



CUSTOMER APPLICATION SURVEY FOR NEW PRODUCT DEVELOPMENT

CAS #

CUSTOMER: SALESPERSON: SALES ORDER #: DATE:

Completion of all information on this form will enable our engineers to accurately meet your application requirements. Please be as detailed and complete as possible. Upon request, we will be happy to assist with the level of expertise necessary to properly define a final design specification.

I. CUSTOMER:

ADDRESS: CITY: STATE: ZIP: PROJECT NAME: COUNTRY: CONTACT NAME: TITLE: PHONE: FAX: E-MAIL:

II. PRODUCT DEFINITION:

A: DESCRIPTION: BATTERY CHARGER SAFETY CIRCUIT OTHER B: CLASSIFICATION: CONSUMER COMMERCIAL MEDICAL GOVERNMENT C: DEVICE: D: TYPE DESIGN: PRELIM FINAL MECHANICAL ELECTRICAL

IF YOUR PRODUCT ALREADY EXISTS, CAN SAMPLES AND/OR SCHEMATICS BE PROVIDED?

III. PRODUCTION QUANTITIES PER YEAR:

BATTERY: MIN. ORDER QTY REQUIRED BY: CHARGER: SAFETY CIRCUIT: OTHER:

IV. ELECTRICAL SPECIFICATIONS:

IF A SPECIFICATION OR DRAWINGS ALREADY EXIST, PLEASE ATTACH

CAPACITY: mAh VOLTAGE: VOLTS

V. PROTECTION / SAFETY:

ALL BATTERY PACKS SHOULD BE PROTECTED AGAINST SHORT CIRCUITS AND OVER CHARGING LITHIUM ION PACKS MUST HAVE CIRCUITS TO PROTECT AGAINST OVER CHARGING.

CUSTOMER WILL PROTECT BATTERY EXTERNALLY DEFINE BUILT IN PROTECTION REQUIREMENTS

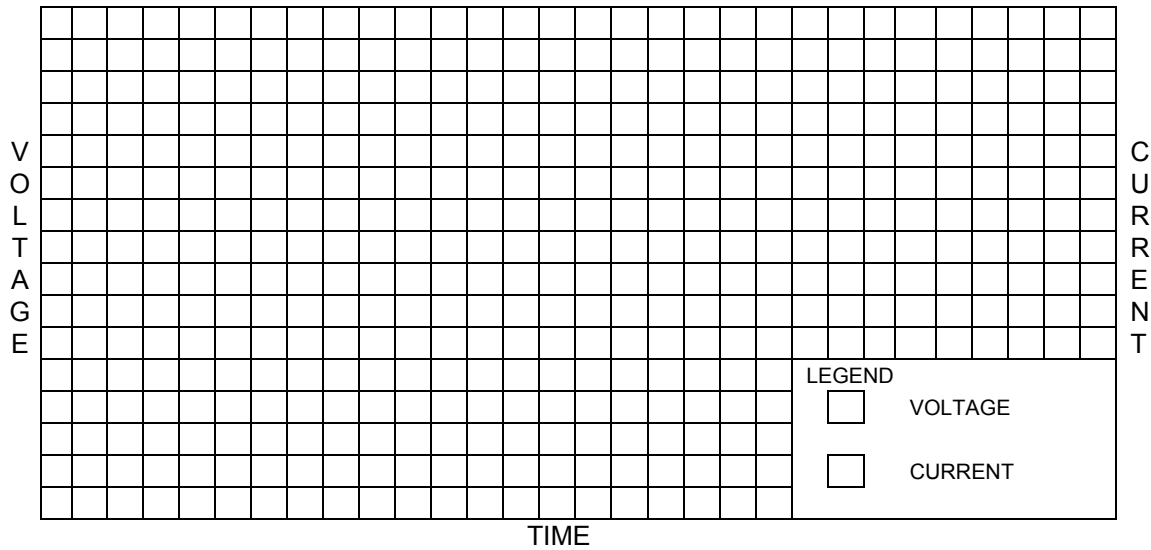
Table with columns: SHORT CIRCUIT, OVERCHARGE, RATING, MANUFACTURER, MODEL #. Rows: POLYSWITCH, THERMOSTAT, THERMISTOR, FUSE, OTHER.

Note 1. NiMH cells can reach over 95°C if overcharged. We may recommend a redundant thermostat set at 70°C to 75°C to protect against charger failure.

Note 2. For Li-Ion cells, AMSTRON adds a protection circuit to protect against:

- A. Over Voltage: If any series cell voltage exceeds 4.25 – 4.30 volts, the charge FET's will open to stop the charge. The FET's will close once the voltage drops to a specified value.
B. Over Discharge: If any series cell voltage drops below 2.25 - 2.35 volts, the discharge FET's will open to stop the discharge. They will close once the voltage rises to a specified value.
C. Over Current / Short Circuit: Selected FET's limit the maximum current that can be delivered through the circuit. The value will be determined based on the required battery discharge current.

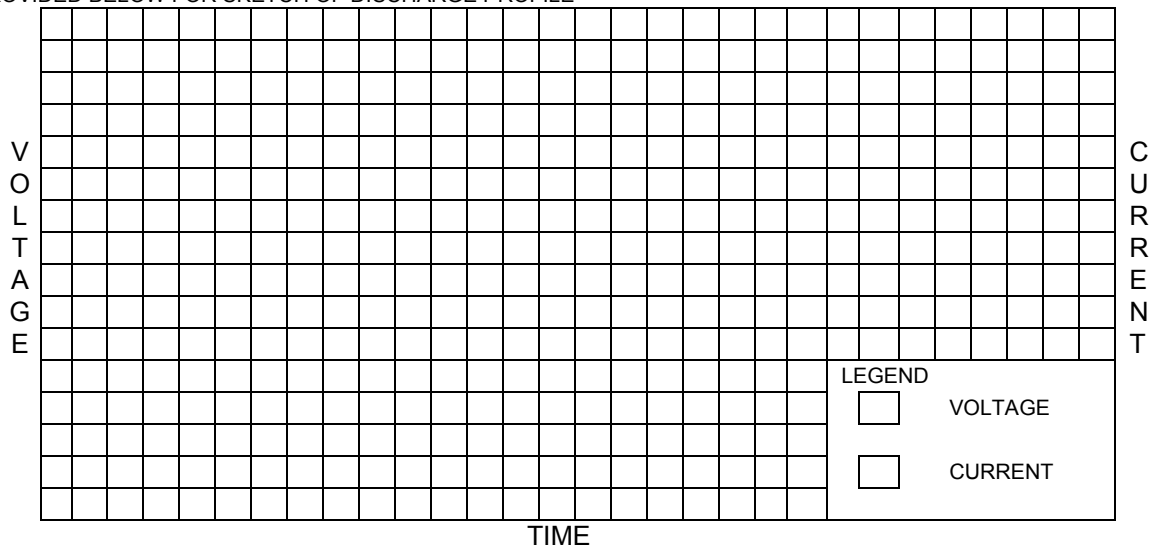
SPACE PROVIDED BELOW FOR SKETCH OF CHARGE PROFILE INCLUDING KNOWN SPIKES / TRANSIENTS OCCURING DURING USE



VIII. DISCHARGING METHOD: *PLEASE ATTACH PROFILE IF KNOWN.*
NiMH & NiCd STANDARD IS 0.2C TO 1 VOLT PER CELL. LITHIUM ION STANDARD IS 0.2C TO 2.8 VOLTS PER

- A. DIS CHARGE TERMINATION METHOD: TIME: _____ MINUTES CURRENT _____ mAh
 VOLTS: _____ V OTHER: _____
- B. OPERATING TEMPERATURE DURING DISCHARGE: MINIMUM: _____ °C MAXIMUM: _____ °C
- C. MAXIMUM TRANSIENT CURRENT: MAXIMUM: _____ mA DURATION: _____ Time
- D. MAXIMUM IN-RUSH (TO HOST DEVICE) CURRENT: MAXIMUM: _____ mA DURATION: _____ Time
- E. MAXIMUM CONTINUOUS CURRENT: MAXIMUM: _____ mA DURATION: _____ Time
- PULSED APPLICATION: DEFINE PROFILE: _____
- F. WILL YOUR APPLICATION TERMINATE DISCHARGE? _____ AT WHAT VOLTAGE PER CELL? _____

SPACE PROVIDED BELOW FOR SKETCH OF DISCHARGE PROFILE



IX. SMART BATTERY REQUIREMENT:

CONTROL CHIP RECOMMENDED TO USE WITH YOUR HOST: _____

SMBus COMMUNICATION:

Benchmark BQ2040 1.0 COMPLIANT: _____

Benchmark BQ2060 1.1 COMPLIANT: _____

APPLICATION SPECIFIC IC: _____

Benchmark 1-WIRE HDQ16: _____

Dallas 1-WIRE INTERFACE (DS2438): _____

OTHER: SPECIFY: _____

HAVE YOU COMMUNICATED TO THIS CHIP BEFORE WITH YOUR HOST? _____

SPECIAL EEPROM PARAMETERS (IF APPLICABLE)

REMAINING TIME ALARM: _____ (DEFAULT: 10 MINUTES)

REMAINING CAPACITY ALARM: _____ (DEFAULT: DESIGN CAPACITY/10)

CYCLE COUNT: _____ (DEFAULT: ZERO (0))

CHARGE EFFICIENCY: (%): _____ (NORMALLY 100% FOR LI-ION)

END OF DISCHARGE V (V): _____ CAUSES TERMINATE DISCHARGE ALARM, CONDITIONING QUALIFIER

REMAINING CAPACITY ALARM: _____ (DEFAULT: DESIGN CAPACITY/10)

TAPER CURRENT: _____ (mA)

SERIAL NUMBER: _____ DEVICE NAME: _____

OTHER: _____ SPECIFY: _____

HAVE YOU COMMUNICATED TO THIS CHIP BEFORE WITH YOUR HOST? _____

FUEL GAUGE ACCURACY REQUIREMENTS: _____

IS IN-PACK FUEL GAUGE REQUIRED? _____ LOCATION: _____

NUMBER OF LIGHTS / INCREMENTS: _____

CONNECTOR:

STANDARD **AMP** STYLE 5.1mm 5 PIN CONNECTOR: _____

OTHER: : _____

PIN OUT LOCATIONS **-TDC+** : PROVIDE DRAWING _____

KEY SLOT REQUIRED: _____ OPEN: _____ BLOCKED: _____

BEFORE MOST SMART BATTERIES CAN BE USED, THEY MUST GO THROUGH A LEARNING CYCLE.

DO YOU REQUIRE THIS BEFORE SHIPMENT (ADDED COST):: _____

MAX ERROR WILL BE AROUND 2% AND **Federal Communications Commission; FCC** WILL BE UPDATED.

X. MECHANICAL DESIGN, BATTERY: IF DRAWINGS ALREADY EXIST, PLEASE ATTACH.

IF YOUR DESIGN REQUIRES A PLASTIC ENCLOSURE:

- | | |
|---|--|
| <input type="checkbox"/> ALREADY HAVE EXISTING PLASTICS | <input type="checkbox"/> REQUIRE PLASTIC ENCLOSURE |
| <input type="checkbox"/> ALREADY HAVE EXISTING DESIGN | <input type="checkbox"/> REQUIRE ENCLOSURE DESIGN |
| <input type="checkbox"/> ALREADY HAVE COSMETIC FINISH SPEC. | <input type="checkbox"/> REQUIRE COSMETIC FINISH SPEC. |
| <input type="checkbox"/> ALREADY HAVE COSMETIC FIT SPEC. | <input type="checkbox"/> REQUIRE COSMETIC FIT SPEC. |
| <input type="checkbox"/> ALREADY HAVE TEXTURE SPEC. | <input type="checkbox"/> REQUIRE TEXTURE SPEC. |

ENCLOSURE PLASTICS

COLOR _____ TEXTURE _____

MATERIAL: _____

- | | |
|---|--|
| <input type="checkbox"/> ULTRAVIOLET ADDITIVE | <input type="checkbox"/> OTHER ADDITIVES _____ |
| <input type="checkbox"/> UNDERWRITERS LABORATORIES FLAME RETARDANT REQUIRED | |

ELECTRICAL CONTACTS:

- | | |
|--|---|
| <input type="checkbox"/> ALREADY HAVE CONTACT DESIGN | <input type="checkbox"/> REQUIRE CONTACT DESIGN |
| <input type="checkbox"/> ALREADY HAVE CONTACT VENDOR | <input type="checkbox"/> REQUIRE CONTACT VENDOR |

CONTACT MATERIAL SPECIFICATION:

MATERIAL BASE: _____
THICKNESS: _____
HARDNESS _____

PLATING MATERIAL: _____
THICKNESS: _____
HARDNESS _____

ENCLOSURE ASSEMBLY METHOD

- | | |
|--------------------------------------|--------------------------------------|
| <input type="checkbox"/> SNAPS | <input type="checkbox"/> ADHESIVES |
| <input type="checkbox"/> SCREWS | <input type="checkbox"/> SOLVENT |
| <input type="checkbox"/> ULTRASONICS | <input type="checkbox"/> OTHER _____ |

IF DRAWINGS EXIST, IN WHAT FORMAT

- | | |
|--------------------------------------|--------------------------------------|
| <input type="checkbox"/> CAD | <input type="checkbox"/> PRO E |
| <input type="checkbox"/> SOLID WORKS | <input type="checkbox"/> OTHER _____ |

XI. MANUFACTURING: ALLOW 8-12 WEEKS FOR MOLD TOOLING

WHAT ARE THE EQUIPMENT / PROTOTYPE REQUIREMENTS FOR PRE-PRODUCTION AND PRODUCTION
PLEASE CHECK WHERE ADDITIONAL PROTOTYPE AND MANUFACTURING CAPABILITIES ARE REQUIRED.

- | | |
|---|--|
| <input type="checkbox"/> STEREO LITHOGRAPHY / OTHER | <input type="checkbox"/> PRODUCTION TEST EQUIPMENT |
| <input type="checkbox"/> SOFT INJECTION MOLD TOOLING | <input type="checkbox"/> TEST EQUIPMENT |
| <input type="checkbox"/> PROD. INJECTION MOLD TOOLING | <input type="checkbox"/> _____ |
| <input type="checkbox"/> CONTACT TOOLING | <input type="checkbox"/> _____ |
| <input type="checkbox"/> PRINTED CIRCUIT BOARD VENDOR | <input type="checkbox"/> _____ |
| <input type="checkbox"/> PCB COMPONENT PLACEMENT VENDOR | <input type="checkbox"/> _____ |
| <input type="checkbox"/> PRODUCTION ASSEMBLY FIXTURES | <input type="checkbox"/> _____ |

XIII. COMPLIANCE REQUIREMENTS:

- UNDERWRITERS LABORATORIES INC.; UL60950: INFORMATION TECH: _____
- UNDERWRITERS LABORATORIES INC.; UL2054: HOUSEHOLD BATTERY: _____
- EUROPEAN COMMUNITY (CONFORMITE EUROPEENE); CE: _____
- UNDERWRITERS LABORATORIES INC.; UL 2601: MEDICAL: _____
- FOOD AND DRUG ADMINISTRATION; FDA: _____
- FEDERAL COMMUNICATIONS COMMISSION; FCC: _____
- CANADIAN STANDARD ASSOCIATION; CSA: _____
- OTHER: _____

XIV. SPECIAL ENVIRONMENTAL CONDITIONS (BEYOND TEMPERATURE):

HUMIDITY? _____

SHOCK AND VIBRATION: _____

ELECTRO STATIC DISCHARGE (ESD): _____

RADIO FREQUENCY (RF): _____

ELECTRO MAGNETIC INTERFERENCE (EMI): _____

THERMAL CYCLING: _____

XV. OTHER REQUIREMENTS BY CUSTOMER:

INTERNAL IMPEDENCE OF PACK: _____

CYCLE LIFE REQUIREMENTS: _____

WATER TIGHT DESIGN: _____ RAIN TEST: _____

AIR TIGHT DESIGN: _____ DUST TEST: _____

OTHER – PLEASE DESCRIBE: _____

XVI. PACKAGING:

HOW MANY BATTERIES PER BOX? _____

TEMPERATURE DURING STORAGE: _____ MINIMUM: _____ °C MAXIMUM: _____ °C

MAXIMUM WEIGHT OF BOX: _____

MARKING REQUIREMENT ON BOX: _____

MARKING REQUIREMENT ON PALLET: _____

BATTERIES WILL BE SHIPPED WITH 20% - 30% OF CHARGE _____

XVII. LABELING:

WILL CUSTOMER SUPPLY ARTWORK? _____

RECYCLE SYMBOL REQUIRED? _____

TO BE SOLD OUTSIDE THE U.S.? _____

"MADE IN CHINA" REQUIRED? _____

LOCATION/ORIENTATION OF LABEL? PLEASE SPECIFY _____

MATERIAL: UL ? _____

ADHESIVE: UL? _____

OTHER REQUIREMENTS: _____

MEMBER OF THE "RECHARGEABLE BATTERY RECYCLING CORPORATION; RBRC? _____

UL; ULTRAVIOLET (UV) PROTECTION REQUIRED? _____ (OUT DOOR USE)

XVIII. CHARGER DESIGN:

PLEASE ANSWER THE FOLLOWING:

- A. _____ mA +/- _____ % = MAXIMUM CURRENT DURING THE CONSTANT CURRENT PHASE OF CHARGE.
- B. _____ V +/- _____ % = MAXIMUM VOLTAGE DURING THE CONSTANT VOLTAGE PHASE OF CHARGE.
- C. CHARGE TERMINATION METHOD: TIME: _____ MINUTES CURRENT: _____ mA
 OTHER: _____
- D. TIME REQUIRED TO FULLY CHARGE BATTERY/PACK: _____
- E. MAXIMUM CURRENT DURING CHARGE CYCLE: _____
- F. OPERATING TEMPERATURE: MINIMUM: _____ °C MAXIMUM: _____ °C
- G. DO ANY VOLTAGE OR CURRENT TRANSIENTS OR SPIKES OCCUR DURING INSERTION, RUNNING OR REMOVING BATTERY FROM THE CHARGER? IF SO, PLEASE SKETCH IN AREA PROVIDED BELOW OR PROVIDE PROFILE.
- H. DO SIMILAR BATTERIES OF DIFFERENT CHEMISTRIES EXIST IN THE SAME FORM FACTOR (PLASTIC ENCLOSURE)?
 YES IF YES, PLEASE DETAIL: _____
 NO
- I. WILL THIS CHARGER BE USED FOR MORE THAN ONE STYLE OF BATTERY? YES NO
- J. CHARGER WILL BE BUILT INTO THE HOST DEVICE
 CHARGER WILL BE A STAND ALONE DEVICE
 CHARGER WILL BE BUILT INTO BOTH DEVICES
- K. WILL THE CHARGER CHARGE MORE THAN ONE BATTERY AT A TIME? IF SO, HOW MANY? _____
- L. BATTERIES TO BE CHARGED SEQUENTIALLY
 BATTERIES TO BE CHARGED CONCURRENTLY
- M. IS A SMART CHARGER REQUIRED? YES NO
SMBus 1.0 COMPLIANT? YES NO
SMBus 1.1 COMPLIANT? YES NO
WHAT CONTROL CHIP DO YOU USE? MANUFACTURER: _____ MODEL #: _____
CONTROLS: LED's: DESCRIBE FUNCTIONS, COLORS: _____
LED DISPLAY – DESCRIBE INFORMATION REQUIRED: _____
- N. **CONDITIONING:** SMART BATTERIES MAY SIGNAL FOR A FULL CHARGE/DISCHARGE CYCLE AFTER SEVERAL PARTIAL CHARGES IN ORDER TO RE-CALIBRATE ITS FUEL GAUGE ACCURACY. DO YOU WANT CONDITIONING IN YOUR CHARGER?
 YES NO IF YES, SELECT ONE OF THE OPTIONS BELOW.
 AUTOMATICALLY PERFORM THE CONDITIONING CYCLE.
 SUPPLY A MEANS TO MANUALLY START CYCLE.

XIX. MECHANICAL DESIGN, CHARGER: IF DRAWINGS ALREADY EXIST, PLEASE ATTACH.

IF YOUR DESIGN REQUIRES A PLASTIC ENCLOSURE:

- | | |
|---|--|
| <input type="checkbox"/> ALREADY HAVE EXISTING PLASTICS | <input type="checkbox"/> REQUIRE PLASTIC ENCLOSURE |
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ENCLOSURE PLASTICS

COLOR _____ TEXTURE _____

MATERIAL: _____

- | | |
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|--|---|
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THICKNESS: _____	THICKNESS: _____
HARDNESS _____	HARDNESS _____

ENCLOSURE ASSEMBLY METHOD

- | | |
|--------------------------------------|--------------------------------------|
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| <input type="checkbox"/> SCREWS | <input type="checkbox"/> SOLVENT |
| <input type="checkbox"/> ULTRASONICS | <input type="checkbox"/> OTHER _____ |

POWER SUPPLY:

- | | |
|-----------------------------------|-----------------------------------|
| <input type="checkbox"/> INTERNAL | <input type="checkbox"/> EXTERNAL |
|-----------------------------------|-----------------------------------|

WALL CONNECTORS:

- | | | | |
|-------------------------------|---------------------------------|-------------------------------|--------------------------------------|
| <input type="checkbox"/> U.S. | <input type="checkbox"/> EUROPE | <input type="checkbox"/> ASIA | <input type="checkbox"/> OTHER _____ |
|-------------------------------|---------------------------------|-------------------------------|--------------------------------------|

IF DRAWINGS EXIST, IN WHAT FORMAT

- | | |
|--------------------------------------|--------------------------------------|
| <input type="checkbox"/> CAD | <input type="checkbox"/> PRO E |
| <input type="checkbox"/> SOLID WORKS | <input type="checkbox"/> OTHER _____ |

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- | | |
|---|---|
| <input type="checkbox"/> STEREO LITHOGRAPHY / OTHER | <input type="checkbox"/> PCB COMPONENT PLACEMENT VENDOR |
| <input type="checkbox"/> SOFT INJECTION MOLD TOOLING | <input type="checkbox"/> PRODUCTION ASSEMBLY FIXTURES |
| <input type="checkbox"/> PROD. INJECTION MOLD TOOLING | <input type="checkbox"/> PRODUCTION TEST EQUIPMENT |
| <input type="checkbox"/> CONTACT TOOLING | <input type="checkbox"/> TEST EQUIPMENT |
| <input type="checkbox"/> PRINTED CIRCUIT BOARD VENDOR | <input type="checkbox"/> _____ |

XX. PRODUCT ACCEPTANCE CRITERIA:

DROP TEST REQUIREMENTS: RECOMMEND UNDERWRITERS LABORATORIES.

HEIGHT _____ # TIMES/ FACE _____ SURFACE _____

CRITERIA: REMAINS OPERATIONAL CRACKS ACCEPTABLE NO EXPOSED INTERNAL COMPONENTS

ULTRASONIC SEALING FLASH ALLOWED YES NO

MAXIMUM OFFSET IN PLASTICS: _____ PARTING LINE MARKS: _____

CRITICAL DIMENSIONS: _____ GATES AND EJECTOR PIN LOCATION: _____

DATE CODING, CAVITY NUMBER OR REVISION I.D. REQUIRED ON PLASTICS: NO YES

SINK MARKS, FLOW OR KNIT LINE – MAX. ACCEPTABLE: NUMBER _____ DEPTH _____

XXI. COMPLIANCE REQUIREMENTS:

UNDERWRITERS LABORATORIES INC.; UL: _____

EUROPEAN COMMUNITY (CONFORMITE EUROPEENE); CE: _____

CANADIAN STANDARD ASSOCIATION; CSA: _____

OTHER: _____

XXII. PROGRAM BUDGET REQUIREMENTS:

ESTIMATED COSTS. SUBJECT TO FURTHER APPROVALS.

NRE (NON RECURRING EXPENSES):

ELECTRONICS DESIGN \$ _____ NOTES _____

TOOLING \$ _____

PRODUCTION \$ _____

SET-UP \$ _____

TOTAL: \$ _____

ELECTRONICS ENGINEERING \$ _____

MECHANICAL ENGINEERING \$ _____

COMPLIANCE TESTING:

UL \$ _____

CSA \$ _____

EU \$ _____

FCC \$ _____

FDA \$ _____

TUV \$ _____

OTHER \$ _____

TOTAL: \$ _____

DOCUMENTATION: \$ _____

OTHER: \$ _____

GRAND TOTAL: \$ _____

XXIII. PROGRAM SCHEDULING:

QUOTE DATE: _____

DATE TO 1ST ARTICLE: _____

DATE TO PRODUCTION _____

OTHER MILESTONES: _____

NOTES:

XXIV. ADDITIONAL INFORMATION:

ARE THERE ANY OTHER CONSIDERATIONS OR ADDITIONS NOT COVERED? PLEASE DEFINE IN DETAIL.

