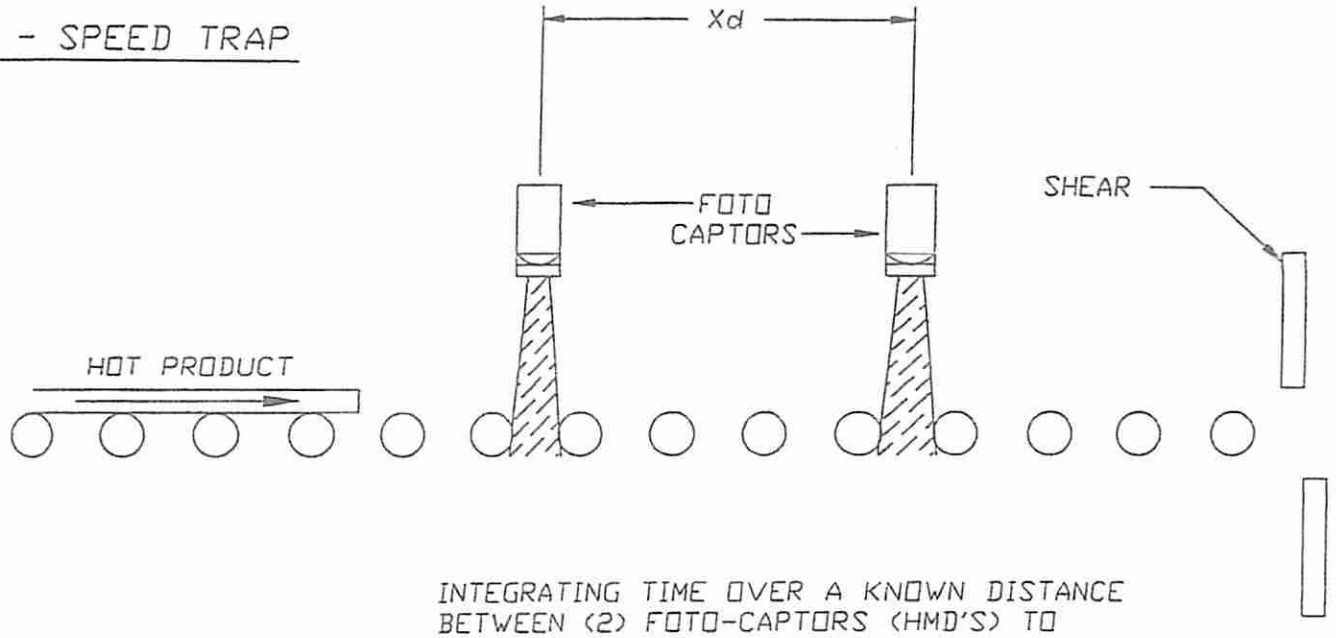
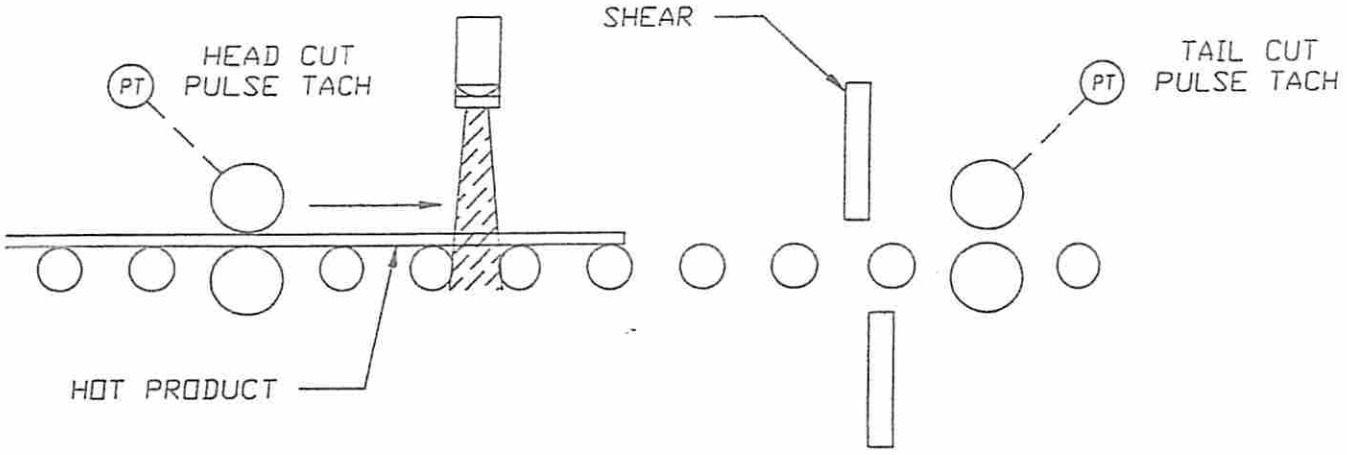
CUT-OFF APPLICATIONS

1 - SPEED TRAP



INTEGRATING TIME OVER A KNOWN DISTANCE BETWEEN (2) FOTO-CAPTORS (HMD'S) TO DETERMINE HEAD & TAIL CUT AT SHEAR

2 - PULSE TACH READ

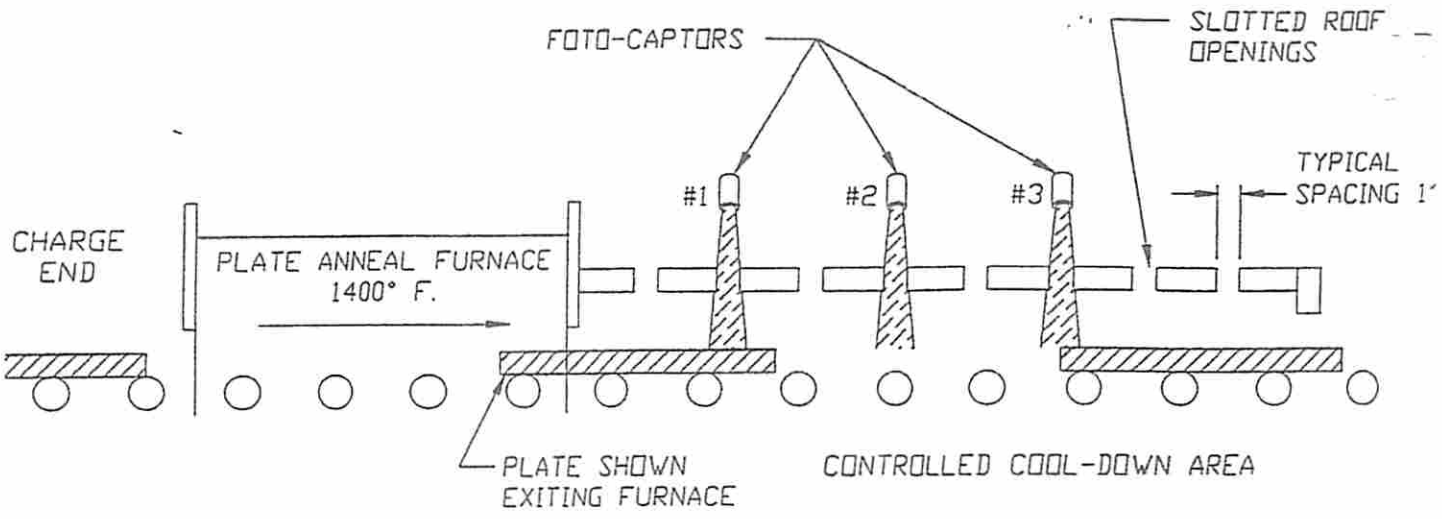


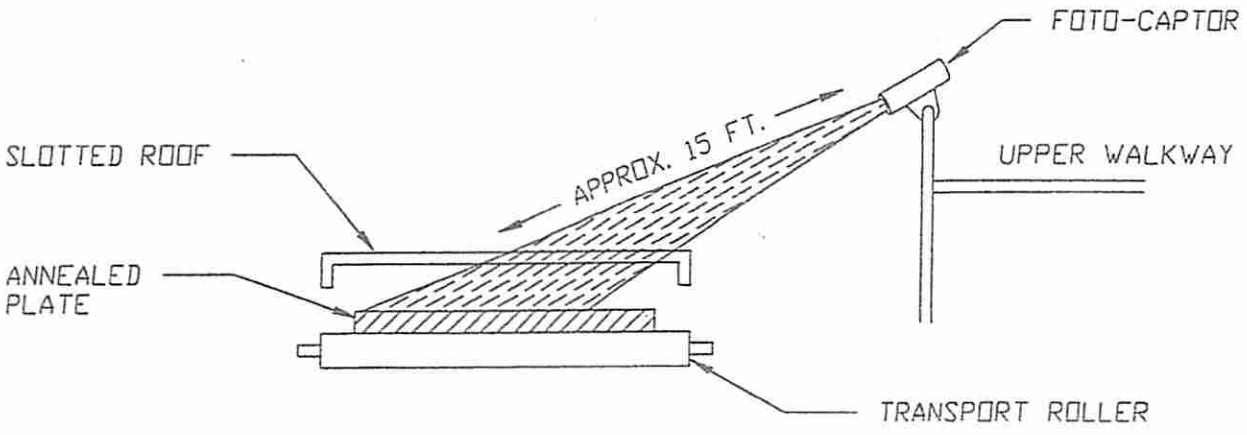
PULSE TACH "READ" INITIATE TO DETERMINE LEAD AND TAIL CUT AT SHEAR

NOTE: TYPICAL HOT STRIP MILL APPLICATION WOULD USE 450° C. RESPONSE TEMPERATURE FOTO-CAPTORS WITH A 1° VIEWING FIELD LENS. REDUNDANT HMD'S AND APPLICATION OF EXTENSION TUBES IS OPTIONAL.

DRAWN BY: CHIP DATE 06/26/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc.
CHECKED BY:					CUT-OFF APPLICATIONS	P.O. BOX 203, N. LIMA, OH 44452 (216)-549-5746
PAGE 1 OF 1 SCALE NONE						STATE-OF-THE-ART captor
DWG. No.: 003-1						

TRACKING THRU ANNEAL FURNACE COOL-DOWN ZONE





END VIEW OF CONTROLLED COOL-DOWN AREA
SHOWING FOTO-CAPTOR MOUNTING POSITIONS.

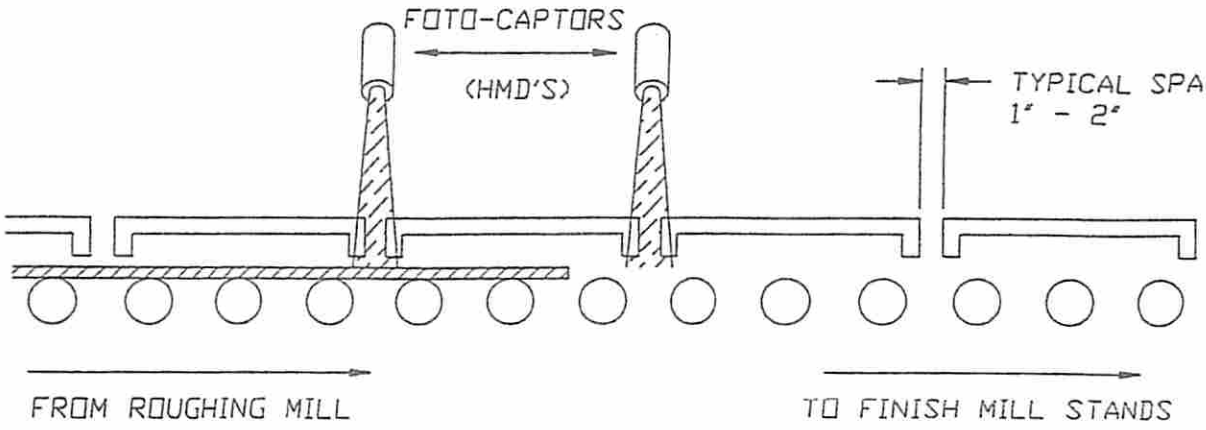
PROBLEM: PLATE CAN "HANG UP" AS IT PASSES THRU THE COOL-DOWN AREA. VISUAL CONTACT IS NOT POSSIBLE. THEREFORE, NORMAL PASSAGE CAN NOT BE VERIFIED.

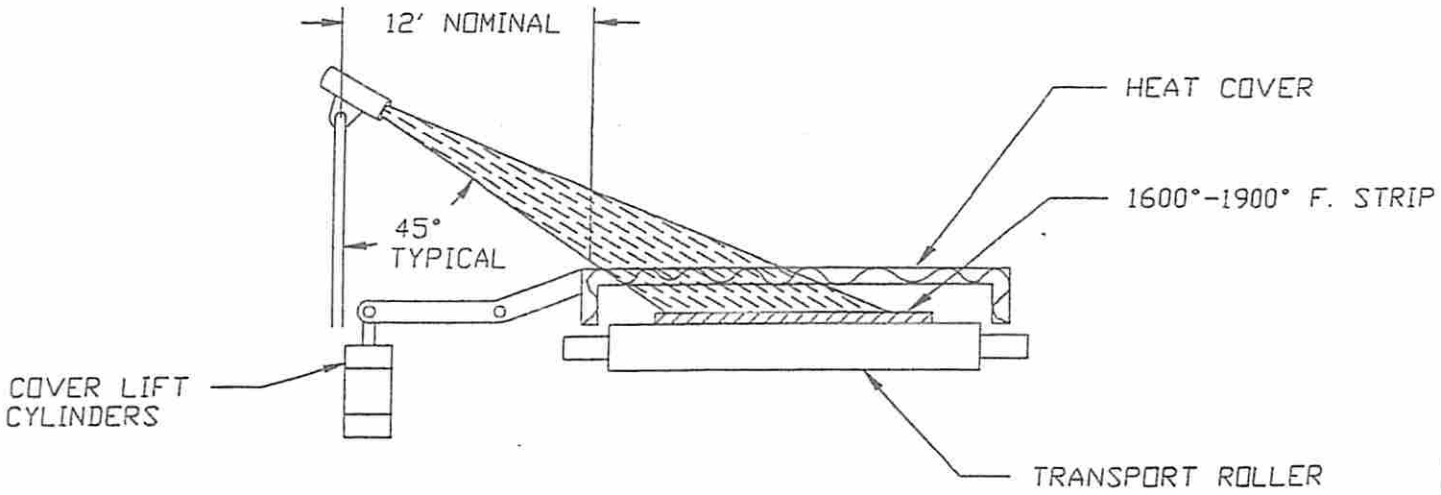
SOLUTION: INSTALL (3) EQUALLY SPACED FOTO-CAPTORS TO VIEW PLATE POSITION THRU NARROW ROOF SLOTS AND DISPLAY VIA POSITION LIGHTS IN MAIN OPERATOR'S PULPIT.

APPLICATION: THE 450° RESPONSE UNIT WAS USED, WHICH WAS ABOVE THE MAXIMUM ROOF PANEL TEMPERATURE BUT RESPONDED TO THE HIGHER TEMPERATURE PLATE.

DRAWN BY: CHIP DATE 06/29/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH (216)-549-5746 STATE-OF-THE-ART captor
CHECKED BY:					FOTO-CAPTOR TRACKING THRU ANNEAL FURNACE COOL-DOWN ZONE	
PAGE 1 OF 1 SCALE NONE						
DWG. No.: 003-2						

STRIP TRACKING THRU HEAT COVERS IN A HOT STRIP MILL



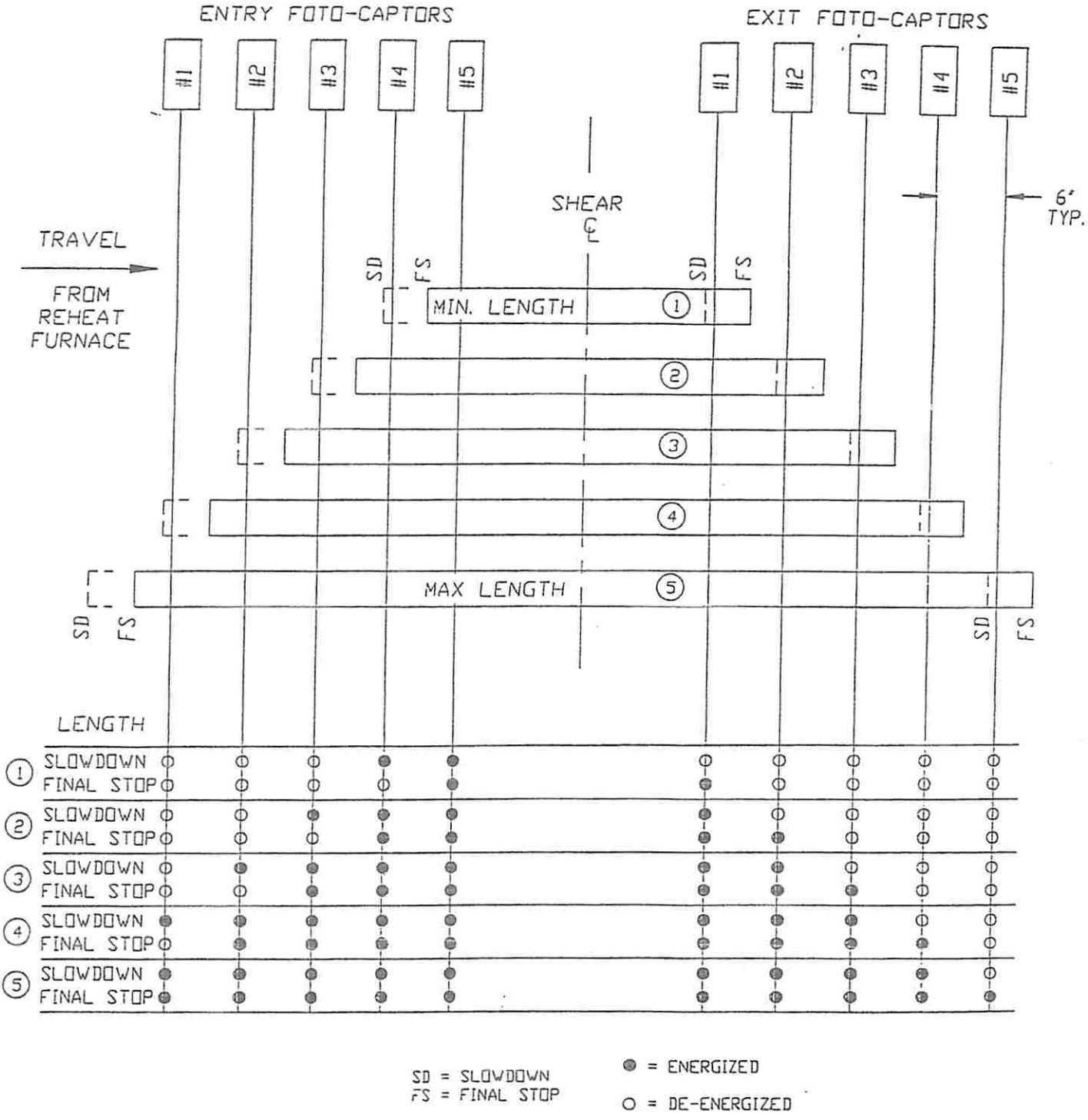


END VIEW

- ABOVE APPLICATION USED 450° C. RESPONSE FOTO-CAPTORS WITH A 2° VIEW FIELD LENS.
- THE ABOVE ANGLE AND MOUNTING DISTANCE PERMITS STRIP DETECTION THRU THE SPACING BETWEEN THE HEAT COVERS WITHOUT FALSE TRIGGERING ON THE COVER SURFACE TEMPERATURE OR FROM VIEWING THE RADIENT HEAT LINING OF THE INSIDE COVER WALLS. NORMAL DETECTION EXISTS WITH COVERS IN 'RAISED' POSITION.
- THE FOTO-CAPTOR ELIMINATES THE REQUIREMENT TO MODIFY THE HEAT COVERS TO ACCEPT OTHER TYPES OF HMD'S.
- THE NOMINAL 12 FT. MOUNTING DISTANCE ELIMINATES THE REQUIREMENT FOR COOLING JACKETS ON THE HMD.

DRAWN BY: CHIP DATE 07/03/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc.
CHECKED BY:					STRIP TRACKING THRU HEAT COVER IN A HOT STRIP MILL	P.O. BOX 203, N. LIMA, OH 44452 (216)-549-5746
PAGE 1 OF 1 SCALE NONE						STATE-OF-THE-ART captor
DWG. No.: 003-3						

BILLET SPLITTING APPLICATION

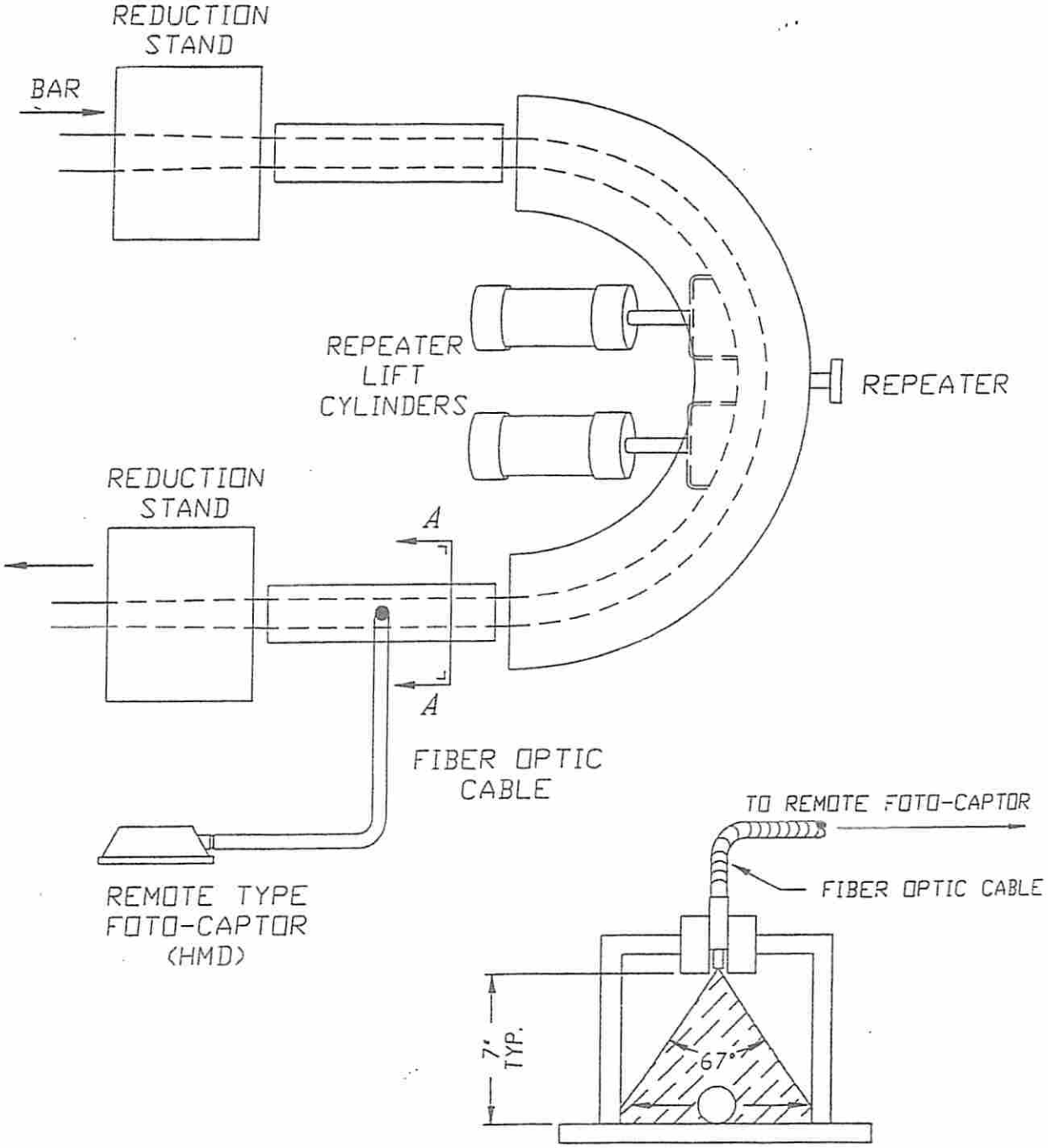


ABOVE SYSTEM UTILIZED 800° C. RESPONSE TEMPERATURE FOTO-CAPTORS WITH A 2 X 25° VIEWING FIELD, ALL SPACED EQUALLY AROUND THE SHEAR CENTERLINE AT AN APPROXIMATE (3) FT. DISTANCE. SPLIT CUT ACCURACY IS ± 3". AVERAGE BILLET TEMPERATURE WAS 2200° F.

DRAWN BY: CHIP DATE 07/09/90	REV	DESCRIPTION	BY	DATE	TITLE: BILLET SPLITTING APPLICATION
CHECKED BY:					
PAGE 1 OF 1 SCALE NONE					
DWG. No.: 003-4					

weber sensors inc.
P.O. BOX 203, N. LIMA, OH 44
(216)-549-5746
STATE-OF-THE-ART
captor

BAR MILL REPEATER AUTOMATIC SEQUENCING



SECTION "A-A"

- TYPICAL BAR MILL "REPEATER" APPLICATION USING REMOTE TYPE FOTO-CAPTORS (HMD'S) WITH FIBER OPTIC CABLES. "TAIL" DIRECTION "LOWERS" REPEATER, "HEAD" DIRECTION "RAISES" REPEATER.
- MOST APPLICATIONS WILL USE 350° C. RESPONSE UNITS.

ALL DIMENSIONS IN MM

DRAWN BY: CHIP DATE 07/09/90	REV	DESCRIPTION	BY	DATE	TITLE: BAR MILL REPEATER
CHECKED BY:					
PAGE 1 OF 1 SCALE NONE					
DWG. No.: 003-5					

weber sensors inc.
P.O. BOX 203, N. LIMA, OH 44452
(216)-549-5746
STATE-OF-THE-ART captor

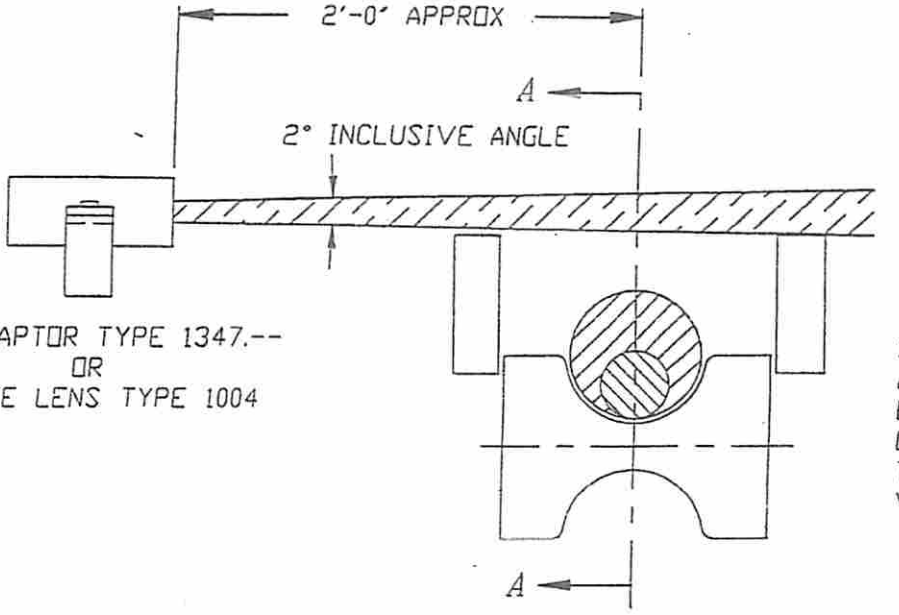
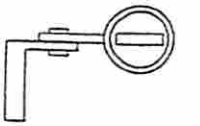
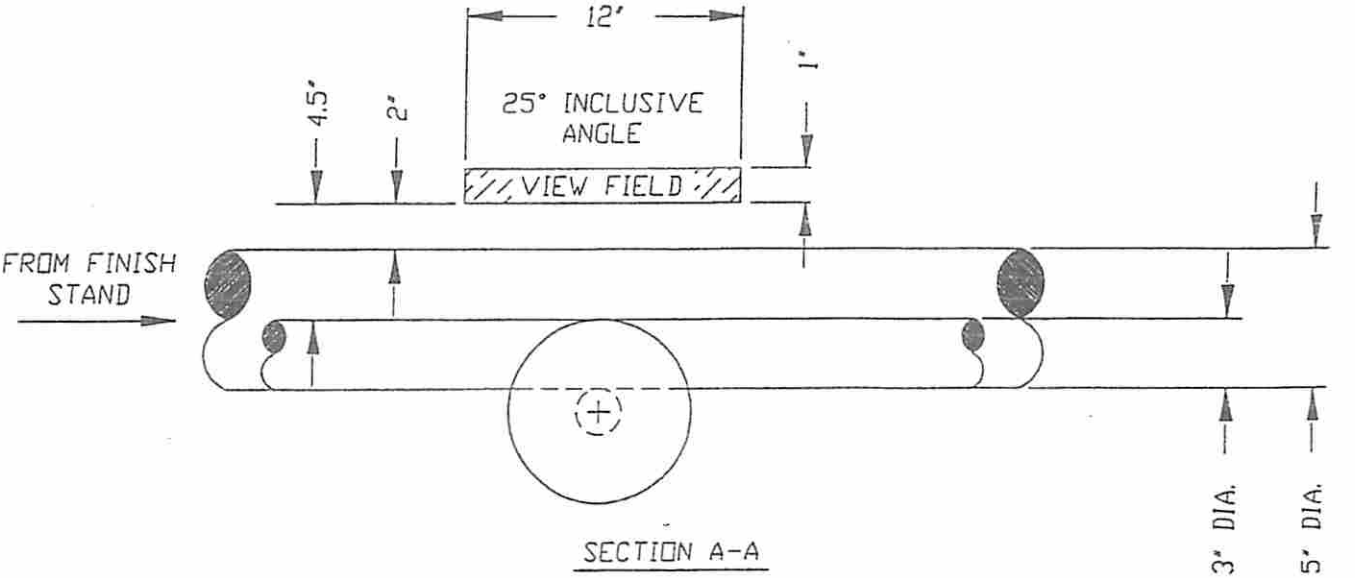


FOTO-CAPTOR TYPE 1347.--
OR
REMOTE LENS TYPE 1004

FOTO-CAPTOR
MOUNTING CONFIGURATION



SHOWN WITH MOUNTING LUG AT 9 O'CLOCK POSITION TO ORIENTATE THE 25° VIEW ANGLE ON A HORIZONTAL PLANE AND THE 2° VIEW ANGLE ON A VERTICAL PLANE.



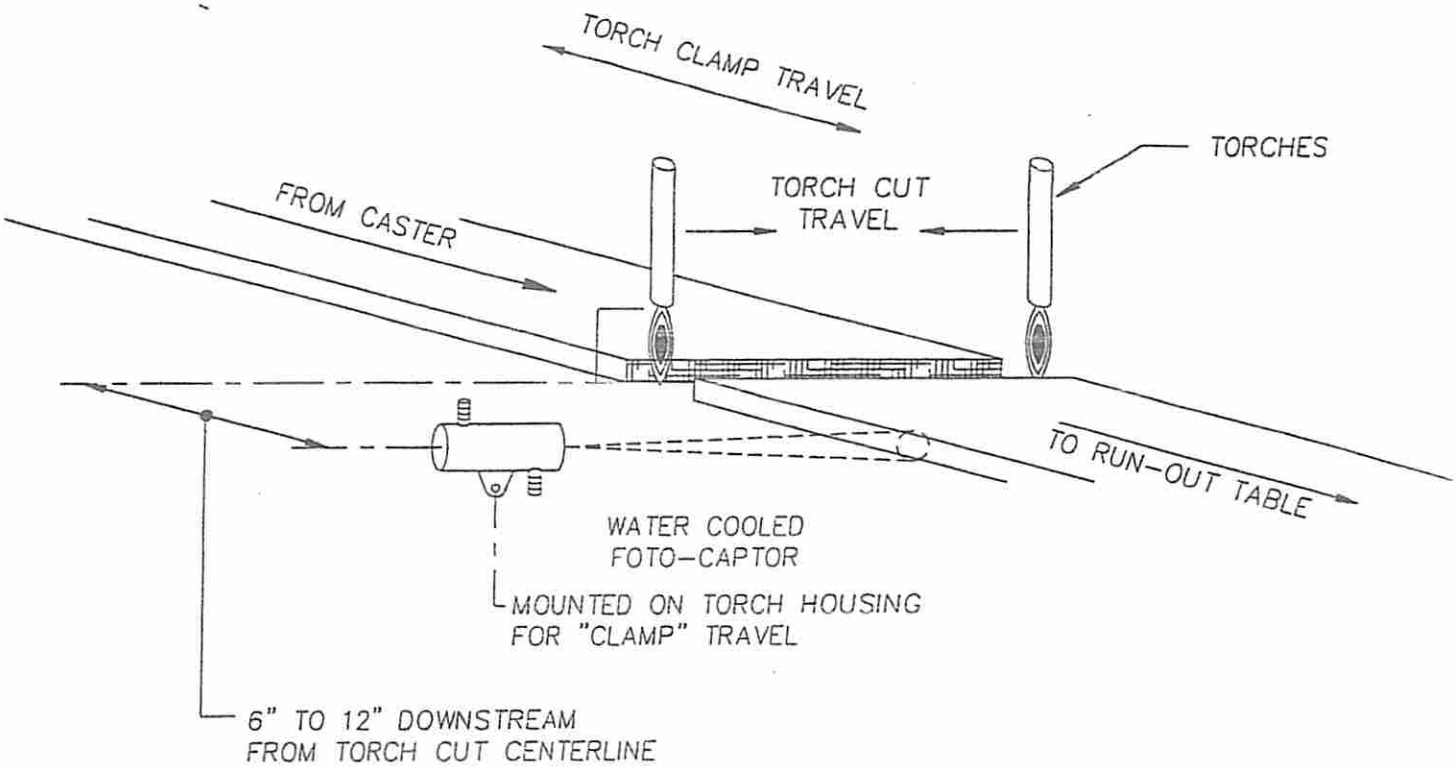
SECTION A-A

- WITH THE ABOVE CONFIGURATION THE FOTO-CAPTOR (HMD) WILL SEE ANY VERTICAL PASS LINE CHANGE THAT ENTERS IT'S VIEWING FIELD.
- THE 2'-0" FOTO-CAPTOR TO MILL DIMENSION MAY BE CHANGED TO SUIT SPECIFIC MILL LAYOUTS. REFER TO SCAN AREA-DISTANCE CHART.

DRAWN BY: CHIP DATE 07/10/90	REV	DESCRIPTION	BY	DATE	TITLE: BAR MILL PASS LINE DEVIATION AUTO DETECTION
CKED BY:					
PAGE 1 OF 1 SCALE NONE					
DWG. No.: 003-6					

weber sensors inc.
P.O. BOX 203, N. LIMA, OH 4454
(216)-549-5746
ENGINEERED SOLUTIONS
captor

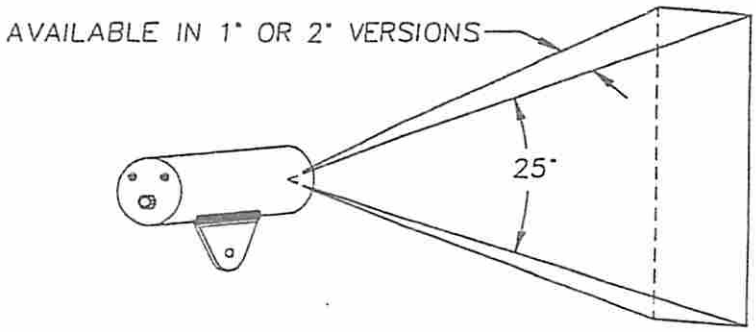
SLAB SEPERATION VERIFICATION



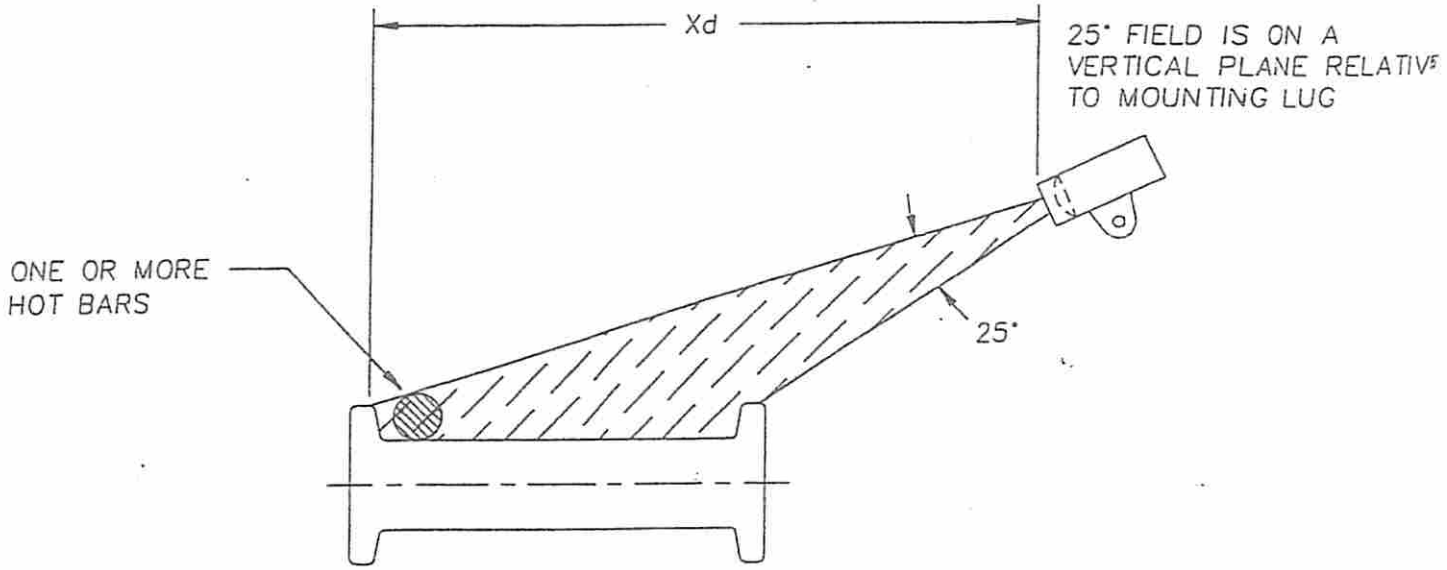
- The FOTO-CAPTOR (HMD) is mounted six to twelve inches "downstream" of the cut-off torch centerline. Slab must seperate by this distance.
- When FOTO-CAPTOR sees tail out of cut slab the torch "cut" sequence is terminated and the torch assembly "unclamps" and returns to its "home" position.

DRAWN BY: CHIP DATE 07/24/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH 44452 (216)-549-5746
CHECKED BY:					SLAB SEPERATION VERIFICATION	STATE-OF-THE-ART captor
PAGE 1 OF 1 SCALE NONE					FOTO-CAPTOR APPLICATION	
DWG. No.: 003-7						

FOTO-CAPTOR VIEWING FIELDS
OTHER THAN CIRCULAR



TYPICAL APPLICATION



Xd IS DETERMINED FROM SCAN AREA/DISTANCE CHART, (DRAWING 1-007). ASSUMING ROLL FACE DIMENSION "X" IS 36", Xd WOULD BE 7 FT.

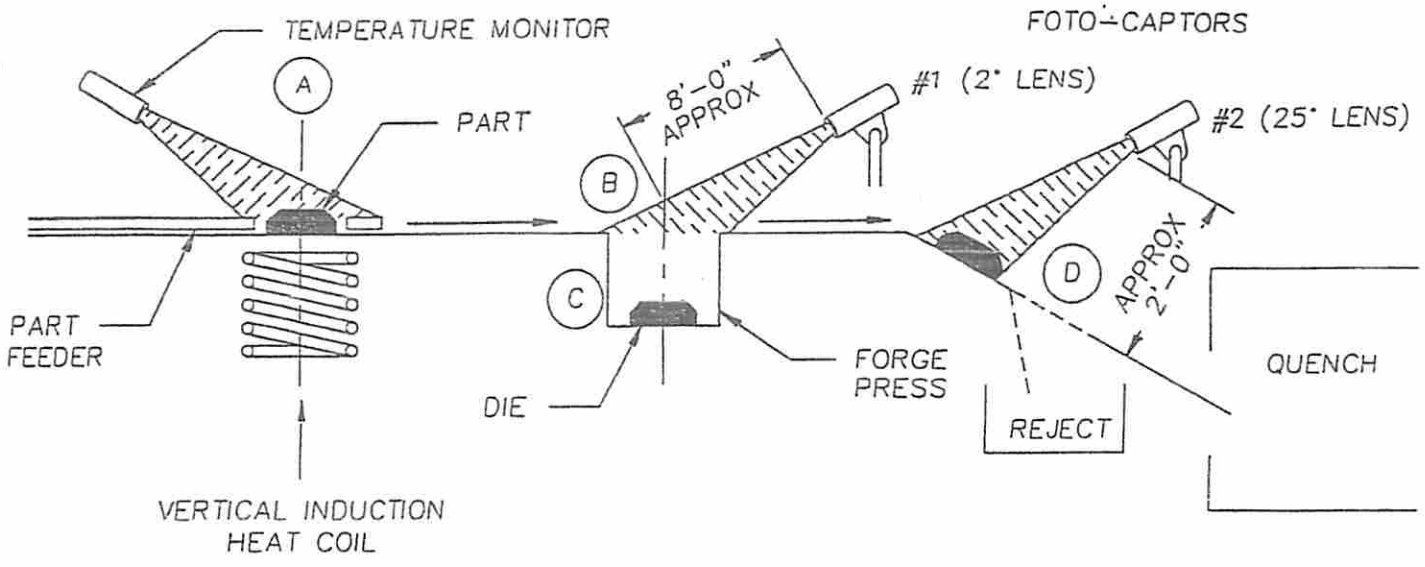
DRAWN BY: CHIP DATE 07/24/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH 444 (216)-549-5746 STATE-OF-THE-ART captor
CHECKED BY:					VIEWING FIELDS OTHER THAN CIRCULAR	
PAGE 1 OF 1 SCALE NONE						
DWG. No.: 003-8						

TYPICAL FOTO-CAPTOR (HMD) LOCATIONS
FOR A HOT STRIP MILL TRACKING SYSTEM

DRAWN BY: CHIP	DATE 08/03/90	REV	DESCRIPTION	BY	DATE
CKED BY:					
PAGE 1 OF 1	SCALE NONE				
DWG. No.: 003-10					

TITLE
HOT MILL TRACKING SYSTEM USING FOTO-CAPTORS
(HOT METAL DETECTORS)

weber sensors inc.
P.O. BOX 203, N. LIMA, OH 444
(216)-549-5746
STATE-OF-THE-ART
optor



PRODUCT: POWDERED METAL PARTS, 1.5" X 1.5" MINIMUM, IRREGULAR SHAPES

TEMPERATURE: 1600° F. (870° C.)

OPERATION: MONITOR FORGED PARTS TO CONTROL PRESS STROKE

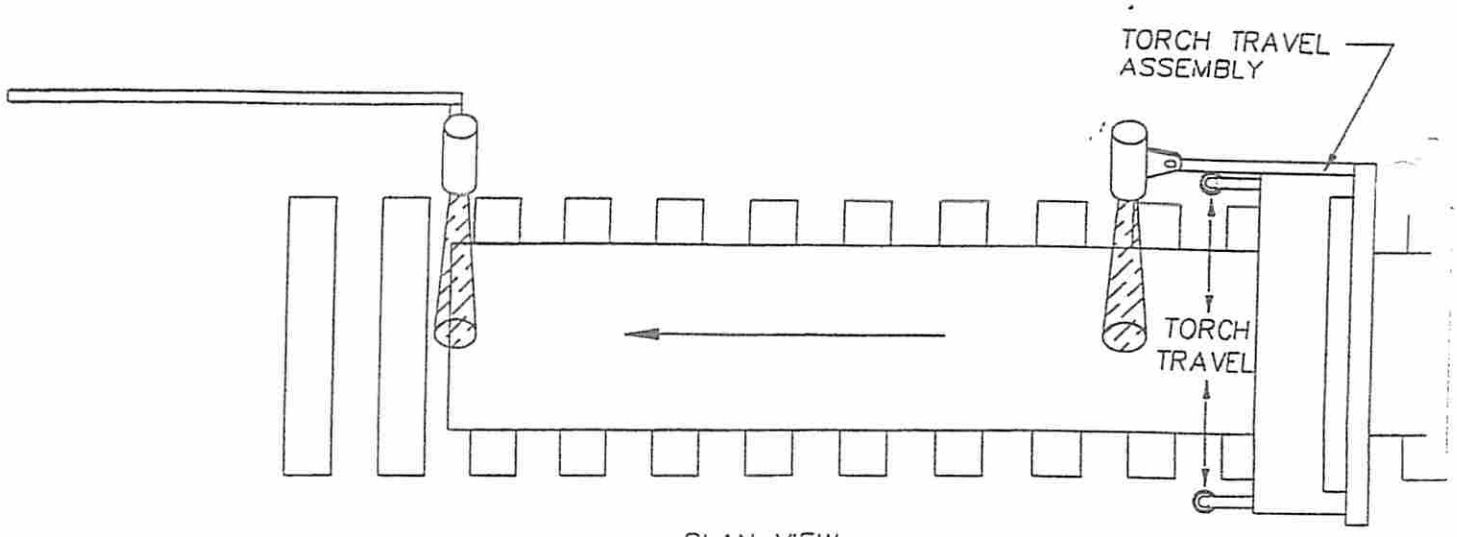
SEQUENCE: PART IS HEATED TO 1600° F. THRU VERTICAL INDUCTION HEAT COILS FEEDER INDEXES PART FROM (A) TO (B) AND RELEASES INTO DIE (C). PART IS FORGED, EJECTED FROM DIE AND INDEXED TOWARD (D) FOR QUENCH OR REJECT.

BY LOGIC, FOTO-CAPTOR #1 SEES PART AT INITIAL (B) POSITION AT RELEASE POINT INTO DIE ONLY AND IGNORES PART DURING DIE EJECTION, ETC., FOTO-CAPTOR #2 CONFIRMS PART IS OUT OF DIE (MUST SEE AT SLOPE).

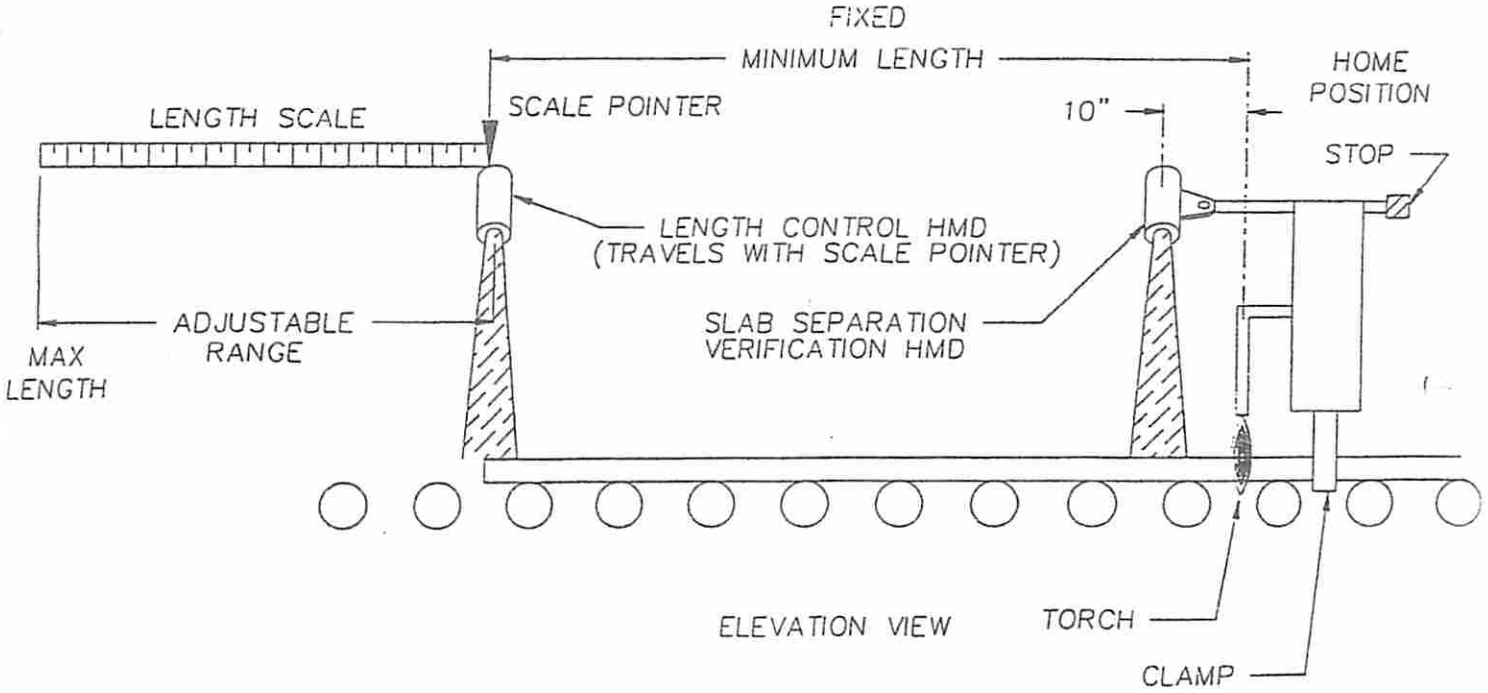
SELECTION: FOTO-CAPTOR #1: 450° C., 2° LENS
FOTO-CAPTOR #2: 350° C., 25° LENS

REQUIRED SCAN AREA: (VIEWING FIELD) POSITION (B): 4" DIA. (PART POSITION IS FIXED)
POSITION (D): 12" DIA. (PART POSITION VARIES ±6")

DRAWN BY: CHIP DATE 08/09/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH 44452 (216)-549-5746 STATE-OF-THE-ART captor
CHECKED BY:					MONITORING POWDERED METAL FORGING PROCESS	
PAGE 1 OF 1 SCALE NONE						
DWG. No.: 003-11						



PLAN VIEW



ELEVATION VIEW

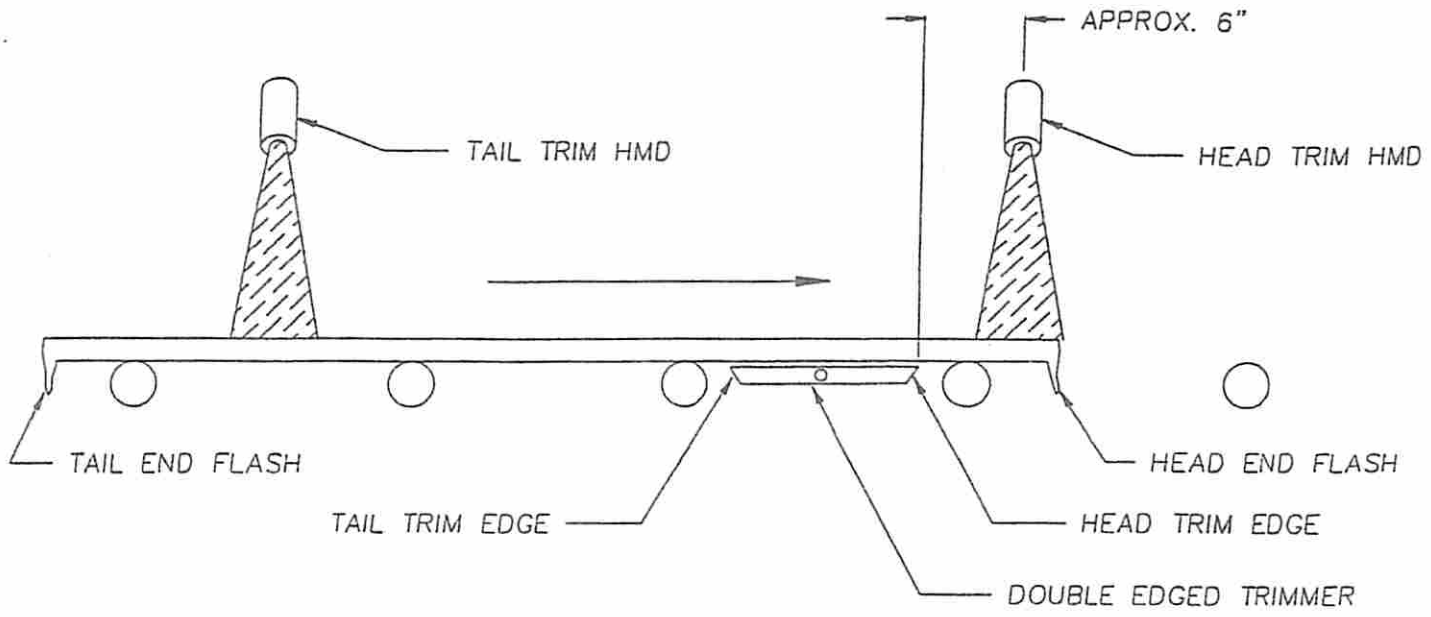
SEQUENCE

1 – WHEN LEAD END OF SLAB REACHES THE "LENGTH CONTROL" HMD, THE TORCH CLAMP IS INITIATED.

2 – AFTER SLAB IS CUT AND MOVES BEYOND THE "SLAB SEPARATION VERIFICATION" HMD, THE CLAMPS DISENGAGE AND THE TORCH MOVES BACK TO HOME POSITION.

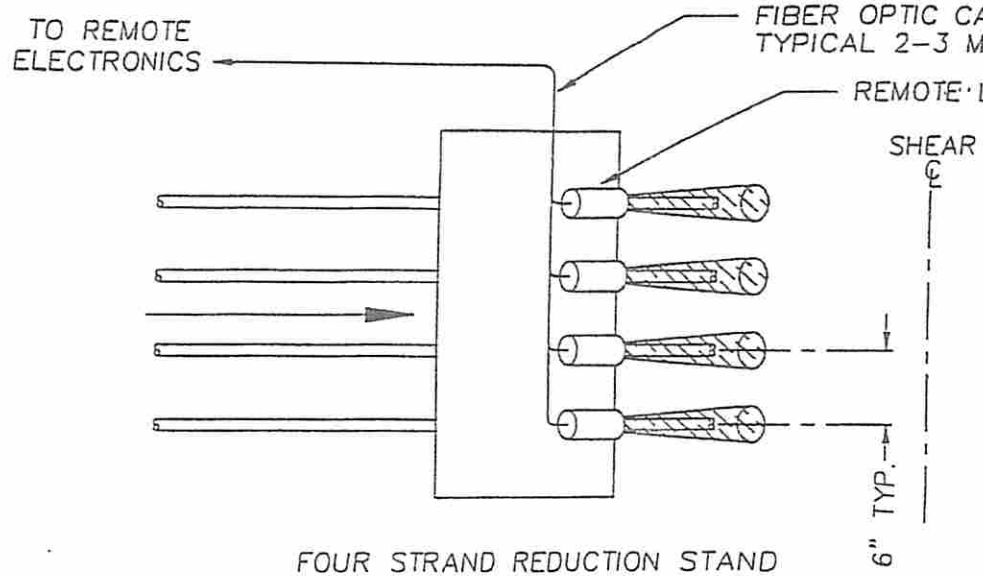
ALSO SEE DRAWING 003–7

DRAWN BY: CHIP DATE 08/24/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc.
CHECKED BY:					SLAB CASTER LENGTH CONTROL	P.O. BOX 203, N. LIMA, OH (216)-549-5746
PAGE 1 OF 1 SCALE NONE						STATE-OF-THE-ART raptor
DWG. No.: 003-13						



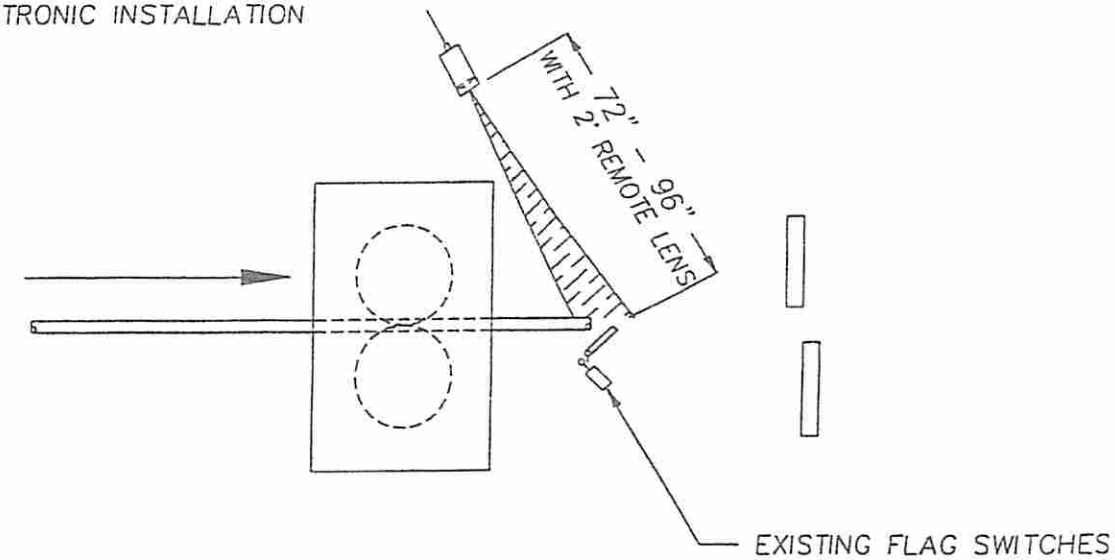
- WHEN SLAB IS AT THE HEAD TRIM FOTO-CAPTOR (HMD) THE SLAB DECELERATES TO ZERO SPEED, THE TRIMMER ROTATES SO THE HEAD TRIM EDGE COMES IN CONTACT WITH SLAB AND THE SLAB THEN REVERSES DIRECTION TRIMMING THE FLASH OFF OF THE HEAD END.
- WHEN THE HEAD TRIM FOTO-CAPTOR SENSES THE END OF THE SLAB THE TRIMMER IS RETURNED TO THE NEUTRAL POSITION. THE SLAB THEN BEGINS TO TRAVEL IN ITS ORIGINAL DIRECTION.
- THE TAIL TRIM FOTO-CAPTOR (HMD) SEES THE TAIL END AND ROTATES THE TRIMMER SO THAT THE TAIL TRIM EDGE COMES IN CONTACT WITH THE SLAB AND TRIMS THE TAIL END FLASH FROM THE SLAB. THE SLAB CONTINUES MOVING UNTIL THE HEAD TRIM FOTO-CAPTOR SEES THE TAIL END AND ROTATES THE TRIMMER BACK TO ITS NEUTRAL POSITION.

DRAWN BY: CHIP DATE 08/27/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH 44452 (216)-549-5746 STATE-OF-THE-ART captor
CHECKED BY:					SLAB FLASH TRIMMER	
PAGE 1 OF 1 SCALE NONE						
DWG. No.: 003-14						



FOUR STRAND REDUCTION STAND

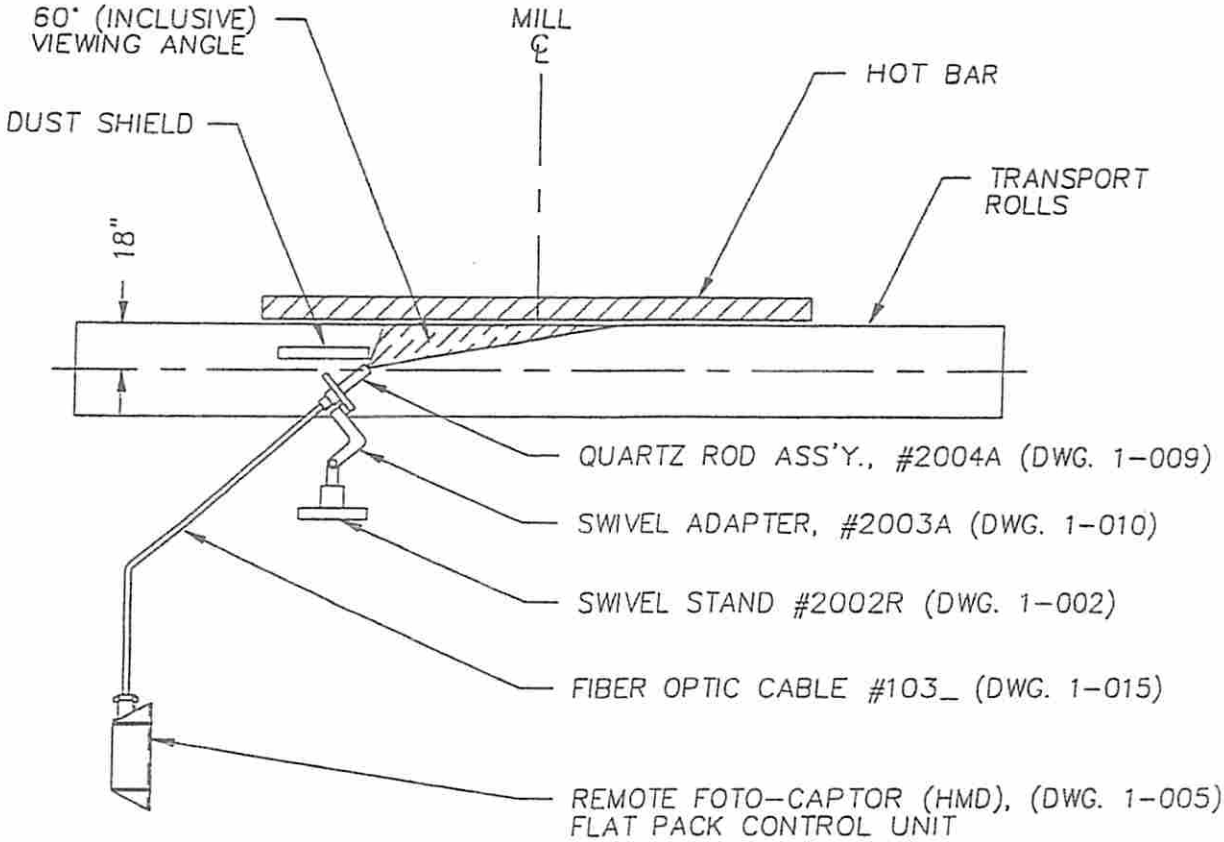
NOTE: SEE DWG. 003-16 FOR TYPICAL REMOTE LENS MOUNTING AND REMOTE ELECTRONIC INSTALLATION



CROP SHEAR IS CONTROLLED BY (4) REMOTE-TYPE FOTO-CAPTORS (HMD'S) WHICH REPLACED THE EXISTING MECHANICAL FLAG SWITCHES.

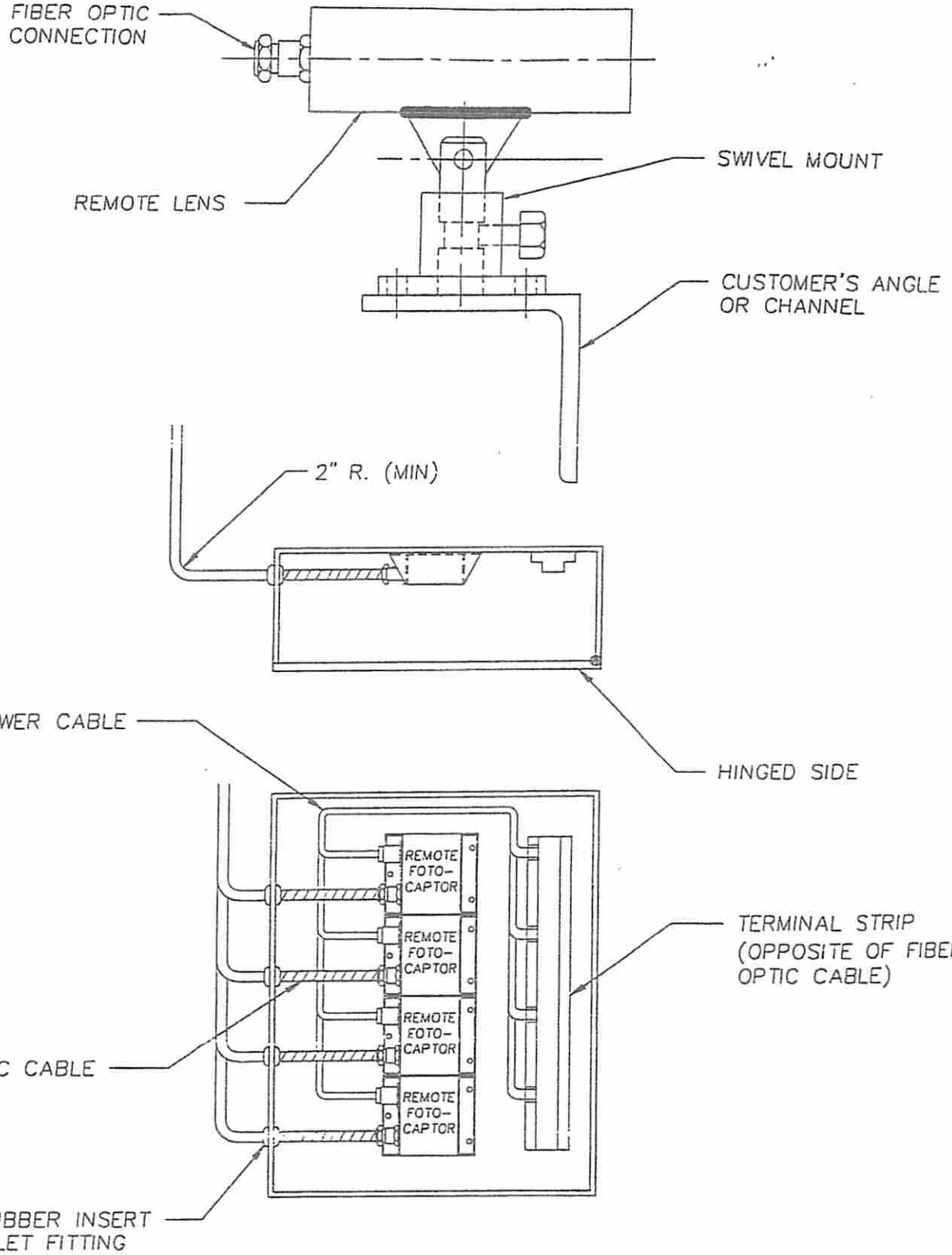
MATERIAL: 1" DIA. MINIMUM STEEL ROD
TEMPERATURE: 1600° F. MINIMUM
APPLICATION USES: 450° C. (850° F.) REMOTE TYPE FOTO-CAPTORS WITH 2" REMOTE LENS AND FIBER OPTIC CABLES.

DRAWN BY: CHIP DATE 09/04/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH 444 (216)-549-5746 STATE-OF-THE-ART captor
CHECKED BY:					CROP SHEAR CONTROL	
SHEET 1 OF 1 SCALE NONE						
DWG. No.: 003-15						



QUARTZ ROD: – VIEWING FIELD ANGLE IS 60° (INCLUSIVE)
– 18" DISTANCE FROM TARGET = 24"ø SCAN AREA (FROM CHART #1-007)
– AMBIENT TEMPERATURE RATING OF QUARTZ ROD IS 450° C.

DRAWN BY: CHIP DATE 11/21/91	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc.
CHECKED BY: G. DiVINCENZO					QUARTZ ROD APPLICATION FOR TRACKING HOT BAR	P.O. BOX 203, N. LIMA, OH 44452 (216)-549-5746
PAGE 1 OF 1 SCALE NONE						ENGINEERED SOLUTIONS captor
DWG. No.: 015						

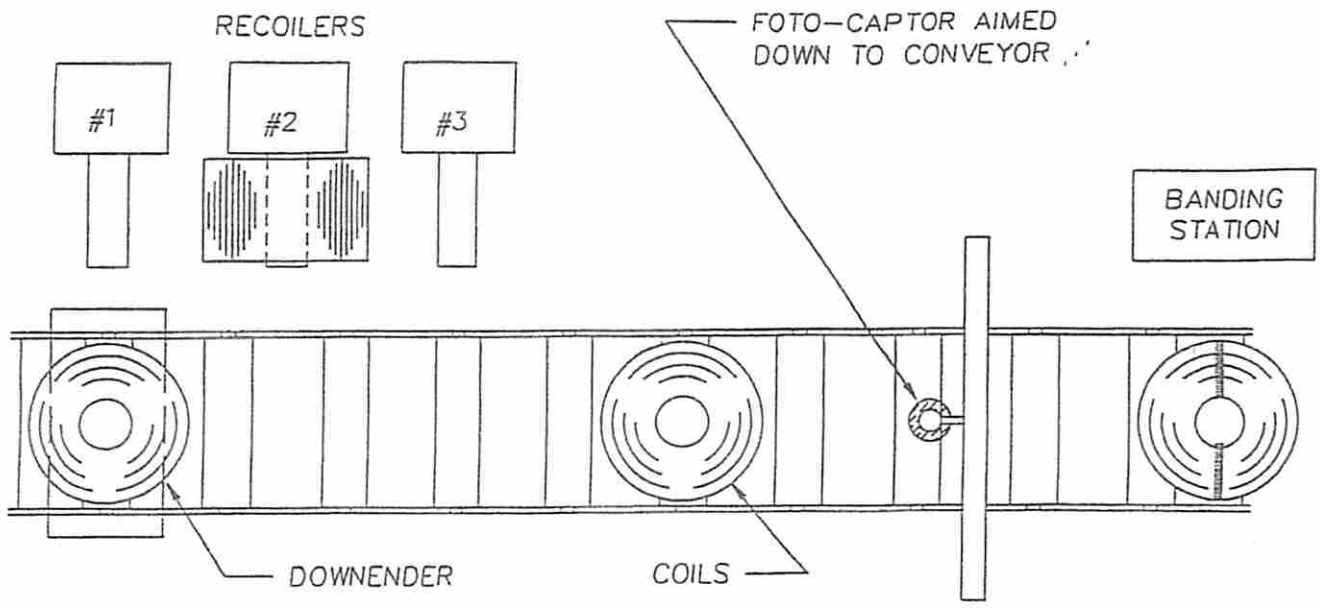


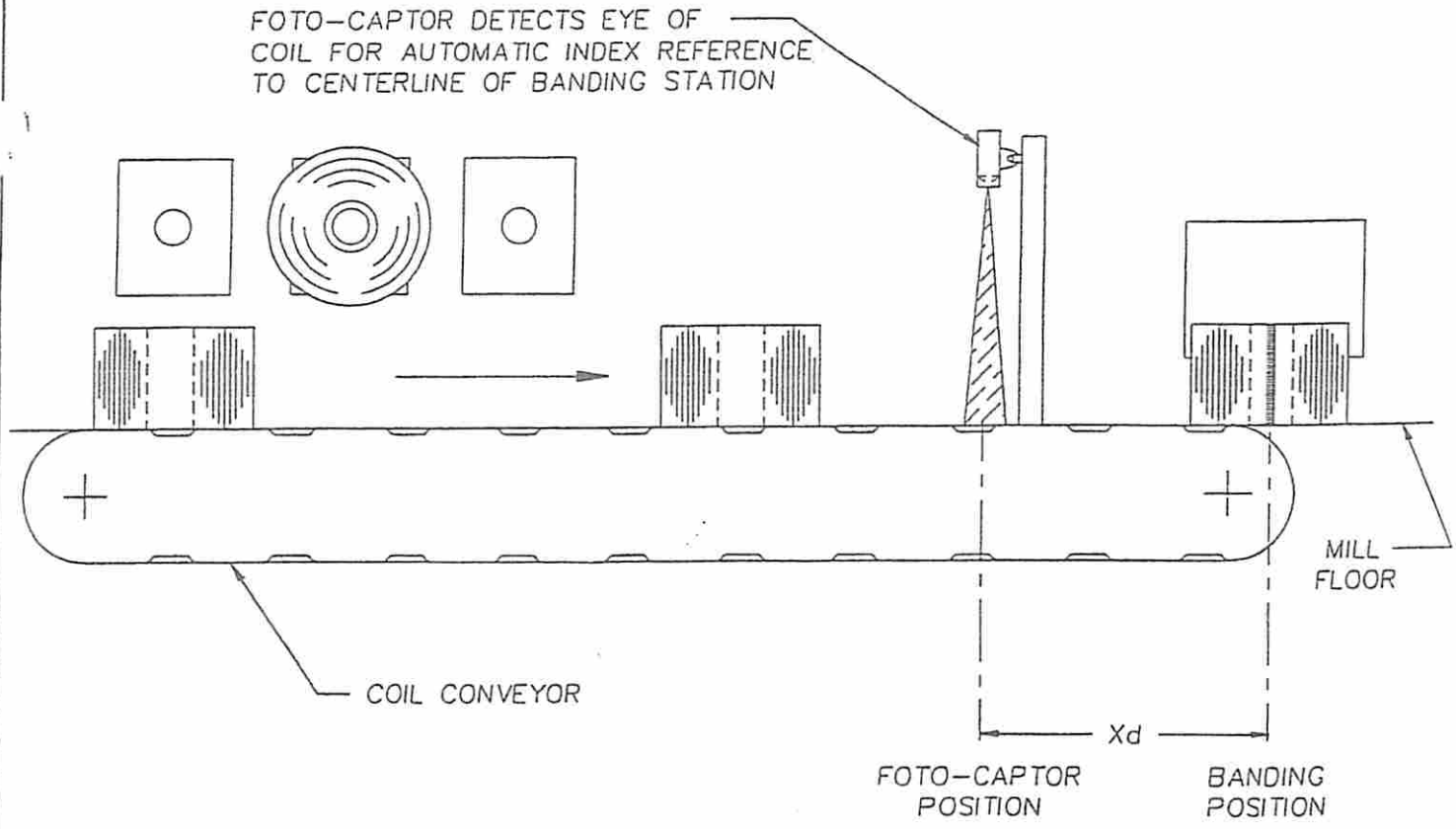
TYPICAL REMOTE LENS MOUNTING WITH REMOTE CONTROLLER IN NEMA 12 ENCLOSURE

CAUTION: FIBER OPTIC CABLE COVERING IS CONDUCTIVE. DO NOT ROUTE NEAR EXPOSED TERMINALS.

DRAWN BY: CHIP DATE 09/04/90	REV	DESCRIPTION	BY	DATE	TITLE: TYPICAL REMOTE LENS INSTALLATION
CHECKED BY:					
PAGE 1 OF 1 SCALE NONE					
DWG. No.: 003-16					

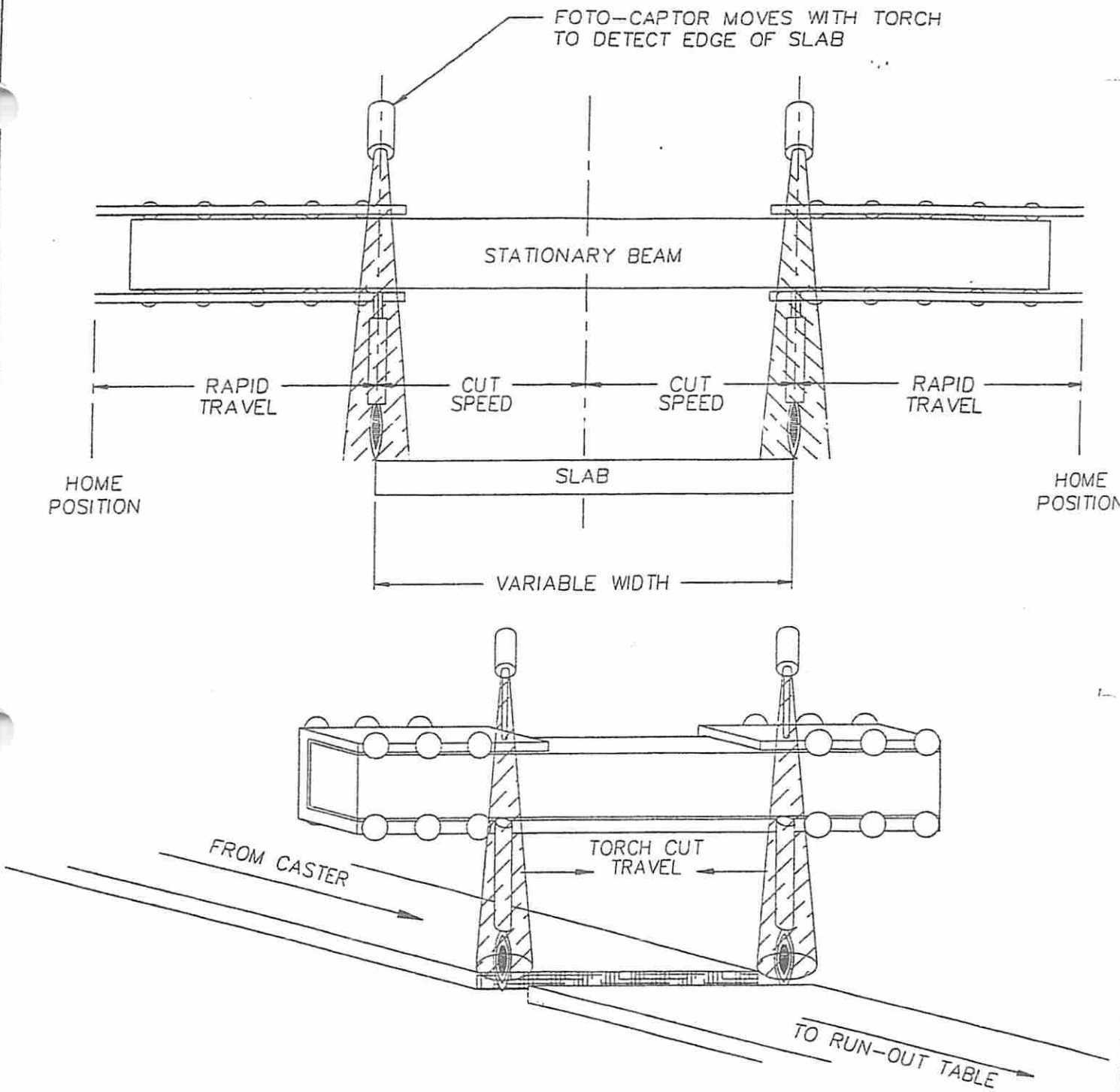
weber sensors inc.
P.O. BOX 203, N. LIMA, OH 444
(216)-549-5746
STATE-OF-THE-ART captor





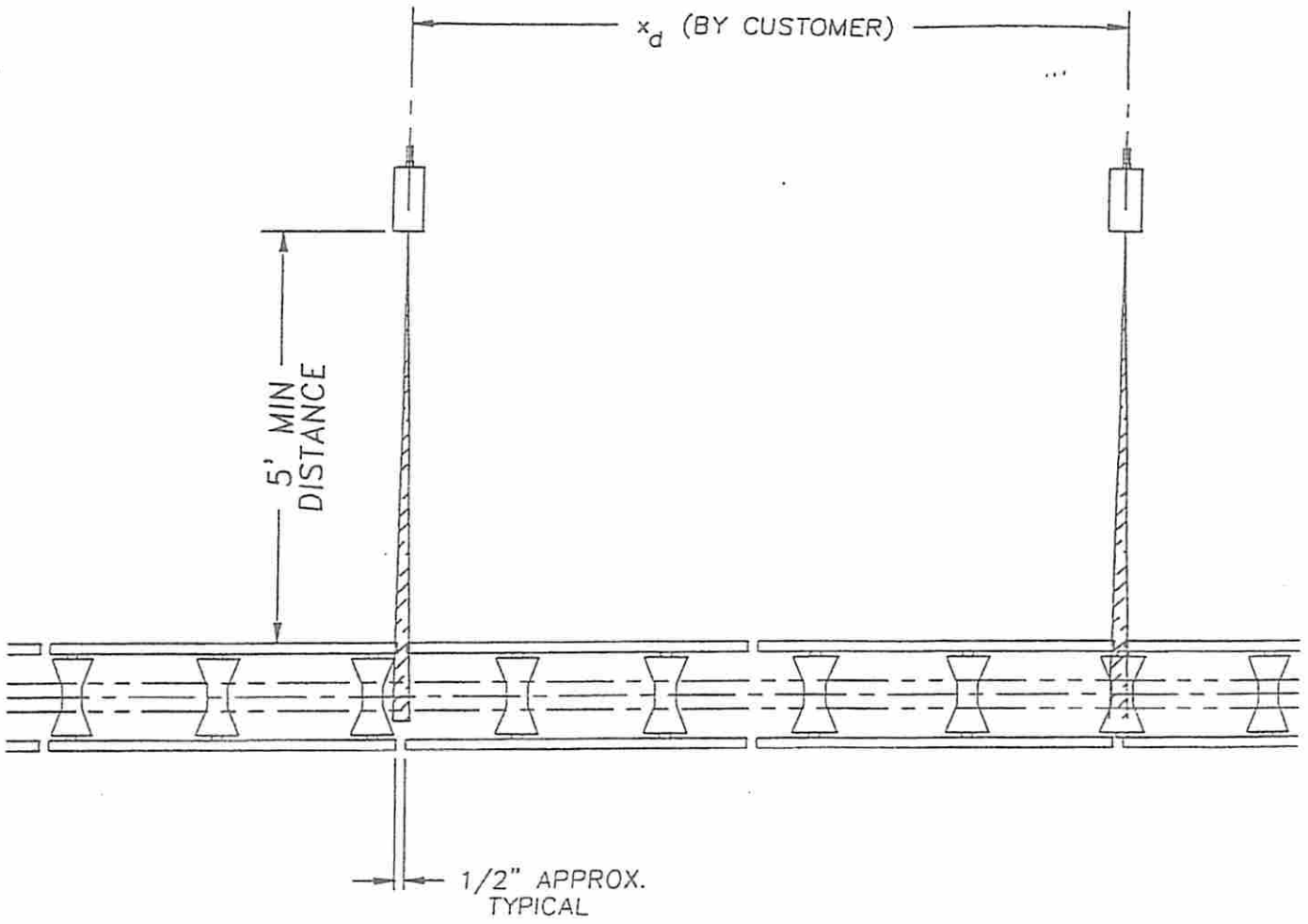
ALL DIMENSIONS IN MM

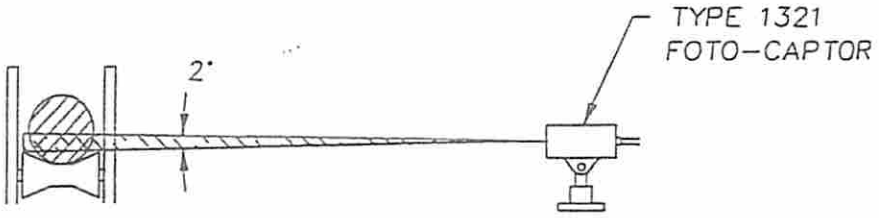
WN BY: CHIP DATE 10/11/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH 44452 (216)-549-5746 STATE-OF-THE-ART captor
ECKED BY:					COIL BANDER APPLICATION	
PAGE 1 OF 1 SCALE NONE						
DWG. No.: 003-17						



TORCHES HAVE RADID TRAVEL TO WITHIN 1" OF THE SLAB, WHICH IS DETECTED BY THE FOTO–CAPTORS AND CAUSES TORCHES TO SLOW TO "CUT" SPEED

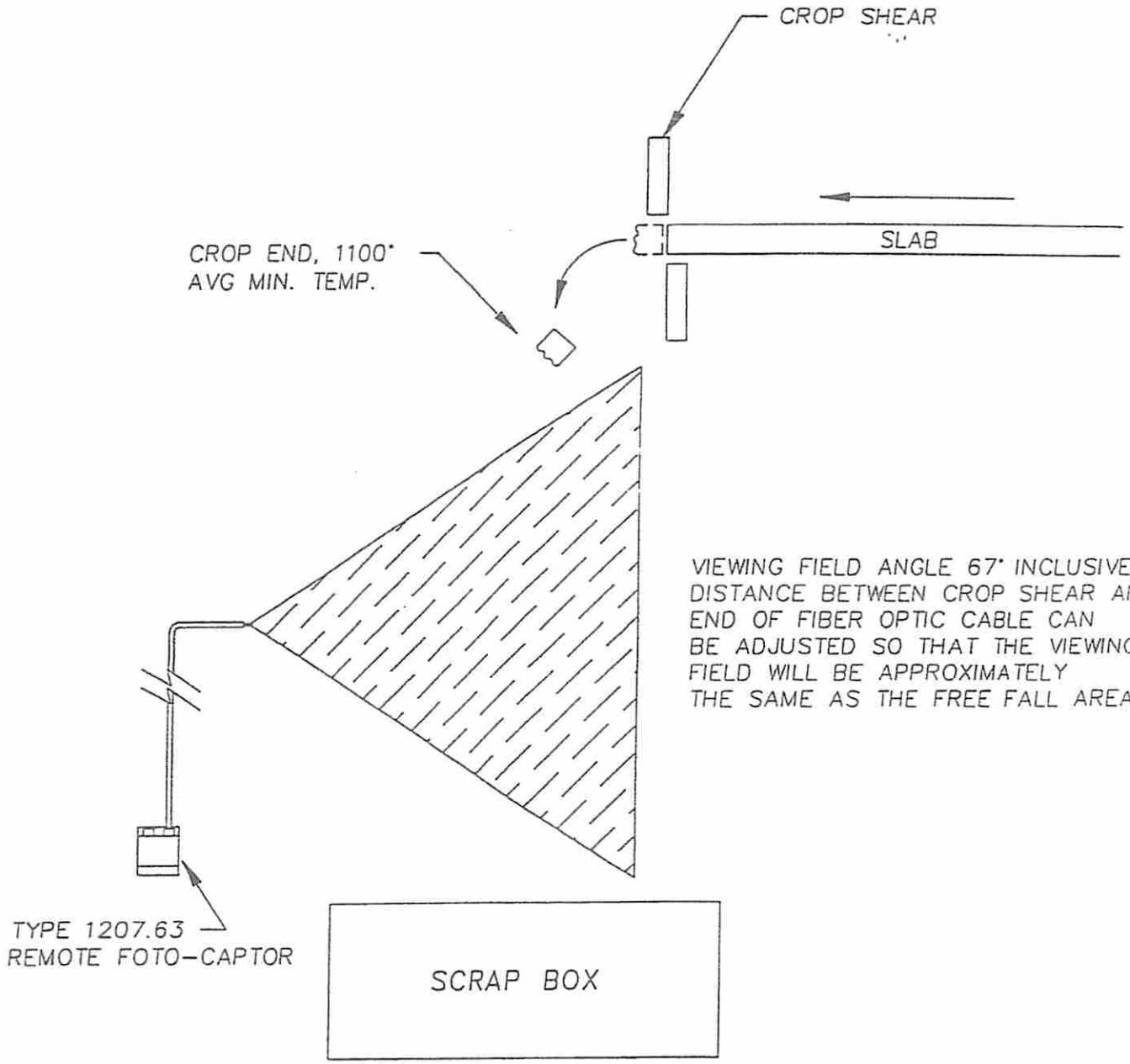
DRAWN BY: CHIP DATE 10/15/90	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc.
CHECKED BY:					AUTOMATIC SLAB EDGE DETECTION	P.O. BOX 203, N. LIMA, OH 4
PAGE 1 OF 1 SCALE NONE						(216)–549–5746
DWG. No.: 003–18						STATE–OF–THE–ART captor





FRONT VIEW

DRAWN BY: CHIP DATE 03/30/92	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH 44452 (216)-549-5746 ENGINEERED SOLUTIONS captor
CHECKED BY:					FOTO-CAPTOR BAR TRACKING APPLICATION THRU SLOT	
PAGE 1 OF 1 SCALE NONE						
DWG. No.: 003-19						

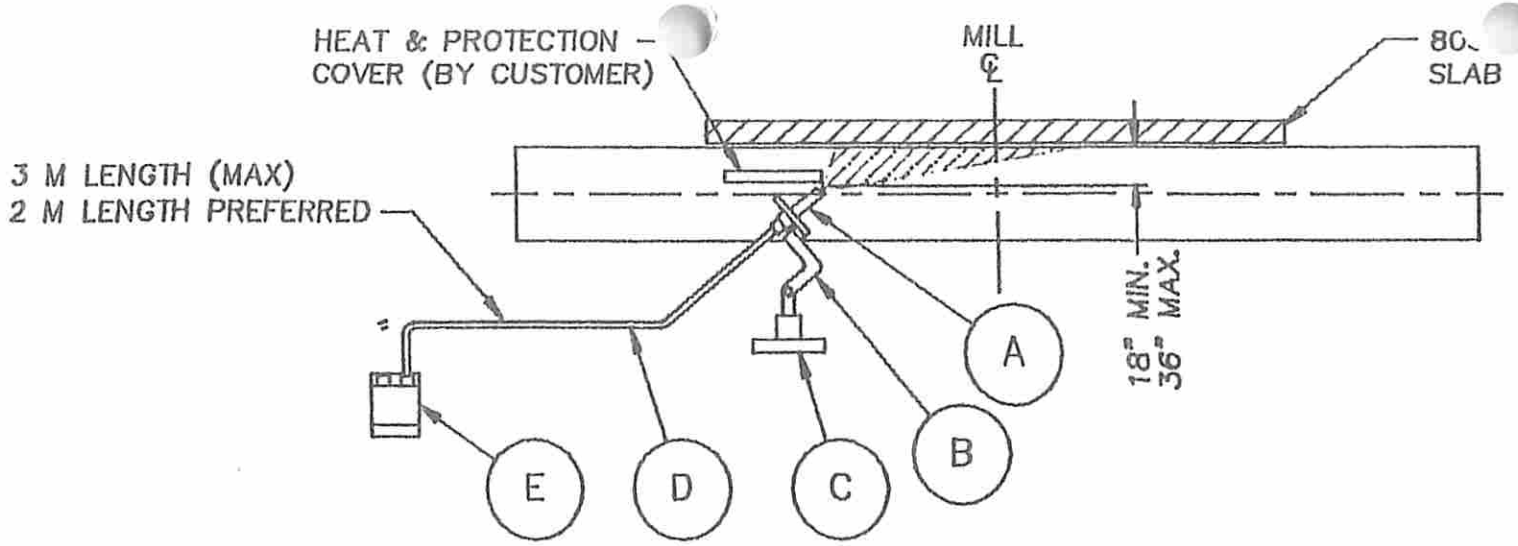


VIEWING FIELD ANGLE 67° INCLUSIVE. DISTANCE BETWEEN CROP SHEAR AND END OF FIBER OPTIC CABLE CAN BE ADJUSTED SO THAT THE VIEWING FIELD WILL BE APPROXIMATELY THE SAME AS THE FREE FALL AREA

APPLICATION: DETECT CROP END IN FREE FALL MODE TO CONFIRM CROP CUT IS MADE.

DRAWN BY: CHIP DATE 04/01/92	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors inc. P.O. BOX 203, N. LIMA, OH (216)-549-5746 ENGINEERED SOLUTIONS captor
CHECKED BY:					CROP SHEAR DROP OFF APPLICATION USING REMOTE UNIT W/ FIBER OPTIC CABLE	
PAGE 1 OF 1 SCALE NONE						
DWG. No.: 003-20						

1



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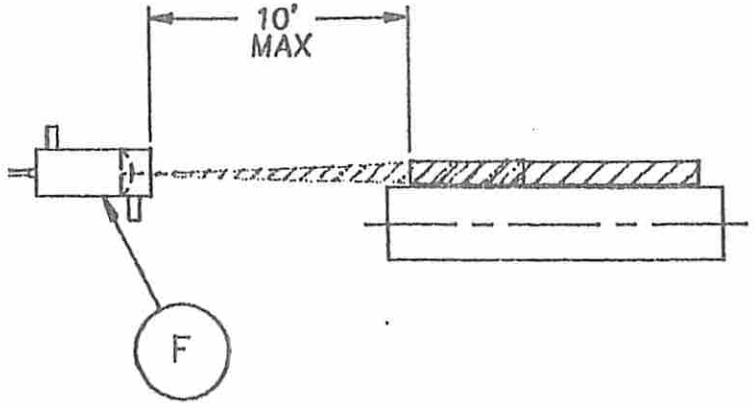

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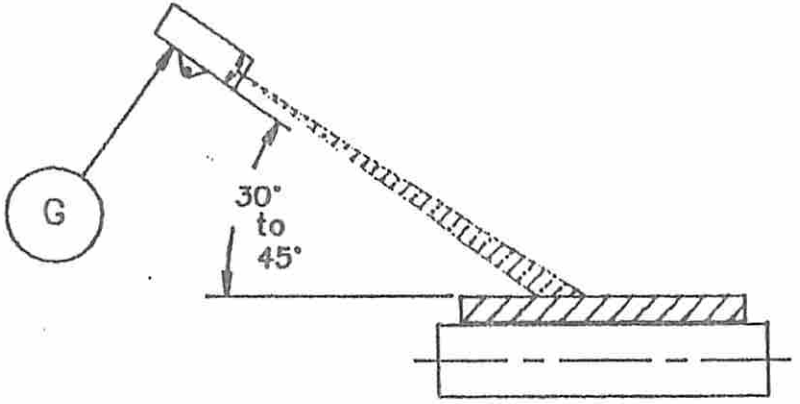


ITEM	DESCRIPTION	DWG No.
A	QUARTZ ROD ASSEMBLY	1-009
B	STAND ADAPTER	1-010
C	SWIVEL STAND	1-002
D	FIBER OPTIC CABLE	1-015
E	TYPE 1207.-- FOTO-CAPTOR	1-005
F	TYPE 1222.-- FOTO-CAPTOR	1-003
G	TYPE 1221.-- FOTO-CAPTOR	1-001

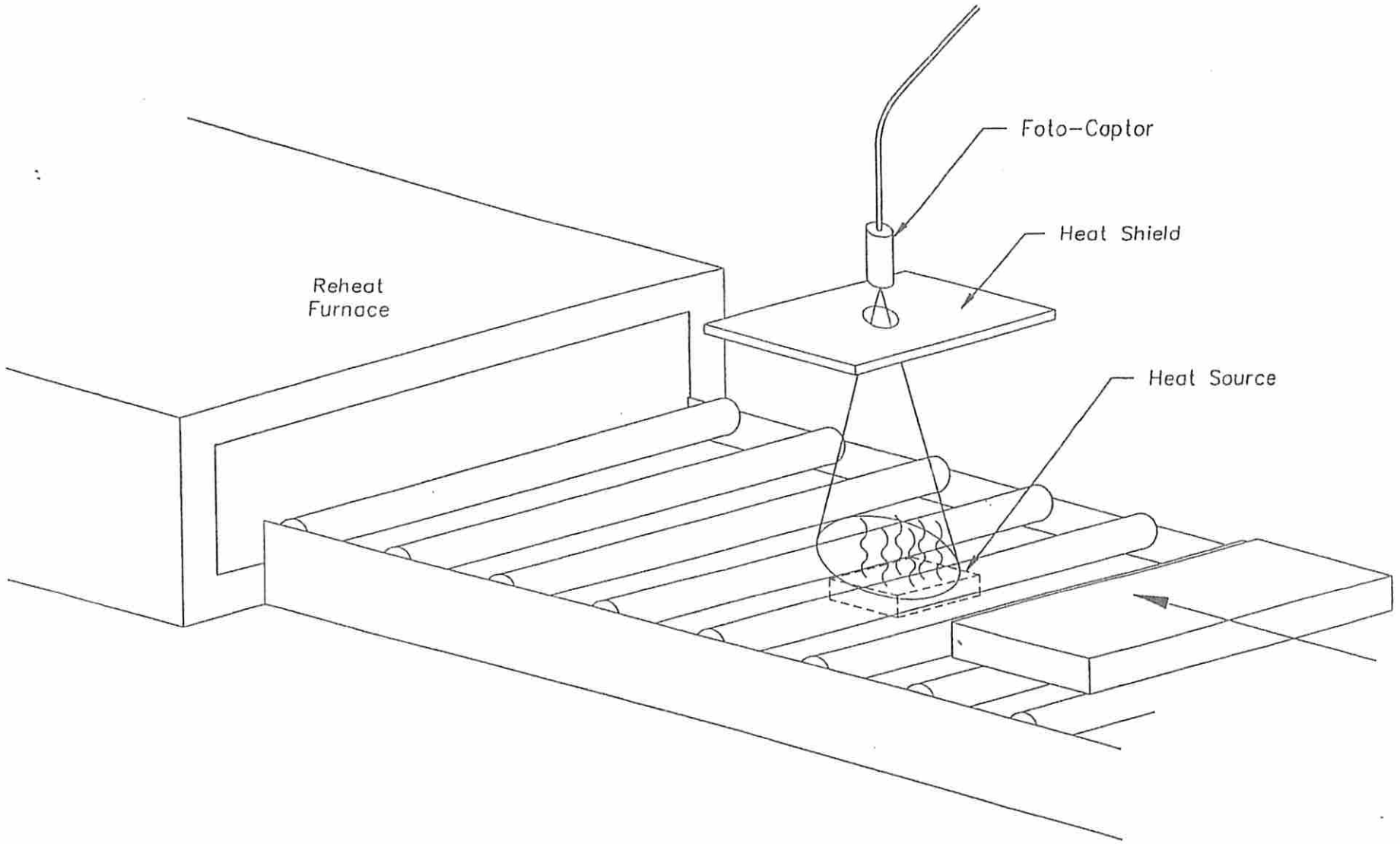
DRAWN BY: CHIP DATE 04/03/92
CHECKED BY:
PAGE 1 OF 1 SCALE NONE
DWG. No.: 003-21

REV	DESCRIPTION	BY	DATE

TITLE

FOTO-CAPTOR
SLAB DETECTION
OPTIONS

weber sensors inc.
P.O. BOX 203, N. LIMA, OH 44452
(216)-549-5746
ENGINEERED SOLUTIONS
captor



DRAWN BY: CHIP DATE 03/29/93	REV	DESCRIPTION	BY	DATE	TITLE	weber sensors Inc.
CHECKED BY:					FOTO-CAPTOR/ HEAT SOURCE COMBINATION FOR DETECTING COLD LAB	P.O. BOX 599, N. LIMA, OH 44452
PAGE 1 OF 1 SCALE None						(216)-549-5746
DWG. No.: 003-22						ENGINEERED SOLUTIONS captor