleprotection channels are available for permissive (DEF 1), permissive (DEF2) and direct intertrip functions. Direct intertrip is also available on a phase segregated basis.

It shall be digital current differential scheme with backup distance operating over a fibre optic communication system and complying with the requirement of Clause 1.6.1.2-Digital Current Differential Protection for 275kV Overhead Lines, supplemented with backup directional earth fault relay complying with the requirements of Clause 1.6.1.3-275kV Directional Earth Fault Protection.

Main 2 is to operate on C37.94 data channel for permissive (distance protection) and permissive (DEF2) and direct intertrip on a phase segregated basis. Tele-protection channels are available for 3 phase direct intertrip functions.

These current differential relays are also to operate with duplicate channels C37.94 protection data communication interface. Each set of protection shall be energised from separate current transformer cores, operate on duplicated dc supplies and shall have facilities for independently tripping duplicated circuit-breaker tripping coils and initiating auto-reclosing, breaker failure protection, intertripping, alarms, fault location, equipment, disturbance recorders etc.

1.6.1.1 Distance / DEF Protection for 275kV Overhead Lines

The distance protection shall comprise **four (4)** zone distance relays capable of detecting all types of phase and earth faults. Separate elements shall be provided for phase and earth fault measurement. Separate elements shall also be provided for each zone. Phase and earth fault compensation features shall be incorporated to ensure accurate distance measurement for all types of fault and to allow for variation in the path of earth faults on the system.

The Zone 1 elements will be set to approximately 80 per cent of the line. They shall trip the local line circuit-breaker. In addition, the relays shall initiate a phase selective transfer trip to the remote end.

The Zone 2 elements will be set to over-reach the remote substation and shall operate in conjunction with teleprotection signalling in a permissive overreach transfer tripping mode. They shall also act as a back-up time delayed zone.

The Zone 3 elements shall provide a further time delayed back-up zone.

The Zone 4 elements shall be set to detect reverse faults.

Partially cross-polarised mho relays are preferred for Zones 1 and 2 for 2-phase and 3-phase faults but other characteristics will be considered. Quadrilateral characteristics with adaptive reactance measurement to avoid overreach or under reach for resistive faults with pre fault load shall be provided for earth faults. The relays shall operate for faults in the direction of the protected line only. Under no circumstances shall they operate for reverse faults even when the voltage supplied to the relay fall to zero on all three phases nor shall they operate due to the transient response of the capacitive voltage transformers following reverse close-up faults.

Details of methods used for polarising the relays to deal with faults close to the relaying point shall be provided. Zone 3 shall be capable of being set as either directional or non-directional and shall be capable of being independently off set in both directions.

The reach of each zone and reverse element shall be individually adjustable by means of a multi-tap voltage transformer or other approved method. The characteristic angle shall be adjustable between approximately 40 and 80 degrees.

It is preferred that the distance relays have integral in-built signalling scheme selection logic thus allowing permissive underreach, overreach or blocking scheme to be readily selected at the distance relay.

Distance relays shall be equipped with suitable logic to achieve fast tripping at the sending end in the event of a weak infeed at the receiving end. The weak infeed logic shall comprise a Zone 3 element set to look in the reverse direction, which 'echos' back the received signal to the sending end if the reversed Zone 3 comparator does not operate.

The reverse looking impedance/directional elements shall detect all reverse faults capable of being detected by the Zone 2 relay at the remote substation. Tenderers shall explain how this is achieved.

To provide high speed tripping when a line terminal is open a 'signal echo feature' shall be provided, which is initiated when either the feeder disconnector is open, when both busbar disconnectors are open or when the associated circuit breaker is open.

Single pole tripping and auto-reclosing are being employed and the auto-reclosing scheme requirements. The distance protection shall be suitable for such a scheme and the Contractor shall substantiate by calculation or other means that phase selective tripping will be achieved under the various system and load conditions.

The necessary circuitry shall be incorporated to inhibit the Zone 1 and Zone 2 phase fault elements when necessary during single phase to earth faults and during the single phase autoreclose dead time. These features shall be selectable by links or switches. Provision shall also be made to ensure that the earth fault elements reset during the single phase dead time.

The protection sensitivity shall be shown to be adequate for the stated minimum plant conditions.

Fault resistance will be significant and the Contractor to illustrate that the distance protection can cover the values given taking fault current distribution and load conditions into account.

The operating time of each distance protection zone shall be substantially independent of fault current magnitude. The operating times shall be stated in the tender submission and, in addition, curves shall be provided showing the effect of line and source impedance, fault position and operating current.

Under no circumstances shall any line protection operate because of normal system switching including de-energisation of the line.

A feature shall be incorporated to ensure instantaneous tripping in the event that the circuit-breaker is closed onto a fault on a previously de-energised line.

Distance protection back-up Zone 2 and Zone 3 time delays setting ranges shall be 0.2 to 1.0 seconds and 0.5 to 3.0 seconds respectively.

A monitoring system shall be provided to supervise the voltage transformer supply to each set of distance protection. In the event of loss of one, two or three phases, the monitoring system shall inhibit relay operation and initiate an alarm.

All relays shall incorporate indicators to show the relay tripped, zone indication and the phase or phases faulted. Indication must not be lost in the event of a supply failure.

Directional earth fault protection shall be provided to cater for high resistance faults which cannot be detected by the distance protection.

Voltage polarising for directional relays must be able to operate down to a zero-sequence voltage of 1% of rated voltage, while at the same time a third harmonic voltage of 3% is prevailing.

Dual polarising with zero sequence voltage and current shall be provided where the source is strong. The relay sensitivity shall be adjustable between approximately 5 and 20% of rated current. A relay characteristic angle of 60 degrees is preferred but alternative angles will be considered.

Directional earth fault relays will be arranged to operate in a permissive overreach scheme, which should be capable of being enabled or disabled either by means of a switch or as an option on a menu. A dedicated DEF-function communication channel is preferred to have the highest possible security against maloperations due to communication or polarising problems.

A reverse looking DEF element shall be provided to allow the signal sending end to trip in the event of a weak infeed at the signal receive end.

Where source impedances are high there is a danger that the reverse Zone 3 or DEF element may not operate for faults beyond the weak infeed terminal, and therefore allow the weak infeed logic to echo the signal back to the sending end. To prevent incorrect tripping occurring under these circumstances, a current level detector must have picked up before any signal is sent.

The directional earth fault protection shall initiate three pole tripping without autoreclosing. It must therefore include a short time delay to permit single pole tripping by the distance protection.

The forward looking directional relays shall incorporate a definite time back-up stage. The time delay range shall be 0.2 to 2.0 seconds. It shall also be possible to set Normal inverse characteristic, with a minimum time delay so as not to interfere with the normal tripping from distance protection under maximum fault conditions.

Neither the distance protection scheme nor the directional earth fault scheme shall mal-operate due to fault current reversal during sequential clearance of a fault on the parallel circuit.

An approved current reversal guard is required to prevent the possibility of maloperation on current reversals following sequential opening of circuit breakers.
Suitable time delays, or other approved means shall also be provided for the following purposes:

i) To prevent the signalling channel "locking up" following fault clearance due to the 'echo' arrangement.

ii) To extend the duration of the send signal initiated by the Zone 1 unit, to enable both ends of a protected circuit to trip, following a fault close to one end of a parallel circuit, which is fed from one end only.

The extension of the duration of the send signal must not occur for permissive intertripping signals initiated by Zone 2 elements, as this may result in unwanted tripping of a healthy circuit during current reversals during fault clearance on a parallel circuit.

The effect of zero sequence mutual coupling between the double circuit lines on the protection shall be described, together with any measures considered necessary to overcome this effect.

The distance protection time delayed back-up Zones 2 and 3 and the directional earthfault scheme and back-up stage shall intertrip the remote station circuit-breakers over direct intertripping channels. Auto reclosing shall not be initiated on receipt of direct intertripping signal. Direct intertripping shall also be initiated in the event of a 3 phase fault in any zone.

Distance relays shall be supplemented by power swing blocking relays. Power swing blocking relays shall be compatible with their appropriate distance relays, and for distance relays having offset mho Zone 3 characteristics or starters shall comprise an offset mho characteristic which encompasses and is concentric with the distance relay impedance starter or Zone 3 characteristic. Similarly where it is possible to shape the Zone 3 or starter characteristic the power swing blocking relay characteristic shall also be capable of similar shaping.

Facilities shall be provided to block Zones 1, 2 and 3 of the distance relay as required.

Blocking logic shall be derived by determining the time taken for the apparent impedance of the power swing locus to pass from the characteristic of the power swing relay to the distance relay starter characteristic. Blocking shall not take place until the apparent impedance has passed through the two power swing characteristics and the time has expired.

The associated time delay relay shall have a setting range of 50-250 ms.

The setting range of the power swing relay characteristic angle shall at least be adjustable over the same range as the distance relay starting or Zone 3 characteristic.

Reset times shall be low to ensure the associated distance relay reverts to its normal role as soon as possible following a power swing.

Power swing blocking shall be inhibited during the single pole dead time of an auto reclose cycle so that if a power swing develops during this period the distance protection can give an immediate three phase trip. The tenderer shall advise whether it is possible to extend the inhibition of the power swing blocking to cover a period immediately following auto reclosing so that if a power swing develops on reclosing onto a permanent fault a 3 phase trip would be permitted. The tenderer shall also advise whether power swing blocking can be inhibited if an earth fault occurs during a power swing.

If the associated VT supplies are lost due to VT fuse failure the power swing blocking relay shall not operate.

Where protection is supplied from multi-ratio current transformers, the lowest ratio will be used for the initial system configuration, when fault levels are low. The working ratio will be increased when the system expands and the fault levels and load transfers increase.

The unit scheme shall be self-monitoring from end-to-end and give separate alarms for relay failure or communication channel failure. Any failure of the scheme shall automatically render the scheme inoperative.

The relays shall incorporate fault and event recording features. It shall be possible to transfer recordings out through a serial communication link and be saved in Comtrade format. All necessary application and communication software are to be provided for protection monitoring through serial communication facilities. Protocol for communication between protection relays and any Substation Control System shall be IEC 61850.

The correct local loop back link required for commissioning shall also be provided.

The integral direct intertripping facility shall be employed to initiate Direct Intertripping from one substation terminal to the remote terminal (and vice versa) on operation of:

- 275kV & 132 kV busbar protection

- Circuit breaker failure
- Directional earth fault protection
- Distance protection time delayed back and zones
- Back up overcurrent and earth fault protection.

1.6.1.2 Digital Current Differential Protection for 275kV Overhead Lines

Digital current differential relays shall have phase segregated measuring elements, providing single phase tripping for single phase faults and three phase tripping for multi phase faults. Evaluation should be done simultaneously at both line ends and take into consideration both amplitude and phase angle.

They shall operate for phase faults and earth faults within the protected zone and remain stable for through faults of magnitude up to the maximum rated breaking capacity of the associated switchgear. The associated CT requirement shall be stated.

Phase and earth fault operating sensitivities shall not be more than 100% and 20% respectively of the nominal rated current of the relay. Operating time characteristic shall not be more than 30ms. Primary faults along the whole line shall be cleared by circuit breaker tripping within 80ms, with fault resistance in the fault and for different fault inception angles.

The relay shall be equipped with charging current and load compensation features.

The maximum fault resistance coverage provided by the current differential relay for each line section shall be stated assuming the load current is 1 pu and the CT ratio is selected to the maximum value.

The current differential protection shall operate over a multiplexed linked provided by others. The relay communication interface will be C37.94 with redundant channel. Delay in communication shall be continuously measured and automatically compensated for.

The fibre optic cable and all accessories for connection from relay to communication equipment are deemed to be included this contract. In that case, fibre optic cable and all accessories used should follow the recommendation as specified by the manufacturer.

The unit scheme shall be self-monitoring from end-to-end and give separate alarms for delay failure or communication channel failure. Any failure of the scheme shall automatically render the scheme inoperative.

The relays shall incorporate fault and event recording features. It shall be possible to transfer recordings out through a serial communication link and be saved in Comtrade format. All necessary application and communication software are to be provided for protection monitoring through serial communication facilities. Protocol for communication between protection relays and any Substation Control System shall be IEC 61850.

The correct local loop back link required for commissioning shall also be provided.

The integral direct intertripping facility shall be employed to initiate direct intertripping from one substation terminal to the remote terminal (and vice versa) on operation of:

- 275kV and 132kV busbar protection
- Circuit breaker failure
- Directional earth fault protection
- Distance protection time delayed backup zones
- Back up overcurrent and earth fault protection

The backup distance protection and directional earth fault protection in the digital current differential protection relays shall comply with the requirements stated in Clause *1.6.1.1- Distance/DEF Protection for 275kV Overhead Lines.*

1.6.1.3 275kV Directional Earth Fault Protection

The second main protection (digital current differential) shall be supplemented by a back-up directional earth-fault protection. This shall comply generally with *Clause 1.6.1.1- Distance / DEF Protection for 275kV Overhead Lines.*

1.6.2 System Operating Modes

The line protection shall be shown to be suitable for the maximum system fault levels quoted, and for the minimum and maximum generation conditions which shall be made known to the Contractor prior to the preparation of data for the line protection scheme test.

For minimum generation condition, the fault resistance shall be:

- 31 ohms for phase - phase faults
- 10.3 ohms for phase - earth faults

These are the estimated fault resistance values based upon total fault current. When substantiating the relay performance, the effective resistances are to be used taking current distribution, etc., into account.

1.6.3 Summary of Information to be Provided Following Contract Award

(a) Provide details of methods used for polarising the distance relay to deal with faults close to the relaying point.

(b) Substantiate that phase selective tripping will be achieved under the system conditions.

(c) Show that the distance protection will cover the fault resistance values. Fault current distribution and load currents are be taken into account.

(d) Provide curves showing the effect on distance protection operating times of line and source impedance, fault position and operating current.

(e) Provide full details of the Weak end infeed relaying equipment.

(f) Describe the effect of zero sequence mutual coupling between the double circuit lines on the distance and directional earth fault protection together with any measures considered necessary to overcome the effect.

1.7 AUTOMATIC RECLOSING

1.7.1 275kV Automatic Reclosing

Three pole and/or single pole single shot repetitive auto-reclosing equipment is available.

(This section is mainly for information)

Reclosing shall be initiated following tripping by the digital current differential relay, distance protection Zone 1 or accelerated Zone 2, or on receipt of a permissive intertripping signal. Reclosure shall not be initiated in event of a three phase fault, tripping following circuit breaker failure, any type of fault in the second or third distance relay back-up zones or when the circuit-breaker is closed onto a fault on a previously de-energised line. The following modes of operation shall be selectable by means of a switch or switches:

(a) Single pole, high speed, reclosing. Auto-reclosing shall only be initiated in the event of a single phase to earth fault. All other types of faults shall result in three phase tripping without auto-reclosing.

(b) Three pole delayed reclosing. Delayed reclosing shall only be initiated in the event of a single phase or two phase fault. Three phase faults shall result in tripping without auto-reclosing.

(c) Single pole, high speed/three pole delayed reclosing. Single pole, high speed auto-reclosing shall be initiated only in the event of a single phase-earth fault and delayed three pole reclosing initiated in the event of a two phase fault. Three phases tripping without re-closing shall take place for three phase faults.

(d) No auto reclosing. Three phases tripping without auto-reclose shall take place for any type of fault. Means shall be provide to switch the autoreclosing equipment in and out of service from the control panel and by supervisory control.

If a second earth fault occurs during the single pole auto-reclose dead time, three phase tripping with subsequent delayed three pole auto-reclose shall take place if the auto-reclose selector switch is in the single and/or three pole reclosing mode. If the selector switch is in the single pole reclose mode, three phases tripping with lockout should follow. If the second fault is a phase to phase fault, three poles tripping without reclosing shall take place for both selector switch positions.

It is appreciated that if the second fault occurs just prior to or during the elapse of the single pole dead time, it may not always be feasible to have the single pole reclosing sequence. Under such circumstances single pole closing will be tolerated but the relaying scheme must ensure that all poles are then tripped immediately without further reclosure. Tripping initiated by the circuit-breaker pole discrepancy scheme will not be permitted. Two shot reclosing i.e. single pole high speed followed by delayed reclosing will not be permitted.

The high speed and delayed reclosing dead times shall be:-

- High speed single pole reclose dead time - 0.3 to 3 seconds.
- Delayed three pole reclose dead time - 3 to 30 seconds.

The reclaim time i.e. the time period following the automatic reclosing of the circuit breaker, during which further faults result in three phase tripping and lockout, shall be chosen to match the duty cycle of the circuit-breakers, assuming the shortest available dead time is chosen. The reclaim time shall not, however, be less than five seconds, and the reclaim timer range shall extend to 180 seconds. (The reclaim time commences at the instant the reclose command is given to the circuit-breaker and, therefore, includes the circuit-breaker closing time). The closing command shall be limited to two seconds, after which time the reclosing equipment shall automatically reset without resetting the reclaim timer. The reclosing equipment shall also reset if dead line check or synchronism check conditions are not satisfied within five seconds of the check relays being energised.

A counter shall be provided to record the number of reclosures.

Dead line check relays shall monitor the condition of the line and busbar and permit three pole reclosing under dead line conditions only when the line is de- energised and the busbar is energised. The line is considered to be de-energised when the voltage is less than twenty percent of rated voltage, and the busbar is considered to be energised when the voltage is greater than eighty percent of rated voltage.

In the case of an energised line, a synchronism check relay shall monitor the magnitudes of the voltages on both sides of the open circuit-breaker, and the phase angle and frequency between these voltages. Closing is only permitted when these are within prescribed limits. The voltage setting shall be adjustable between eighty and one hundred per cent of rated voltage and the phase angle setting adjustable between zero and forty degrees. The maximum permissible slip frequency shall be of the order of 0.10Hz.

1.8 TRIPPING RELAYS

All tripping relays, where specified shall be of the heavy duty type suitable for panel mounting.

Trip relay contacts shall be suitably rated to satisfactorily perform their required duty and relay operating time shall not exceed 10 ms from initiation of trip relay operating coil to contact close.

Where specified latching type relays shall have hand or electrically reset contacts and hand reset flag indicators. Resetting of the flag indicator and the contacts shall be possible without having to open the relay case.

1.9 TELEPROTECTION SIGNALLING

Details of protection initiation and various blocking and direct intertripping signals are indicated in the attached drawing.

The teleprotection signalling provides for phase segregated transfer intertripping. Receipt of the transfer trip signals shall trip the relevant phase and initiate single pole auto-reclosing.

2.0 ALARM SCHEMES

Alarm shall be sub-divided into trip and non-trip functions and each arranged to operate a common bell or buzzer as specified. All the expenses for making the existing bell or buzzer into operation or replace the faulty bell or buzzer are deemed to be included in the Contract Cost.

Trip alarms are located on top rows of annunciator window while non-trip alarms are at the bottom. Non-trip alarms are supposes to trigger a buzzer and trip alarms are to trigger a bell. Red colour filter or red luminaries (LED type is preferred) shall be used for trip alarms. Yellow colour filter or yellow luminaries shall be used for non-trip alarms.

Means shall be provided for silencing audible alarms whilst leaving the bell or buzzer free to sound if any other alarm circuit is energised.

Alarm indicating lamps shall remain alight until cancelled by the resetting devices initiating the alarms and the operation of a separate cancellation switch.

Where devices initiate alarms when machines are shut-down the circuit should avoid unnecessary display and sounding of the alarm condition.

A common fascia for each circuit shall be provided and mounted on the associated control panel. Common alarm fascia shall be of the multi-window type (preferably with individually replaceable windows) with individual alarms operated from self seal-in relays and indicated by flashing illumination of an inscribed transparent window. The number and type of alarm of alarms shall be to the approval of the Engineer. A common accept key shall operate in such a way that it cause the light to become steady and silence the audible alarm, and the flasher relays shall be arranged to be cut-out when the substation is unattended. When no alarm fascia is specified, alarms shall be displayed by means of individual lamps mounted on the control panels. Resetting of the individual alarm relays shall only be possible after initiating contacts have been reset.

For the purpose of transmission to the system control centre, alarms shall also be received by SCADA interface cabinet located in the Substation Control Room (to present these signal to the supervisory equipment and interposing relays). Therefore a switch internally (repeater to output) in the annunciator is preferable rather than individual auxiliary switches.

PC based software must be provided according to the contract, if applicable.

2.1 ANNUNCIATOR

The Contractor shall replace existing annunciator system to the approved alarm (annunciator type: DC-DC converter). The minimum window for the annunciator shall be 56 windows.

2.2 DIGITAL POWER METERS

The Contractor shall replace existing smart meter to digital power meter. Type of the Digital Power Meter to be supplied shall be equipped with RS485 communication port and support MODBUS protocol. The power meters shall be used to receive a number of pulse type inputs from energy meters and from these produce analogue outputs, pulse type outputs and serial data links on which measured data is transmitted to other devices. The operational metering data required shall include both analogue and digital measurements of active and reactive power flows and energy measurements of the same quantities.

Meters shall be in the form of two physically separate units; one to receive the meter pulse inputs (located near the source contacts) and the other to process the inputs (located 2 km away from the source). The two units shall be connected via a serial data link.

2.2.1 Inputs

Inputs shall be voltage free contacts provided either directly from the meters or more normally via interposing relays fed from the meters. For a fixed amount of either active or reactive power energy, an input pulse shall be received by the meters depending on the type. These will have to be agreed with the Engineer. High accuracy meters shall have to be used for the provision of the pulse inputs; accuracy of 0.2% class with pulse rates of typically between 2Hz to 4Hz at the nominal full load rating of the circuits involved.

The number of inputs required for a unit shall be agreed with the Engineer. Units able to accommodate up to 32 inputs will be suitable. The meter shall have a minimum of 16 meter input channels with the capability to accommodate 32 channels.

Supply voltage for inputs shall be supplied by the meter and not greater than 43 V DC.

2.2.2 Analogue Outputs

The analogue outputs representing active and reactive power shall be derived from one or more of the pulse type inputs. The meters shall be provided with a serial data link output to link the analogue and pulse type outputs to the SCADA outstation.

Meters shall at minimum provide 16 bi directional current loop outputs. Maximum output current shall be at least 12.5 mA and the maximum output voltage under all conditions including open circuit shall be 20 V.

Each output shall be provided with two external connection points.

2.2.3 Pulse Outputs

Meter shall be capable of providing a minimum of 8 isolated pulse contact outputs. These shall be either solid state or electromechanical relay types. The contacts shall have a minimum life at least 2 x 108 operations at the nominal contact burden conditions.

The pulse outputs shall be suitable for use with an external 48 V DC battery supply. A reversed voltage connection to the outputs shall not cause any damage.

2.3 PROTECTION SETTINGS

Relay settings for all unit type protective schemes and for distance relays shall be submitted to the Engineer and Employer prior to commissioning of any plant for approval. Because of the need to co-ordinate the distance relay settings, settings shall also be provided for all distance relays supplied under this contract or existing devices which require settings to be amended as a result of work carried out on this Contract. Settings shall also be provided for those relays and other equipment provided under this Section of the Contract which do not require an intimate knowledge of existing relay settings e.g. circuit-breaker fail relays. Detailed calculations shall be provided supporting the recommended settings.

The Contractor shall also be responsible for the preparation of all device logic and configuration files for protection relays. These settings and configurations shall be submitted for review along with protection settings.

Where the programmable internal logic of numeric relays forms part of the scheme design, the Contractor shall also provide these proposed configurations along with the external schematic diagrams.

Any additional information needed by Tenders should be requested.

2.4 SCHEME TESTS BY TRANSIENT NETWORK ANALYSER / SIMULATOR

The 275kV line protection shall be subjected to scheme test using a transient network analyzer or real time digital simulator, such as the RTDS/ EMTDC or an interface of both. A section of the SESCO power system shall be modelled, inclusive of line reactors. The test shall be carried out using RTDS located in SEB's headquarters. The Contractor is required to survey the said RTDS facility. In order to ensure the existing facility is adequate, any additional requirement shall be provided by the Contractor. The manufacturer's representatives are required to carry out the test.

Conjunctive tests are required to test the operation and stability of the line protection relays at both ends of a transmission line, for simulated SESCO power system faults, with sources at both ends. The simulation shall include the teleprotection signalling channel pickup & drop-off times.

The tests shall comprehensively cover the different fault types, fault incident angles, for various circuit configurations, double line and single line operation, under maxiumum and minimum generation conditions.

Fault shall be applied on 0%, 30%, 70%, 100% of the transmission line for internal solid and high ohmic fault and busbar, 0%, 100% of the parallel line for external solid and high ohmic faults. Tests for current reversal shall include solid and high ohmic faults.

Fault resistive coverage shall be determined iteratively to obtain the fault resistance which would lead to an instantaneous fault clearance at Kemantan, Engkilili, and Betong.

The tests are to include autoreclosing sequence, including evolving faults for a single pole tripping, reclosure, and three pole tripping sequence to the distance relays to simulate the distance protection response to a reclosure.

2.5 DIAGRAMS

The Contractor shall submit schematic diagrams for consideration of the Engineer within one month of the Contract commencement date.

The Contract documentation shall include modified circuits at existing substations. These may include existing drawings and cable numbering systems where they are unchanged and new drawings covering the modified and new equipment.

2.6 CURRENT TRANSFORMER CALCULATIONS

The Contractor shall submit to the Engineer detailed calculation substantiating the parameter of the current transformers he proposes to provide. They shall be presented within six weeks of the Contract commencement date.

The existing current transformer ratio details are such as listed below;

i. At Engkilili 275kV Substation
- 1250/500/250/1A - 5P20, 10 VA

ii. At Kemantan 275kV Substation
- 1250/500/250/1A - 5P20, 10 VA

iii. At Betong 33kV Substation
- 600/400/200/100/5A MR - 10P20, 100 VA

The detailed calculations shall prove the existing current transformer can be used for the current differential protection at Kemantan, Engkilili and Betong substations.

2.7 TESTING OF PROTECTIVE RELAYING EQUIPMENT

2.7.1 Type Tests

Type tests may be waived at the Engineer's discretion if adequate type tests have already been performed and copies of the type test reports are supplied giving detailed test information, including test results.

Otherwise tests shall be performed on relay supplied under the contract. They shall cover the complete performance of the relay and shall be based on the appropriate sections of the latest issues of IEC 60068, 60255 and 61000 Recommendations. They shall also include the following tests as a minimum requirement:

1. Tests to prove that the device will not maloperate when the dc supply is interrupted and/or reduced, irrespective of the duration of interruption and magnitude of the dc and irrespective of the magnitude of the ac measuring quantities. The test must also prove that its performance is unaffected when the dc supply is reduced to any value above the claimed minimum operating threshold.

2. Type tests shall be performed on each type of protective scheme simulating service conditions as closely as possible to prove sensitivity, stability, operating times and correct operation.

3. Type tests to BS 2011 classification 00/50/04.

4. Secondary Injection, full scheme test which involves end to end testing and all the necessary tests as required by the Engineer must be carried out.

2.8 TRAINING

It is the intention of the Purchaser to undertake the maintenance of the protection relay after the warranty period. At such the Contractor shall instruct the Purchaser's personnel, both at Purchaser's place and at site, in the operation and maintenance (including trouble-shooting) of the current differential protection supplied under this Contract. The Contractor shall satisfy himself and the Engineer that the Purchaser's employees are fully capable of operating and maintaining the system before the Contractor's personnel leave the site.

Tenderers are required to submit the following recommendations: -

i. Full details of training facilities as well the type of courses available.

ii. Details and duration of the formal hardware and software training programmed and courses.

iii. Proposed location for the formal hardware and software training courses.

2.9 FACTORY ACCEPTANCE TEST (FAT)

The Contractor shall give to Engineer, with a copy to the Employer, 21 days notice in writing of the date after which he will be ready to make the Tests on Completion. Unless otherwise agreed the tests shall take place within 10 days after the said date on such days as the Engineer shall notify the Contractor in writing.

If the Engineer fails to appoint a time after having been asked so to do or to attend at any time or place duly appointed for making the said tests the Contractor shall be entitled to proceed in his absence and the said tests shall be deemed to have been made in the presence of the Engineer and the results of the tests shall be accepted as accurate.

The Contractor shall conduct the following preliminary functional and system performance test (pre-FAT) locally (in Kuala Lumpur, Malaysia) to verify compliance with the requirement of the specifications:

i. Diagnostic test of all the hardware, using the latest revision level of the diagnostic programs.

ii. Functional testing on all computing function, including memory and program interrupt facilities.

The Contractor shall provide documented evidence that the systems meets the specification before the Purchaser deems that the system is ready for the FAT.

The formal FAT will be witnessed and conducted in some parts by the Purchaser's personnel and shall include, but not necessarily be limited to the following:

i. All operational and functions shall be demonstrated.

ii. All input / output contacts points shall be individually verified for correctness.

iii. All software functions shall be demonstrated to be operational.

iv. All alarm and error detection functions shall be checked.

v. All software maintenance procedures shall be checked.

If any Portion of the Works fails to pass the tests, tests of the said Portion shall, if required by the Engineer or by Contractor, be repeated within a reasonable expenses to which the Employer may be put by the repetition of the tests shall be deducted from the Contract Sum.

If the Works fails to pass the tests on the repetition, the engineer shall be entitled to:

i. To order a further repetition of the tests.

ii. To reject the Works or a Section thereof in accordance that if the results of the tests show that the Works or the Section fail to meet the performance guarantees or the agreed tolerances specified in the Contract, or there are not in accordance, the results show that the Works or the Section are not in accordance with the Contract.

iii. To issue a Taking-Over Certificate, if the Employer so wishes, subject to such reduction of the Contract or, failing such provision, as may be agreed by the Employer and the Contractor or, failing agreement, as may be determined by arbitration.

For tender purposes, it can be assumed that two SESCO engineers will be required to witness the system performance tests and fully trained on both the hardware and software maintenance aspect of the protection relay during the system performance tests. All the expenses for the system performance tests are deemed to be included in the Contract Cost.

2.10 SITE TESTS

Tests on completion of erection shall be carried out by the Contractor. They shall provide all necessary test equipment to carry out the Site tests and shall include the cost of the equipment so that the Purchaser may have the option to buy the equipment on completion of the Contract.

The Contractor shall submit a written program of tests and checks according to this Clause for the approval of the Engineer. A brief description of all tests and testing procedures shall be provided before tests commence and the method of testing, unless otherwise specified in the Schedules, shall be agreed with the Engineer.

The Contractor shall provide experienced test personnel and testing shall be carried out during normal working hours as far as is applicable. Tests which involve existing apparatus and outages may be carried out outside normal working hours. The Contractor shall give sufficient notice to allow for the necessary outage arrangements to be made in conformity with the testing program.

During the course of erection, the Engineer shall have full access for the inspection of the progress of work and for checking workmanship and accuracy as may be required. On completion of the work prior to commissioning, all equipment shall be tested to the satisfaction of the Engineer to demonstrate that it is entirely suitable for operation.

Commissioning tests shall be carried out in the presence, and to the satisfaction, of the Engineer by qualified technical representatives agreed by the Engineer. The Contractor will also need to conduct parts of the tests, especially those related to operational functions and features. The tests shall be exhaustive and shall demonstrate that the overall performance of the complete system satisfies every requirement specified.

2.11 LOCAL TECHNICAL SUPPORT

The contractor shall provide local technical support to SESCO at all time with regards to the entire proposed protection relay systems. The contractor shall submit to SESCO three names including the contact number of their local support based in Malaysia.

SCHEDULE A: SCHEDULE OF REQUIREMENTS

No.	Current Differential Protection for Transmission Substation
1.	Replacement of existing THR distance protection (Main 2) line linking Engkilili 275kV S/S and Kemantan 275kV S/S and T-off Betong 33kV S/S to numerical type of current differential protection with carrier assisted directional earth fault protection; switch on to fault, fault locator for the following feeder : • Engkilili-Kemantan (Flush Mounting) • Kemantan-Engkilili (Flush Mount) • T-off Betong (Flush Mount)
2.	Engkilili-Kemantan 275kV and T-off Betong 33kV Line Protection System type tests at SEB's RTDS Lab, Kuching, Malaysia by respective manufacturers. Using SEB's RTDS simulator, the line protection scheme including the auto-reclosing equipment shall be thoroughly tested to prove complete performance under service conditions. Aspects to be examined are to include sensitivity, operating times, fault resistance coverage, phase selection, current reversals and various selection of auto-reclosing. The following equipments will be provided by SEB: -4 racks for RTDS Simulator -4 sets of Omicron CMS 156 Voltage & Current Amplifiers -1 no. Tektronix DP03034 Oscilloscope -2 nos. of PC -Ammeter Manufacturer or Tenderer shall visit SEB's RTDS Lab and bring along the necessary testing equipments, tools and accessories that require to perform the type tests.

The current differential with backup distance, switch on to fault and carrier assisted directional earth fault protection shall be equipped with all optional features available.

The current differential protection shall be designed to operate for nominal 110V dc battery and 1 Amp rated.

The current differential protection shall be provided at least 25 output contacts with 6 high-speed outputs, interrupting output contacts and at least 16 optoisolated contacts inputs.

Tenderers are reminded to visit the site to ascertain the site condition and works to be carried before tendering.

SCHEDULE B: TECHNICAL PARTICULARS AND GUARANTEES

The Tenderer shall complete this Schedule in full at the time of Tendering.

Tenderer should note that incomplete entry of this Schedule will be treated as a non-compliance with Tender requirements and might influence the course of Tender Evaluation.

Tenderer should complete in full all the particulars and guarantees for each type of equipment listed in the Schedules.

The Tender Bond is required to accompany your tender.

Additional:

i) Engkilili 275kV-Kemantan 275kV S/S

- Replacement of existing THR distance protection (Main 2) line linking Engkilili 275kV S/S and Kemantan 275kV S/S and T-off Betong 33kV S/S to numerical type of current differential protection.
- Additional cables required between relay panel and control panel, cables from switchgear to control panel and cables from control panel to SCADA interface panel are deemed to be included in the contract cost.
- Include Transient Network Analyzer (TNA).

ii) Kemantan 275kV-Engkilili 275kV S/S

- Replacement of existing THR distance protection (Main 2) line linking Engkilili 275kV S/S and Kemantan 275kV S/S and T-off Betong 33kV S/S to numerical type of current differential protection.
- Additional cables required between relay panel and control panel, cables from switchgear to control panel and cables from control panel to SCADA interface panel are deemed to be included in the contract cost.
- Include Transient Network Analyzer (TNA).

iii) Betong 33kV S/S –

- Install current differential relay.
- Replace the existing annunciator system to the approved alarm (annunciator type: DC-DC converter) with a minimum of 56 windows.
- Additional cables required between relay panel and control panel, cables from switchgear to control panel and cables from control panel to SCADA interface panel are deemed to be included in the contract cost.
- Replace the existing analog meter to digital power meter.
- Include Transient Network Analyzer (TNA).